



SERVICE TO MANKIND IS SERVICE TO GOD

His Divine Soul Padmabhushana Sri Sri Sri Dr. Balagangadharanath MahaSwamiji Founder President, Sri Adichunchanagiri Shikshana Trust®



Belief in God is not ignorance or illusion. It is a belief that there is an unseen, ineffable Power that transcends all our powers of muscles, mind and lives.



His Holiness Parama Pujya Sri Sri Sri Dr. Nirmalanandanatha MahaSwamiji President, Sri Adichunchanagiri Shikshana Trust ®

True richness is the generosity of heart. Cultivate it and work to help the less fortunate ones in life.

Revered Sri Sri Dr. Prakashanatha Swamiji Managing Director, BGS & SJB Group of Institutions & Hospitals



People and prosperity follow the path which the leaders take. So the elders and leaders should make sure that they give the right lead and take the right path.



||Jai Sri Gurudev|| Sri Adichunchanagiri Shikshana Trust (R)

SJB INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under Visvesvaraya Technological University, Belagavi) Approved by AICTE, New Delhi, Recognized by UGC, New Delhi with 2 (f) & 12 (B) Accredited by NAAC with 'A+' Grade. No. 67, BGS Health & Education City, Dr. Vishnuvardhan Road, Kengeri, Bengaluru-560060. DEPARTMENT OF ARTIFICIAL INTELLIGENCE & MACHINE LEARNING





Institution Vision:

To become a recognized technical education center with a global perspective.

Institution Mission:

To provide learning opportunities that foster students' ethical values, intelligent development in science technology and social responsibility so that they become sensible and contributing members of society

Department Vision:

To gain global acclaim by fostering excellence in education, research, and innovation, thereby creating leaders who influence society through technology.

Department Mission:

M1: Foster a comprehensive understanding of both the theory and application of Artificial Intelligence and Machine Learning.

M2: Establish a conducive learning environment that nurtures globally competitive skills.

M3: Nurture innovation and ethics, preparing students as responsible societal members.



2023 Schem	e – UG
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Syllabus for 3rd & 4th Semester

The syllabus, scheme and guidelines are provided in detail.

The syllabus, scheme and guidelines are subjected to changes if any needed. The updates will be done timely.

Regularly access the institution website for the updated information.

The Syllabus book is available on	www.sjbit.edu.in
F	and amind an Oribit advin

For any queries, please write toacademicdean@sjbit.edu.in

UPDATES

Release / Revision	Date	Remarks
Release	03/09/2024	First release



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Department of Artificial Intelligence & Machine Learning

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Autonomous Scheme of Teaching & Examinations (ST&E) (Tentative) UG - BE 2nd Year Dept: AI & ML

S	CHE	ME:	2023	SEM: III			Revis	sion	date	:	23-Aug-2024							
		e			pt.	ept		Te	eaching	g Hrs/\	Week		Exa	aminat	ions			
<i>a</i> "	Course	e typ ies		C TH	g De	l b gr	dits	L	Т	Р	0	rks	SEI	E (Dur	. & Ma	arks)		
S. #	Туре	Course	Cours	Course Code	Course Title	Teachi	QP settii	Cree	Lecture	Tutorial	Practical	PBL/ABL / SL/etc.	CIE Ma	Dur.	Th.	Lab	Tot.	
1	IBSC	3	23AII301	Discrete Mathematics and Graph Theory	Maths	Maths	4	2	2	2	@	50	03	50	-	100		
2	PCC	1	23AIT302	Data Structures with Application	AI & ML	AI & ML	3	2	2	0		50	03	50	-	100		
3	IPCC	1	23AII303	Logic Design & Computer Organization	AI & ML	AI & ML	4	3	0	2		50	03	50	-	100		
4	IPCC	2	23AII304	Database Management Systems	AI & ML	AI & ML	4	3	0	2	@	50	03	50	-	100		
5	PCCL	1	23AIL305	Data Structures Lab	AI & ML	AI & ML	1	0	0	2	@	50	03	-	50	100		
6	ETC	1	23AIE31y	Emerging Technology Course - 1	AI & ML	AI & ML	3	3	0	0	@	50	03	50	-	100		
7	AEC	3	23AIAE31	Data Visualization and Analysis with Power BI	I.E.	I.E.	1	1	0	0	3	50	02	50	-	100		
8	NCMC	3	23PDSN03	Skilful Futures : Empowering Aptitude and Soft skills	I.E.	I.E.	PP/NP	0	0	0	2	50	-	-	-	50		
			23PASN01	Physical Education - Sports and Athletics	PED	PED												
			23YOGN02	Yoga	PED	PED												
9	NCMC	4	23NSSN03	NSS - National Service Scheme	NSS	NSS	PP/NP	-	-	-	2	50	-	-	-	50		
			23NCCN04	NCC - National Cadet Corps	NCC	NCC												
					23IKSN05	Indian Knowledge System	HSS	HSS										
						Total	20	14	4	8	7	450		300	50	800		

BSC: Basic Science Course; PCC: Professional Course; IPCC: Integrated Professional Core Course; PCCL: Professional Core Course Laboratory; AEC: Ability Enhancement Course; {I.E.-Industry Experts};

 $\{ (a) - Compulsory one activity \}.$

PBL: project Based learning; ABL: Activity Based Learning; SL: Self-Learning

ETC (Emerging Technology Course):

For ETC (L:T:P:O) can be plaanned by the depts considering practicality & possibility of conduction, same shall be indicated along with course title in the list, if altered than above. If planned altering the prescription, the same shall be approved at the department BOS & authorities. Atleast one activity is mandatory during the delivery of the course. The guidelines is applicable to all the semesters III to VI semesters (ETC-1 to ETC-4).

NCMC (Non Credit Mandatory Course): The following guidelines are applicable for the course type series-4 as mentioned above.

1) All students must register for any one of the course with the department during the first week of the III semester.

2) Once registered for a course in the III semester, the student shall continue and complete the same course in the remaining semesters. No provision for changing the courses after registration.

3) Activities shall be carried out by the students between III semester to VI semester (for 4 semesters).

4) The activities shall be organized, executed and monitored by the concerned department as mentioned above in coordination with the department level course coordinators. The same shall be reflected in the calendar of events of the above concerned departments.

5) Successful completion of the registered course and requisite CIE score (PP) is mandatory for the award of degree.

6) These courses are not considered for vertical progression, calculation of SGPA & CGPA, however it is mandatory for the award of degree.

7) The guidelines is applicable to all the remaining IV to VI semesters.

Additional courses for Lateral Entry students:

1) The lateral entry students getting admitted from the 2nd year of programme, shall register, study and complete additional courses prescribed & offered time to time.

2) Successful completion of the registered course and requisite CIE score (PP) is mandatory for the award of degree.

3) These courses are not considered for vertical progression, calculation of SGPA & CGPA, however it is mandatory for the award of degree.

Self-Learning Courses (SLC) as per the VIII Semester ST&E:

1) Offering and Registration of Self-learning Courses will commence from 3rd Semester itself and continues till the end of the duration of study.

2) Both regular & lateral entry students shall start registering for the self learning courses and complete as per the guidelines published separately. (Refer to the Self Learning Courses guidelines published).

3) These courses are not considered for vertical progression.

4) Calculation of SGPA & CGPA is considered for VIII Semester, irrespective of period or time of completion of the course.

	Emerging Technology Course - 1								
Course Code	Course Title								
23AIE311	Object Oriented Programming with Java								
23AIE312	Python for Data Science								
23AIE313	Introduction to Big Data Analytics								
23AIE314	Introduction To Cyber Security								

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AUTONOMOUS SCHEME (Tentative) UG - BE 2nd Year 2024

SCHEME: 2023

Date of release: 29/06/2024

SEM: III

Additional courses for Lateral Entry students

Note:

1) For the fulillment of successful completion of degree, lateral entry students, shall study & complete additional courses as per the guidelines released time to time.

2) Regular courses (SL No 1 to 8) are same as applicable to all defined in the scheme of teaching & examinations (ST&E).

3) The below prescribed courses has to be registered whenever they are offered and successfully completed before the end of Seventh Semester End Examinations.

		unt			bt t		bt .	Teaching Hrs/Week				Examinations				
SL	Course	e Co			(Dep	ləp Bı	its	L	Т	Р	S	ks		SEE		ks
No	Туре	Course typ	Course Code	e Course Litle	Teaching	QP settin	Cred	Lecture	Tutorial	Practical	PBL/ABL/ SL/othrs.	CIE Marl	Dur.	Th. Mrks	Lab. Mrks.	Tot. Marl
For (CS strean	ı (CSF	E/ISE/AIML/C	CSE(DS))												
9	BSC	-	23MAT31A	Additional mathematics-1	Maths	Maths	PP/NP	2	0	0	@	50	-	-	-	50
For I	EE strean	n (ECl	E & EEE)													
9	BSC	-	23MAT31B	Additional mathematics-1	Maths	Maths	PP/NP	2	0	0	@	50	-	-	-	50
For (CV strear	n (Civ	il)						-	-						
9	BSC	-	23MAT31C	Additional mathematics-1	Maths	Maths	PP/NP	2	0	0	@	50	-	-	-	50
For N	ME strea	m (Me	echanical)	· · · · · · · · · · · · · · · · · · ·												
9	BSC	-	23MAT31D	Additional mathematics-1	Maths	Maths	PP/NP	2	0	0	@	50	-	-	-	50







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Self Learning course list for UG BE Dept:AI & ML

	SCHEME :	2023	Re	lease date:	22-N	lay-2023			
	Self-Learning course - 1 (NPTE	L)	Self-Learning course - 2 (NPTEL)						
Course Code	Course Title	NPTEL Code	Course Code	Course Title		Course Title		NPTEL Code	
23AIS101	Artificial Intelligence : Search Methods For Problem Solving	106106226	23AIS201 Artificial Intelligence: Knowledge Representation and Reasoning			106106140			
23AIS102	Learning Analytics Tools	106101224	23AIS202	Deep Learning for Com	Deep Learning for Computer Vision				
23AIS103	Games and Information	106101360	23AIS203	Affective Computing		Affective Computing		106106244	
23AIS104	Linear programming and its applications to computer science	106104356	23AIS204	Artificial Intelligence: K Representation and Reas	106106140				
23AIS105	AI: Constraint Satisfaction	106106158	23AIS205	Games and Information		106101360			
23AIS106	Advanced R Programming for Data Analytics in Business	noc24-mg113	23AIS206	Algorithmic Game Theo	ry	noc24-cs109			
23AIS107	Computer Architecture	noc24-cs83	23AIS207	Distributed Optimization Learning	and Machine	noc24-cs86			
23AIS108	Matrix Computation and its Applications	noc24-ma88	23AIS208	Practical Cyber Security Security Practitioners	noc24-cs85				
23AIS109	Software Testing	noc24-cs91	23AIS209	Responsible & Safe AI S	noc24-cs132				
23AIS110	Probability Theory for Data Science	noc24-ma64	23AIS210	Advanced Distributed S	ystems	noc24-cs99			



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Guidelines for Self-learning courses – Under Graduation (UG)

- As per the Scheme of Teaching & Examinations (ST&E) the UG students to earn totally 06 credits by studying and completing 02 NPTEL/SWAYAM courses of 12 weeks each earning 03 credits.
- The credits so earned by successful completion of the courses will be credited in the 8th SEM grade card.
- The successful completion of the courses means earning of the course completion certificates from NPTEL/SWAYAM.
- 4) The courses shall be studied and completed starting from 3rd Semester and shall be completed before the announcement of 8th Semester End Examinations. However, it is advised to complete both the courses before the 7th SEM of their graduation.
- 5) The respective department BOS shall identify the professional courses related to the respective discipline either core or multidisciplinary from the list of courses released by NPTEL/SWAYAM every season. At least ten such courses shall be identified and finalized after the discussions in the respective BOS meetings, and the list shall be approved by the Academic Dean.
- 6) The approved list shall be published by the departments to the students at the beginning of the 3rd SEM itself and the student shall be given an option to choose up to 02 courses for the study and earn certificates of completion.
- 7) The practicing of studying and completion of NPTEL/SWAYAM courses starting from 3rd SEM itself has multi-fold effect:
 - i) Enhances the self-learning ability of the students.
 - ii) Study of self-learning courses will have impact on the learning of other courses in the scheme of teaching & examinations.
 - iii) Will address the real time challenges/difficulties/differences in the calendars of NPTEL/SWAYAM & Institution.
- 8) The respective departments shall make holistic efforts to bring awareness to the students about the objectives and importance of self-learning courses. The departments shall thrive towards fulfilment of the objectives.
- 9) The departments shall continuously monitor & track the progress of the accomplishment of the courses by the students.
- 10) The departments shall assign course mentors as per the guidelines of the NPTEL/SWAYAM.

- The departments shall take care that the registered courses and the examinations shall be under the local chapter of the Institution.
- 12) Every care must be taken by the departments to guide, motivate, to help the students in completing the courses as the academic calendar of the institution and the calendar of the NPTEL/SWAYAM does not match. The faculty advisory system or Mentor System must play a significant role.
- 13) Every season new courses may be added to the identified list and a fresh list of courses shall be prepared based on the list announced by the NPTEL/SWAYAM every season. However, the courses published from the first list shall be maintained if the NPTEL/SWAYAM list has the courses.
- 14) If the students are unable to successfully complete the course, they shall be given an option to re-register for the same course multiple times if the courses are available during the respective seasons in NPTEL/SWAYAM list.
- 15) An option for making fresh choice shall be given to the students until the successful completion of the courses and earning of required number of credits within the defined time.
- 16) The list of students registered for the courses and completion of the courses shall be submitted to the dean office on completion of every season.
- 17) All the regulations such as "Dropping of courses", "Withdrawal of Courses", etc. as described in the academic regulations shall be applicable to the Self Learning Courses (SLC).
- 18) The performance of the students in the assignments and the certification exam of the NPTEL/SWAYAM shall be considered for awarding the grade points to the students in the selflearning courses.
- 19) If the students are successfully completing more than the prescribed number of courses in their period of study, best performed courses (group wise) may be considered for the award of credits.
- 20) The CIE & SEE marks as prescribed in the Scheme of Teaching & Examinations (ST&E) shall be considered as per the performance of the student in the successfully completed NPTEL/SWAYAM course. The obtained assignment marks in the successfully completed NPTEL/SWAYAM course shall be mapped to the CIE and obtained exam certification percentage in the successfully completed NPTEL/SWAYAM course shall be mapped for SEE marks.
- 21) The students unable to complete the self-learning courses and earn the required credits will not be awarded the degree. Degree shall be awarded only after successful completion and earning of credits.

Academic Dr. Babu N V

Dr. K V Mahendra Prashanth



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Autonomous Scheme of Teaching & Examinations (ST&E) (Tentative) UG - BE 2nd Year Dept: AI & ML

S	SCHE	ME:	2023	SEM: IV]	Revis	ion	dat	e:	23-	-Aug-2024					
		e			pt.	ept		Те	eaching	g Hrs/\	Week		Exa	aminat	ions		
G //	Course	e typ ies			g De	ng d	dits	L	Т	Р	0	rks	SEI	E (Dur	. & Ma	urks)	
5. #	Туре	Cours Ser	Course Code	Course 1 the	Teachi QP sett		Cre	Lecture	Tutorial	Practical	PBL/ABL / SL/etc.	CIE Ma	Dur.	Th.	Lab	Tot.	
1	BSC	4	23AIT401	Probability Distributions and Statistical Methods	Maths	Maths	3	2	2	0	@	50	03	50	-	100	
2	PCC	2	23AIT402	Analysis & Design of Algorithms	AI & ML	AI & ML	3	3	0	0		50	03	50	-	100	
3	IPCC	3	23AII403	Introduction to Artificial Intelligence	AI & ML	AI & ML	4	3	0	2		50	03	50	-	100	
4	IPCC	4	23AII404	Operating Systems	AI & ML	AI & ML	4	3	0	2		50	03	50	-	100	
5	PCCL	2	23AIL405	Analysis & Design of Algorithms Lab	AI & ML	AI & ML	1	0	0	2	@	50	03	-	50	100	
6	ETC	2	23AIE42y	Emerging Technology Course - 2	AI & ML	AI & ML	3	3	0	0	@	50	03	50	-	100	
7	HSMC	5	23SFHH06/ 23UHVH07	Bioscience or UHV-Universal Human Values	any dept	any dept	1	0	2	0	@	50	02	50	-	100	
8	AEC	4	23AIAE41	Azer AI	I.E.	I.E.	1	1	0	0	3	50	02	50	-	100	
9	NCMC	5	23PDSN04	Mindful Mastery: Aptitude and soft skill integration	I.E.	I.E.	PP/NP	0	0	0	2	50	-	-	-	50	
			23PASN01	Physical Education - Sports and Athletics	PED	PED											
			23YOGN02	Yoga	PED	PED											
10	NCMC	4	23NSSN03	NSS - National Service Scheme	NSS	NSS	PP/NP	-	-	-	2	50	-	-	-	50	
			23NCCN04	NCC - National Cadet Corps	NCC	NCC											
			23IKSN05	Indian Knowledge System	HSS	HSS											
				Total			20	15	4	6	7	500		350	50	900	

BSC: Basic Science Course; PCC: Professional Course; IPCC: Integrated Professional Core Course; PCCL: Professional Core Course Laboratory; AEC: Ability Enhancement Course; HSMC: Humanities, Social Sciences & Management Course; NCMC: Non Credit Mandatory Course;

{@ - Compulsory one activity during the semester}

{I.E.-Industry Experts}.

PBL: project Based learning; ABL: Activity Based Learning; SL: Self-Learning

ETC (Emerging Technology Course):

For ETC (L:T:P:O) can be plaanned by the depts considering practicality & possibility of conduction, same shall be indicated along with course title in the list, if altered than above. If planned altering the prescription, the same shall be approved at the department BOS & authorities. Atleast one activity is mandatory during the delivery of the course. The guidelines is applicable to all the semesters III to VI semesters (ETC-1 to ETC-4).

Bioscience & UHV-Universal Human Values:

1) Any one of the course will be offered by the departments in each semester of IV & VI based on the institutional planning.

2) Both the courses shall be studied and completed by the students registering each in the two semesters. For example, if Bioscience is offered in the IV semester, UHV-Universal Human Values is offered in the V semester.

NCMC (Non Credit Mandatory Course) for course type series-4: Refer to guidelines in III SEM.

	Emerging Technology Course - 2									
Course Code	Course Title									
23AIE421	Advanced Java & J2EE									
23AIE422	Introduction to Tensorflow									
23AIE423	Business Intelligence									
23AIE424	Blockchain Technology									



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III SEM Syllabus (2023 Scheme)





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Department of Mathematics

Semester:	III		Course Type:	IBSC						
Course Title: Discrete Mathematics and Graph Theory										
Course Code	:	23AII	301		Credits:	4				
Teaching Ho	urs/W	eek (L	:T:P:O)	2:2:2:@	Total Hours:	40+(10	-12 lab slots)			
CIE Marks:		50	SEE Marks:	50	Total Marks:	: 100				
SEE Type:		Theor	y	·	Exam Hours:	3				
I. Course Objectives:										
 Provide theoretical foundations of computer science to perceive other courses in the programme. Illustrate applications of discrete structures: logic, relations, functions and graphs. Describe different mathematical counting techniques. II. Teaching-Learning Process (General Instructions): In addition to the traditional lecture method, innovative teaching methods shall be adopted. State the need for Mathematics with Engineering Studies and Provide real-life examples. Grading assignments and quizzes and documenting student's progress. Encourage the students for group learning to improve their creative and analytical skills. 										
Module-1: F	undam	entals	of Logic				8Hrs			
Fundamenta The Laws o Quantifiers-T Applications * Application Textbook 2:0 Self Learning	Fundamentals of Logic: Propositions- Logical connectives, Tautologies, contradictions. Logical equivalence- The Laws of Logic, inverse, converse and contra positive. Logical Implication – Rules of Inference, Quantifiers- Types and uses of quantifiers. Applications to verify the algorithm using Mathematical logic. * Application problems to be excluded for SEE. Textbook 2:Chapter 1(1.1, 1.2, 1.3, 1.5). Self Learning: Applications to switching Networks.									
RBT Levels:	L1, L2	and L	3							
Module-2: P	rincipl	es of co	ounting				8Hrs			
 Well ordering principle and Mathematical Induction. Fundamental Principles of Counting: The Rules of Sum and Product, Permutations, Combinations – The Binomial Theorem, Combinations with Repetition. Applications to design algorithms. * Application problems to be excluded for SEE. 										

Textbook 1: Chapter 4(4.1), Chapter 1(1.1 to 1.4).								
Self Learning: The Catalan Numbers. RBT Levels: L1, L2 and L3								
Module-3: Relations and Functions	8Hrs							
Relations and Functions: Cartesian products and Relations, Functions – plain and one-to-one, onto functions. Function Composition and Inverse functions(without proof). Relations:								
Properties of Relations, Computer Recognition – Zero-one matrices and Directed graphs, Partial orders – Hasse diagrams, Equivalence relations and Partitions. Applications to map inputs to outputs in algorithms and represent the relation between the nodes.								
* Application problems to be excluded for SEE. Textbook 1: Chapter 5.1, 5.2, 5.6 Self Learning: Sterling numbers of second kind, Pigeonhole principle, Topological S	orting.							
RBT Levels: L1, L2 and L3								
Module-4: Fundamentals of Graph Theory								
Introduction to Graph Theory: Definitions and Examples, Sub graphs, Complement Isomorphism. Vertex degree: Euler trails and circuits, planar graphs .Graph coloring a polynomials. Illustrative examples on Traveling salesman problem.	ts and Graph nd chromatic							
* Illustrative examples to be excluded for SEE.								
Solf Learning: Hamiltonian paths and cycles								
PRT L evels: 1.1.1.2 and 1.3								
Module-5: Trees and Connectivity	8Hrs							
Trees – properties, pendant vertex, Distance and centers in a tree - Rooted and binary counting trees, traversals, spanning trees. Connectivity Graphs: Vertex Connectivity, Edge Connectivity, Cut set and Cut Vertic separability, Menger's Theorem, Fundamental circuits. Application to organizing and searching data. * Application problems to be excluded for SEE.	trees, es,							
Textbook 3: Chapter 3.1 to 3.8, 4.1 to 4.5.								
RBT Levels: L1, L2 and L3								

III(b) Practical Part Using python/MATLAB software, demonstrate the operation of the following.															
Sl. No.		10 1012 1		, 5010	mare,	ueine	11501	Exp	erim	ents			-111 <u>B</u> .		
1	Р	rograi	n on l	ogica	l con	nectiv	es (A	AND,	OR, N	JOT, J	KOR).				
2	C	heck	wheth	er the	e give	n prop	osit	ion is	a taut	ology	or not	•			
3	C	ompu	te the	sum	of fir	st n oc	ld nu	mber	s usin	g math	nemati	cal in	ductio	n.	
4	Calculation of Permutation and combination.														
5	In (1	Implement functions to check whether a given function is one-to-one and onto (Example: $f(x)=x^2$).													
6	C	Check whether the relation is equivalence or not.													
7	Ir aj	Implement the Fibonacci sequence using both an iterative approach and a recursive approach.													
8	P [1 R	Program to verify a given relation forms a partial order or not. [Example: elements = $[1, 2, 3, 4]$, Relation = $[(1, 1), (1, 2), (2, 2), (2, 3), (3, 3), (3, 4), (4, 4)]$].													
9	P tł	rograi ne san	n on a ne colo	lssigr or.	n colo	rs to t	he ve	ertices	ofag	graph,	no tw	o adja	icent v	vertices s	hare
10	Ir to	Implement the Traveling Salesman Problem (TSP) using a Hamilton Path approach to find the shortest Hamilton Path in a weighted graph.													
11	V V m	Write a program to find the maximum number of edge-disjoint paths between two vertices. Use the Edmonds-Karp algorithm, an implementation of the Ford Fulkerson method for computing the maximum flow in a flow network													
12	U	sing l	Menge	er's th	neorer	n, fino	1 the	minii	num v	vertex	cut be	tween	sourc	e and ta	rget.
		The st	tudent	will	I he ah	V. CO	URS	SE OU	JTCO	MES					
C01	Il	lustra	te the	basic	conc	epts o	f ma	thema	tical	logic a	nd Gr	aph th	neory.		
CO2	A fi	apply anctio	the kn ns, Gr	owle aph t	dge o heory	f mat	hema mpu	atical te pro	logic , blems	count, in var	ing pri ious f	inciple ields o	es, Rel of Eng	lations a	nd ;.
CO3	A te	nalys	e the s ues.	oluti	ons o	f prob	lems	using	g math	emation	cal log	gic and	d grap	hical	
CO4	D	evelo	p the j	progr	ams a	nd alg	gorit	nms o	n disc	rete m	athem	atical	struct	ure and	graphs.
			V.	C O-]	PO-P	SO M	API	PING	(Marl	к H=3;	; M=2	;L=1))		
PO/P	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3
CO1	3	2	1		2							1	1	1	1
CO2	3	2	1		2							1	1	1	1
CO3	3	2	1		2							1	1	1	1
CO4	3	2	1		2							1	1	2	1
				V	\mathbf{I} . As	ssessn	nent	Detai	ls (Cl	E & S	SEE)				
Genera 2023	l Rul	es: Re	efer Cl	IE an	d SEI	E guid	eline	es base	ed on	course	type	for au	tonom	ious sche	eme
Continu	lous	Inter	nal Ev	alua	tion (CIE):	Ref	èr anr	nexure	e sectio	on 2				
Semeste	Semester End Examination (SEE): Refer annexure section 2														

VII. Learning Resources											
VII(a)): Textbooks:										
Sl.	Title of the Book	Name of the	Name of the	Edition and							
No.		author	publisher	Year							
_	Discrete and			5 th Edition							
1	Combinatorial	Ralph P. Grimaldi	Pearson Education	2020							
	Mathematics										
2	Discrete Mathematics and its Applications	Kenneth H. Rosen	McGraw Hill	8 th Edition 2021							
3	Graph Theory With Application to Engineering and Computer Science	Narsingh Deo	Prentice Hall of India	Latest edition 2016							
VII(b): Reference Books:										
1	Discrete Mathematical Structures: Theory and Applications	D.S. Malik and M.K. Sen	Cengage Learning	4th Edition 2010							
2	Discrete Mathematics with Applications	Thomas Koshy	Elsevier	5 th Edition Reprint 2018							
3	Introduction to graph theory	Douglas B. West	Prentice Hall	3 rd Edition 2014							
VII(c)	: Web links and Video Le	ctures (e-Resources):									
1.	http://nptel.ac.in/courses.p	hp?disciplineID=111									
2.	http://www.class-central-c	entral.com/subject/mat	<u>th(MOOCs)</u>								
3.	http://academiccarth.org/										
	Activity Deced Logenier										
	Activity Based Learning										
ASS1g1	iments, Quiz, Presentation.										



Sri Adichunchanagiri Shikshana Trust (R) B Institute of Technolo



BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060 Approved by AICTE, New Delhi.

Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015

Recognized by UGC, New Delhi with 2(f) & 12 (B) Department of Artificial Intelligence and Machine Learning

Course Title: Data Structures with Application Course Code: 23AIT302 Credits: 3 Teaching Hours/Week (L: T: P: O) {O = Other pedagogies, mention @} 2:2:0:0 Total Hours: 40 CIE Marks: 50 SEE Marks: 50 Total Marks: 100 SEE Type: Theory Exam Hours: 3.00 Hrs Preprerequisite: Programming using C I.Course Objectives:	Semester:	III Co	ourse Type:			PCC							
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theoretical knowledge to real-world contexts enhances students' comprehension and retention.	 Diverse alternativ activities Visual A enhance Collabor foster tea Higher O class. Th informati Problem rote mem Multiple real-worl Creative students Real-Wo theoretic 	 The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes: Diverse Teaching Methods: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students. Collaborative Learning: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter. Higher Order Thinking (HOT) Questions: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information. Problem-Based Learning (PBL): Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically. Multiple Representations: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles. Creative Problem Solving: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions. Real-World Application: Discuss how each concept relates to practical scenarios. Connecting devise the problem of the devise for the problem for the devise for the problem for the problem for the problem of the											
III. COURSE CONTENT													

Module-1: Introduction

SCHEME	E: 2023 DATE:22-05-2024														
Introdu	ction: D	on: Data Structures, Classifications (Primitive & Non-Primitive), Data structure operations inserting, deleting, searching, and sorting) Review of Arrays Structures: Array of structures Self-													
(Travers	ing, inser	ting, de	eleting.	search	ning, a	nd sort	ing). R	leview	of Arra	ays. St	ructure	es: Arra	ay of st	tructur	es Self-
Referent	ial Strue	ctures.	Dyna	mic N	1emor	y Allo	ocation	n Fund	ctions.	Demo	onstrat	ion of	frepr	esenta	tion of
Polynom	ials and	Sparse	Matric	es with	h array										
Textboo	k1:Chap	ter1:1.2	2, Chap	oter2:2	.3-2.5,	Textb	ook2:	Chapt	er1:1.1	-1.4,					
RBT L	evels: L1	, L2, L	.3												
Module-	-2: Linea	r Data	Struc	tures:	Stack	and Q	Jueues	5						8 H	rs
Stacks:	Definiti	on, Sta	ick Op	eration	ns, Ar	ray Re	epreser	ntation	of Sta	acks, S	Stacks	using	Dynar	nic A	rrays.
Differer	nt represe	entation	n of ex	xpressi	on. St	ack Aj	pplicat	tions: 1	Infix to	o posti	fix cor	iversio	n, Infi	ix to p	orefix
convers	ion, eval	uation	of po	stfix e	xpress	ion, re	ecursio	on. Qu	eues:	Defini	tion, A	Array	Repres	sentatio	on of
Queues,	, Queue (Operatio	ons, Ci	rcular	Queue	s, Quei	ues and	d Circu	lar que	eues us	ing Dy	namic	arrays	, Dequ	eues,
Priority	Priority Queues. Textbook1: Chapter 3: 3 1-3 4 3 6														
Textbo	ok1: Cha	pter 3:	3.1-3.4	4, 3.6											
RBT L	evels: L1	,L2,L3	5												
Module-3: Linked Lists 8 Hrs															
Linked Lists: Definition classification of linked lists Representation of different types of linked															
Lista in	Linked Lists: Definition, classification of linked lists. Representation of different types of linked														
		y, irav	ersing,	insert			1, sear	uning,	Sorung	g_{1} , and 1					
Singly	inked lis	st, Dou	oly Lii	iked li	sts, C1	rcular	inked	lists, a	and hea	ader In	nked li	ists. Li	nked S	Stacks	and
Queue .	Queue Applications of Linked lists-Polynomials, Sparse matrix representation. Programming Examples.														
Textbo	ok1: Cha	apter 4:	4.1–4.	4,4.5.2	2,4.7,4	.8									
RBT L	evels: L1	, L2, L	.3												
Module	Modulo 4: Troop														
wiouuic	-4. 1100	3												0 1115	
Trees:	Ferminol	ogies, l	Binary	Trees,	Prope	rties of	f Binar	y trees	, Array	y and l	inked l	Repres	entatic	on of B	inary
Trees, E	Binary Tr	ee Tra	versals	- Inor	der, po	ostorde	er, prec	order; l	Binary	Search	h Trees	s – De	finitio	n, Inse	rtion,
Deletion	n, Traver	sal, an	d Sear	ching	operat	ion on	Binar	y sear	ch tree	. Appl	ication	of Tr	ees-Ev	valuati	on of
Express	ion. AVI	Tree	and Re	d blac	k tree.										
Textbo	ok1: Cha	pter 5:	5.1-5.3	5.5,5.	7										
RBT L	evels: L1	, L2, L	.3												
Module	-5. Grai	hs												8 Hrs	
Granhs	• Definit	ione T	ermino	logies	Matri	v and	Adiace	ency L	st Ren	recent	ation of	f Gran	he Ha	shina.	Hach
Table or	roanizati	ons Ha	shina	Functio	ns St	atic an	A Dvn	amic F	lachinc		sion re	solutio	n tech	niques	114511
Textbo	$\mathbf{k} 1 \cdot \mathbf{C} \mathbf{k}$	anter6.	6 1 <u>–</u> 6 1	2162	2 Ch	anter 8	.8 1-8	3	iasiiiig	, c om	5101110	solutio		inques	•
ICAUDO	ok I. en	aptero.	0.1 0.	2.1,0.2	.2, 01	upter o	.0.1 0								
RBT L	evels: L1	, L2, L	.3												
COURS	E OUTO	COME	S: At t	he end	of this	s cours	e, stud	lents w	ill be a	ble to					
	Evolai	a vorio	ua data	atmiat	irog or	d thai	nroot	iool on	plicatio	na					
CO1	Explain	I Vallo	us uata	suucu	ules al	la men	practi	icai ap	pincatic	JIIS.					
CO2	Apply	stack a	nd que	ue con	cepts e	effectiv	ely to	solve	problei	ns.					
	Domor	atroto t	ho pro	ation	nnliga	tions	flink	d lists	in rool	world	lagong	rios			
CO3	Demoi	istrate t	ne pra		пррпса	tions o		u lists	miteai	-worrd	scena	1105.			
CO4	Analyz	e Tree	Data S	tructu	re to so	olve pr	actical	proble	ems.						
	Apply	aranh a	nd has	hing te	chnia	les nro	ficient	tly to h	andle l	Zev_va	lue nai	rs and	recolv	e collis	sions
C05	Арріу	grapha	inu nas	ning it	ciiiiq	ies pro	meren			ccy-va	luc pai	15 and	105010	c com	510115.
IV. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)															
PO/PS	1 2	3	4	5	6	7	8	Q	10	11	12	<u>S1</u>	<u>S2</u>	53	<u>S4</u>
0	1 <u>∠</u>		1			/			10	11	12		52	55	7
<u>CO1</u>	3	1		1						1	1	2			
CO^2	$\frac{3}{2}$	1	2	1						1	1	2			
CO2 CO3	$\frac{2}{1}$ $\frac{2}{1}$	1	1	1						1	1	$\frac{2}{2}$			
CO4	1 1	2	1	2						1	1	2			
CO5	1 2	2	1	1						1	1	2			
				<u> </u>		1		i	i		. <u> </u>		i	1	1

	V. Assessment Details (CIE & SEE)											
Gener	General Rules: Refer Annexure-1 section 1											
Conti	nuous Internal Evalu	ation (CIE): Refer Anne	xure-1section 1									
Semes	ster End Examination	(SEE): Refer Annexure-1 s	ection 1									
	VI. Learning Resources											
VII(a)	VII(a): Textbooks:											
SI. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher								
1	Fundamentals of Data Structures in C	Ellis Horowitz and Sartaj Sahni	Universities Press	2ndEd,2014								
VII(b)	VII(b): Reference Books:											
1	Handbook of Data Structures and Applications,	Dinesh P Mehta, and SartajSahni	2nd edition ,28 October 2004	Chapman and Hall/CRC								
2	Data Structures using C	Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein	Fifth Edition 2007	Pearson Education								
3	Data Structures: A Pseudo code approach with C	Gilberg and Forouzan	2nd Ed, 2014	Cengage Learning								
4	An Introduction to Data Structures With Applications	Jean Paul Tremblay & Paul G. Sorenson	2nd Ed, 2013	McGraw Hill								
VII(c)	: Web links and Vide	eo Lectures (e-Resources	s):									
•	 http://nptel.ac.in/courses/106103069 www.nptel.iitm.ac.in/video.php?subjectId=106105085 www.cse.unt.edu/~rada/CSCE3110/Lectures/Trees.ppt www.nptel.iitm.ac.in/video.php?subjectId=106105085 cslibrary.stanford.edu/103/LinkedListBasics.pdf https://aa.bbs.tr/lab/cen215-datastructures/DataStructures-Using-C2nd-edition.pdf 											
VIII:	Activity Based Learn	ing / Practical Based Le	arning/Experiential learning:									
A		·										

Assignments, Quizzes and Seminar



JB Institute of Technolog



BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060 Approved by AICTE, New Delhi.

Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015 Recognized by UGC, New Delhi with 2(f) & 12 (B)

Department of Artificial Intelligence and Machine Learning

Semes ter:	III		Course Type: IPCC											
Course	Title: Log	ic Desi	gn & Comj	puter Org	ganization									
Course	Code:	23AI	[303			Credits:	04							
Teachi	ng Hours/V	Veek (l	L: T: P: O)		3:0:2:0	Total Hours:	40+8-10 slots							
CIE Ma	arks:	50	SEE 1	Marks:	50	Total Marks:	100							
SEE Ty	pe:			Theory		Exam Hours:	3							
Pre pre	requisite:	basic el	ectronics, p	rogramm	ing fundamentals,	computer basics, and	digital logic,							
I. Cour	I. Course Objectives: • To demonstrate the functionalities of the binary logic system													
•	 To demonstrate the functionalities of the binary logic system. To explain the workings of combinational and sequential logic systems. To understand the basic structure of a computer system. 													
 To understand the basic structure of a computer system. To illustrate the workings of I/O operations and the processing unit. 														
II. Teaching-Learning Process:														
The foll	The following are some of the strategies that teachers can employ to facilitate the achievement of various													
course o	outcomes:													
1.	Diverse Te	eaching	g Methods:	Instead o	f relying solely on	traditional lecture m	ethods, can explore							
alternative and effective teaching approaches. These might include interactive discussions, hands-														
_	on activities, or multimedia presentations.													
2. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations														
2	enhance understanding and engagement among students.													
3.	3. Collaborative Learning: Encourage group learning within the classroom. Collaborative activities													
4.	Higher O	rder T	hinking (F	IOII, and a IOT) Ou	estions: Pose at 1	east three thought-p	rovoking questions							
	during clas	ss. The	se question	s stimulat	e critical thinking	and encourage stude	ents to analyze and							
	evaluate in	formati	on.		C	C	,							
5.	Problem-H	Based 1	Learning (I	PBL): Im	plement PBL, wh	ich nurtures analytic	al skills. PBL goes							
	beyond rote	e memo	orization by	challengi	ng students to desig	gn solutions, evaluate	evidence, and think							
C	critically.		т	. 1 .			1 1' 1							
6.	Multiple F	ceprese	entations: In	ntroduce t	opics using variou	s representations. Vis	uals, diagrams, and							
7	Creative P	roblen	n Solving. I	Present di	fferent annroaches	to solving the same r	roblem Encourage							
/.	students to	think of	outside the b	box and de	evise their own inn	ovative solutions.	iooloni. Encourage							
8.	Real-Worl	ld App	lication: D	iscuss ho	w each concept re	elates to practical sce	narios. Connecting							
	theoretical	knowle	edge to real-	-world con	ntexts enhances stu	idents' comprehensio	n and retention.							
□ Chall	x & Talk □	Stud. A	Assignment	🗆 Web R	esources LCD/S	mart Boards \Box Stud.	Seminars							
				III CO	URSE CONTEN	Г								
	III(a). Theory PART													
Module-1: Introduction to Digital Design 8 Hrs														
Introdu	iction to Di	igital D	esign: Bina	ary Logic,	Basic Theorems a	nd Properties of Bool	ean Algebra,							
Boolear	Functions,	, Digita	l Logic Gat	es, The M	lap Method, Four-	Variable Map, Don't-	Care Conditions							
NAND	NAND and NOR Implementation, Other Hardware Description Language - Verilog Model of a simple													
circuit.														

Text book 1: 1.9, 2.4, 2.5, 2.8, 3.1, 3.2, 3.3, 3.5, 3.6, 3.9.

SCHEME	2023 DATE:	22-05-2024								
RBT L	evels: L1, L2, L3									
Module	e-2: Combinational Logic	8 Hrs								
Combin Subtrac Multiple Text bo	national Logic: Introduction to Combinational Circuits, Design Procedure, tor, Decoders, Encoders, Multiplexers, HDL Models of Combinational (exer, Encoder. bok 1: 4.1, 4.2, 4.4, 4.5, 4.9, 4.10, 4.11, 4.12.	Binary Adder- Circuits: Adder,								
RBT L	evels: L1, L2, L3									
Module	-3: Sequential Logic	8 Hrs								
Sequen Types o Mod -N Text bo	tial Logic: Introduction, Sequential Circuits, Storage Elements: Latches, Flip-Flop of Registers, Applications of Shift Registers, Counter, Asynchronous and Synch Counter ook 1: 5.1, 5.2, 5.3, 5.4.	s, Shift Registers, conous Counters,								
RBT L	evels: L1, L2, L3									
Module	-4: Basic Structure of Computers	8 Hrs								
Basic S –Proces Machin and Inst Textbo	tructure of Computers: Functional Units, Basic Operational Concepts, Bus struct sor Clock, Basic Performance Equation, Clock Rate, Performance Measurement. the Instructions and Programs: Memory Location and Addresses, Memory Opera ruction sequencing, Addressing Modes. bok 2: Chapter: 1.2, 1.3, 1.4, 1.6, 2.2, 2.3, 2.4, 2.5	ure, Performance tions, Instruction								
RBT L	evels: L1, L2, L3									
Module	Module-5: Input/Output Organization 8 Hrs									
Register Pipeline Text bo RBT Lo	r Transfers, Performing ALU operations. Pipelining: Basic concepts, Role of Performance bok 2: 4.1, 4.2.1, 4.2.2, 4.2.3, 4.4, 5.4, 5.5.1, 7.1, 7.2, 8.1 evels: L1, L2, L3	Cache memory,								
CL N	III(b). PRACTICAL PART.									
SI. No.	Experiments									
1	PARI-A Civen Simplifying e 4 Verieble Logic Expression:									
1	 To simplify a 4-variable logic expression, you can use techniques such a 	s Karnaugh maps								
	or the Quine-McCluskey method.	0 1								
	• Karnaugh Maps (K-Maps): K-maps help simplify Boolean expressi adjacent cells with the same output value. You can create a 4-variable K-groups to obtain a simplified expression	ons by grouping map and identify								
	• Quine-McCluskey Method: This method involves tabulation and print minimize Boolean functions with more than 4 input variables	me implicants to								
	 Once you've simplified the expression, you can simulate it using bas 	ic gates.								
2	Designing a 4-Bit Full Adder and Subtractor:									
	• A 4-bit full adder adds two 4-bit numbers and produces a 4-bit sum alo	ong with a carry-								
		4 1 4 1.00								
	• A 4-bit subtractor subtracts one 4-bit number from another and produces along with a borrow-out.	a 4-dit difference								
	• You can design these circuits using basic gates (AND, OR, XOR, et them	c.) and simulate								
3	Verilog HDL for Simple Circuits:									
	 You can implement simple circuits in Verilog HDL using different mode Structural Modeling: Describes the circuit using interconnected modul flops, etc.). 	eling styles es (gates, flip-								
	• Data Flow Modeling: Describes the circuit behavior based on data flow statements, continuous assignments).	(assign								

	• Behavioral Modeling: Describes the circuit behavior using procedural blocks (always, initial blocks)																
			initia	l blo	cks).												
		•	Choo	ose th	ie ap	propi	riate m	odelin	g styl	e bas	ed on	your	requi	ireme	ents.		
4	Ver	ilog	HDI	_ for	Bina	ry Ac	lder-S	ubtrac	tor:					D.I.			
		•	Imple	emen	t bot	h half	adder	and ful	l adde	r circ	uits in	Veril	og Hl	DL,	1 1		1
		•	Com	bine 1 1	them	to cre	ate a b	inary a	dder-s	ubtra	ctor th	at can	perfo	orm a	dditio	n or su	btraction
		_	based	1 on (ol sigi	als.		4								
5	Var	•			ne d	esign (using b	asic ga	tes.								
3	ver	nog	HDI Doci	10r	Deci Varil		Aulo th	at add	true	1	1	nhana)	aconte	tion)	nd
		•	produ	gii a	the d	og mo ecima	l sum	iat auus		lecili	iai iiui	libers	(BCL	repi	esenta	uioii) a	illa
		•	Lise ł	nasic	aster	s and s	i suin. simulat	e the c	ircuit								
6	Ver	Verilog Program for Multiplexers:															
Ŭ	• Create Verilog modules for 2:1, 4:1, and 8:1 multiplexers.																
	• Implement them using basic gates and simulate their behavior.																
7	Verilog Program for De-Multiplexers:																
	• Design Verilog modules for different types of de-multiplexers (1:2, 1:4, etc.).																
	Simulate their functionality.																
8	Verilog Program for Flip-Flops:																
	• Implement Verilog modules for SR, JK, and D flip-flops.																
	Simulate their behavior using basic gates.																
Instru	ictions for conduction of practical part:																
• LAB Activities: Conduct laboratory exercises, prepare lab reports, observations and analyze results,																	
perf	perform lab tests, and work on design and implementation tasks.																
• Exp	xperiential Learning: Students will be evaluated based on their creativity and practical problem-																
solv	solving skills. This includes program-specific requirements and video-based seminars, presentations,																
or demonstrations.																	
COURSE OUTCOMES																	
CO1 Apply K-Map techniques to efficiently simplify Boolean expressions.																	
CO2	Des	ign o	differ	ent ty	vpes	ofcon	nbinati	onal an	d seq	Jentia	al circu	its al	ong w	vith V	erilog	progr	ams.
CO2	Des	cribe	e the t	funds	men	tals of	machi	ne insti	uction	ns ad	dressi	ng mo	des a	nd nr	ncess	or perf	ormance
CO3	Des			unac	inten	1015 01	macm		uction	15, au	uressn	ig illo	ues, a	ina pi	000330	n peri	ormanee.
CO4	Exp	lain	the a	appro	bache	es invo	olved i	n achi	eving	com	munica	ation	betwe	een tl	ne pro	cessor	and I/O
	devi	ces.	.1	•	1			0		1.1					4		
CO5	Ana	lyze	the	Inter	nal o	rganız	zation	of men	nory a	ind th	ne imp	act of	cach	ne/pip	elinin	g on p	processor
	peri	orm	ance.														
				-	-		II. CO)-PO-l	PSO N	AP	PING						
PO/PS	0	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1		3	2	1		1							1	1			1
CO2		3	2	2		1	-			ļ			1		2		
CO3		3	2	1		1							2			1	1
CO4		3	2										1		1	-	1
005		3	2	I		I							I			2	1
						III.	Asses	sment	Detai	ls (Cl	IE & S	SEE)					
Genera	l Rul	es: I	Refer	Ann	exure	e-1 sec	ction 2										
Continu	ious	Inte	rnal	Eval	uatio	on (Cl	E): Re	efer An	nexure	e-1se	ction 2	2					
~																	
Semeste	er En	d E	xami	natio	on (S	EE): I	Refer /	Annexu	re-1 s	ection	n 2						
							IV.	Lear	ning	Reso	urces						
VII(a):	Text	bool	ks														
Sl. No	No. Title of the Name of the author					uthor	Edition and Year					Name of the publisher					

1040.2022

SCHEME: 20	23			DATE: 22-05-2024							
1	Digital Design	M. Morris Mano &	5th Edition	Pearson Education.							
	with an	Michael D. Ciletti									
	Introduction to										
	Verilog										
	Design.										
2	Computer	Carl Hamacher.	5th, Edition	Tata McGraw							
_	Organization	Zvonko Vranesic.		Hill							
	o i Banne and a	SafwatZaky.									
VII(b): Re	ference Books:	2011 (002001) ;									
, 11(0), 14											
SL No	Title of the	Name of the author	Edition and Voor	Name of the							
51. 140.	Book	Traine of the aution	Eution and Tear	publisher							
1	Digital	Donald D. Givone	1st Edition, 2002	Tata McGraw-Hill							
	Principles and			Publishers, ISBN:							
	Design			9780070529069.							
2	Computer	William Stallings	11th Edition, 2019	Pearson, ISBN							
	Organization			9780134997193.							
	and										
	Architecture										
	Designing for										
	Performance,										
3	Logic and	M. Morris Mano	4th Edition 2014	Pearson, ISBN 13:							
	Computer	Charles Kime		978-1-292-02468-4.							
	Design										
	Fundamentals										
4	Digital Design	David M Harris, Sarah	2nd Edition,2013	Elsevier Morgan							
	and Computer	L Harris		Kaufmann							
	Architecture			Publishers, ISBN:							
				978-0-12-394424-5.							
VII(c): W	eb links and Vid	leo Lectures (e-Resourc	es):								
• https://cse11-iiith.vlabs.ac.in/											
VIII: Acti	vity Based Lear	ning / Practical Based I	earning/Experiential learnin	ıg:							
Assignments, Ouizzes, Seminar and also, assign the group task to design the various types of counters and											
display the	output according	gly	C 1	<i>J</i> 1							



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Department of Artificial Intelligence and Machine Learning

Semester:	III	Co	urse Type:		IPCC							
Course Title:	Course Title: DATABASE MANAGEMENT SYSTEM											
Course Code: 23AII304 Credits: 04												
Teaching Hou	rs/We	eek (L: T:	: P: O)	3:0:2:0	Total Hours: 40+8-10							
CIE Marks:		50	SEE Marks:	50	Total Marks: 100							
SEE Type:			Theor	у	Exam Hours:	3						
D .												

Pre prerequisite: Fundamentals of Computer

I. Course Objectives:

- To Provide a strong foundation in database concepts, technology, and practice.
- To Practice SQL programming through a variety of database problems.
- To Understand the relational database design principles.
- To Design and build database applications for real world problems.
- To Understand the basic concepts of NOSQL.

To become familiar with database storage structures and access techniques

II. Teaching-Learning Process:

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

- 1. **Diverse Teaching Methods**: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
- 2. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
- 3. **Collaborative Learning**: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
- 4. **Higher Order Thinking (HOT) Questions**: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
- 5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
- 6. **Multiple Representations**: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
- 7. **Creative Problem Solving**: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
- 8. **Real-World Application**: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.

□ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

III COURSE CONTENT

III(a). Theory PART

Module-1: Introduction to DBMS

8 Hrs

Introduction to databases: Definition, characteristics, advantages of DBMS approach compared to traditional file systems. Different types of database users.

Overview of database languages and architectures: Data models, schemas and instances, three-schema architecture, data independence, Data Languages and Interfaces, Database System Environment.

SCHEME: 2023	DATE	: 22-05-2024
Conceptual D	ata Modeling using Entity-Relationship (ER) Model: Entities, attributes	s, relationships,
cardinality, ER	diagrams.	
I EXTDOOK I:C	n 1.1 to 1.6; 2.1 to 2.4; 3.1 to 3.9	
KDT Levels: I	11, L2, L5	
Module-2: Re	lational Model	8 Hrs
Relational Mo schemas,Updat Relational A (aggregate,grou Mapping Con Relational map Textbook 1: C	odel: Relational Model Concepts, Relational Model Constraints and relate operations, transactions, and dealing with constraint violations. Igebra: Unary and Binary relational operations, additional relation uping, etc.) Examples of Queries in relational algebra. Inceptual Design into a Logical Design: Relational Database Design ping. b 5.1 to 5.3; Ch 8.1 to 8.5; Ch 9.1 to 9.2	tional database nal operations 1 using ER-to-
RBT Levels: I	1, L2, L3	
Module-3: Da	tabase Design	8 Hrs
Normalization to normalization Form, Join Dep Textbook 1: C	a: Informal design guidelines for relation schema, Functional Dependencies on concepts (1NF, 2NF, 3NF, BCNF), Multivalued Dependency and Dependencies and Fifth Normal Form. Transaction Management and concurre th 14.1 to 14.7, Ch 20.1 to 20.3, 21.1, 22.1	es, Introduction Fourth Normal ency Control
KB1 Levels: 1	JI, L2, L3	
Module-4: SQ	L	8 Hrs
SQL: SQL dat DELETE, and Advanced Qu action triggers, Textbook 1: C RBT Levels: I Module-5: Int NoSQL Datab compared to re (Overview of Column-Based Textbook 1: C RBT Levels: I	a definition and data types, Constraints in SQL, Basic retrieval queries in UPDATE statements in SQL, heries: More complex SQL retrieval queries, Specifying constraints as Views in SQL, Schema change statements in SQL. Ch 6.1 to 6.4; Ch 7.1 to 7.4 L1, L2, L3 roduction to NOSQL-MongoDB bases: A High-Level View: Introduce the concept of NoSQL databases an elational models, The CAP theorem, Document-Based NOSQL Systems MongoDB, MongoDB CRUD Operations and Querying), NOSQL Key or Wide Column NOSQL Systems, NOSQL Graph Databases. Ch 24.1 to 24.6 L1, L2, L3	SQL, INSER I, assertions and 8 Hrs d their benefits and MongoDB -Value Stores,
	III(b). PRACTICAL PART.	
Sl. No.	Experiments	
	PART-A	
1	 Create a table called Student & execute the following. Student (USN, SNAME, PROGRAM_NAME, DOB, CLASS) Create a user and grant all permissions to the user. Insert a new student. Change the class of student 'Smith' to '4-AIML'. Delete the record for the student whose name is 'Smith' and stud 17. Alter SNAME to STUDENT NAME 	ent number is
2	 Queries using aggregate functions (COUNT, AVG, MIN, MAX, SUM), Order by. Employee (E_id, E_name, Age, Salary) Create Employee table containing all Records E_id, E_name, Ag Count number of employee names from employee table Find the Maximum age from employee table. 	Group by, e, Salary.

 5. Find salaries of employee in Ascending Order. 6. Find grouped salaries of employees. 																
3	-	0. Create	r 11 a ta	ia gro ble ca	alled S	Student	$\approx 01 \text{ en}$	cute d	iffere	nt ioin	opera	ations	(INN	JER. I	EFT.	
	R	IGH	T, FU	JLL)						in jein	open		(
	S	stude	nt tab	ole: (S	Studer	nt_ID, 1	Name,	Age, l	Major	, GPA	.)					
		Cours	e tab	le: (C	Course	_ID, C	ourse_	Name	, Cree	dits)	C	1 \				
4		nroll	ment	t tabl	e: (Sti	$\frac{1}{1}$	D, Coult	arse_II	D, Se	mester	r, Grae	de)				
4			aer u ENT	10 sc	nema : N SN	Ior Col Jame	lege D Addres	atabas	e: ne G	ender)						
	S	EMS	EC (SSI). Sen	n. Sec)	Audres	5, 1 110	iic, O	chuci)						
	Č	CLAS	S (U	SN,	SSID)	.,)										
	S	UBJ	ЕĊТ	(Sub	code,	Title, S	Sem, C	redits))							
	L	AMA	RKS	S (US	N, Su	bcode,	SSID,	Test1	, Test	t2, Tes	st3, Fi	nalIA)			
	V	Write SQL queries to 1 List all the student details studying in fourth semester 'C' section														
		 List all the student details studying in fourth semester 'C' section. Compute the total number of male and female students in each semester and in 														
	2	2. Compute the total number of male and female students in each semester and in each section.														
	3	3. Create a view of Test1 marks of student USN '1JB19CS101' in all subjects.														
	4. Categorize students based on the following criterion:															
	If FinalIA = 17 to 20 then CAT = 'Outstanding'															
	If FinalIA = 12 to 16 then CAT = 'Average' If FinalIA \leq 12 then CAT = 'Weele'															
If FinalIA<12 then CAT = 'Weak'																
5 Install an Open-Source NoSQL Data base MangoDB & perform basic CRUD (Create, Read Update & Delete) operations. Execute MangoDB basic Operations CRUD																
	operations															
PART-B																
		A tear	n of	4 stu	dents	develo	n datał	base sy	stem	for ar	iv pro	blem	selec	ted n	nake si	re that
the application should have five or more tables. Indicative areas include: Organization,																
	health care, Ecommerce etc.															
Instructions	for	cond	lucti	on of	f prac	tical p	art:									
• LAB Ac	tivit	ies:	Conc	luct	labora	tory e	xercise	es, pre	pare	lab re	eports.	, obse	ervati	ons a	nd ana	alyze
results, p	erfoi	rm la	b test	ts, an	d wor	k on de	esign a	nd imp	oleme	entatio	n task	s.				
• Experien	tial	Lea	rnin	g: S	tudent	s will	be e	valuate	ed ba	ised o	on the	er cr	eativi	ty an	d prac	ctical
problem-	solv	ing s	KIIIS.	1 fill netrat	s incli	udes p	rogram	-speci	nc re	equirer	nents	and	viaeo	-based	1 semi	nars,
presentati		, 01 u	CIIIOI	151141	10115.	COL			010	20						
			.1	0 1		100	KSE (UM	10						
CO1	P	Apply	the	tunda	imenta	al conc	epts of	datab	ases a	and Dł	BMS.					
CO2	Γ	Desig	n and	l imp	lemen	t relati	onal da	atabase	es usi	ng the	Entit	y-Rel	ation	ship m	odel.	
CO3	A	Apply	SQI	_ for	creati	ng, mai	nipulat	ing, ar	nd ret	rieving	g data	from	relat	ional o	latabas	ses.
CO4	A	Apply	norr	naliz	ation	techniq	ues to	desigr	n effic	eient a	nd eff	ective	e data	base s	chema	ıs.
CO5	E	Expla	in th	e cor	ncept o	of NOS	QL.									
						II. CO	-PO-P	SO M	APP	ING						
PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S 1	S2	S3	S4
CO1	3	2			3							3	3			
CO2	3	3	2		3				2			3	3			
CO3	3	$\frac{3}{2}$	3	2	3	3			3		3	3	3			
CO4 CO5	3	3	3	2	3	2			3		2	3	3			
	5	5	5	2	<u> </u>	 A \$\$6655	ment I)etaila		F. & SI	EF)	5	5			
	III. Assessment Details (CIE & SEE)															
General Rul	es: F	Refer	Ann	exure	e-1 sec	ction 2										

SCHEME: 2023

Semester	End Examinatio	on (SEE): Refer Annexu	re-1 section 2	
		IV. Learn	ning Resources	
VII(a): Te	extbooks			
Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Fundamentals of Database Systems	Ramez Elmasri and Shamkant B. Navathe	7th Edition, 2017,	Pearson
2	Database management systems	Ramakrishnan, and Gehrke	3rd Edition, 2014	McGraw Hill
VII(b): R	eference Books:			
Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Database Systems Concepts	Abraham Silberschatz, Henry K. F. Wong, and Michael Stonebraker	7th Edition	McGraw Hill
VII(c)· W				
· II(c)	eb links and Vic	leo Lectures (e-Resourc	es):	
https://ww https://ww https://ww https://ww	eb links and Vic w.coursera.org/le w.udacity.com/co w.w3schools.cor w.tutorialspoint.e inecourses.nptel.a	leo Lectures (e-Resourc earn/relational-database ourse/intro-to-relational-o n/sql/ com/dbms/index.htm ac.in/noc22 cs91/preview	es): databasesud197 v	
https://ww https://ww https://ww https://onli	eb links and Vic w.coursera.org/le w.udacity.com/co w.w3schools.cor w.tutorialspoint.co inecourses.nptel.a	leo Lectures (e-Resourc earn/relational-database ourse/intro-to-relational-o n/sql/ com/dbms/index.htm ac.in/noc22_cs91/preview ning / Practical Based I	es): databasesud197 v earning/Experiential learni	ησ.
https://ww https://ww https://ww https://ww https://only VIII: Acti	eb links and Vic w.coursera.org/le w.udacity.com/co w.w3schools.cor w.tutorialspoint.e inecourses.nptel.a	leo Lectures (e-Resourc earn/relational-database purse/intro-to-relational-o n/sql/ com/dbms/index.htm ac.in/noc22_cs91/preview ning / Practical Based I	es): databasesud197 v Learning/Experiential learni	ng:



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Department of Artificial Intelligence and Machine Learning

Seme	ester:	III	Cou	rse Type:	PCCL										
Course	Fitle: Da	ta Str	ucture	es Lab			1								
Cour	se Code:	:	23	AIL305			Credits:	1							
	Teach {O – O	ning H other p	l ours/N edagog	Week (L:T gies, mentio	:P:O) on @}	0:0:2:0	Total Hours:	20.00							
CIE	Marks:	50)	SEE M	arks:	50	Total Marks:	100							
SE	E Type:		•	Pi	ractica	1	Exam Hours:	3.00							
Pre-Prei	equisite	: Prog	rammi	ng using C											
I. Cours	e Objec	tives:													
 To learn the fundamental types of data structures, their implementation, and their applications. To understand the significance of using appropriate data structures for effective programming. To develop the ability to identify suitable data structures in problem-solving. II. Teaching-Learning Process (General Instructions):															
• 1	mplemer	nt all tl	he nroo	Trams in "("" Proc	pramming Language a	nd Linux OS								
	mpreme	it uii ti	no prog		1108										
SI						PARI-A									
51. No.	List of Laboratory Experiments														
1	Design, Develop and Implement a menu driven Program in C for the following Array operations														
	► Inserting an Element (ELEM)at a given valid Position (POS)														
	Deleting an Element at a given valid Position (POS)														
	🕨 > Di	splay o	of Arra	y Element	s										
	≻Ex	it.													
	Suppor	t the p	rogran	n with func	tions f	or each of the above of	perations.								
2	Develo should -, *, /, 9	p a Pı suppo %(Ren	rogram rt for b nainde	i in C for both parent r), ^(Power	conver hesized) and a	ting an Infix Express 1 and free parenthesize 11phanumeric operands	ion to Postfix Expre ed expressions with the s.	ssion. Program ne operators: +,							
3	Design	, Deve	elop an	d Impleme	nt a pro	ogramming C for the f	ollowing Stack Appli	ications							
	Evalua	tion of	Suffix	c expressio	n with	single digit operands a	and operators: +, -, *,	/,							
	<u>%, ^</u>	Solvin	ig Tow	ver of Hano	1 probl	em with n disks.	anomationa an Cim	aulan OUEUE -f							
4	Charac	pan tors (^		mplemente	tion of	Oueue with maximum	z operations on Circ	ular QUEUE OI							
		ort on	Tay 11	nt on to Ci	uon or		I SIZE WIAA)								
	\rightarrow Ins	loto on	Flore	nt from Ci		QUEUE									
		monsti	nate Ox	erflow and	I Unde	QUEUE rflow situations on Cir	cular OLIFLIF								
		nonsu nlov tl	ha stati	of Circu	lor OU										
		piay li t	ne statt		iai QU	EUE									
	Suppor	t the n	rogran	n with appr	opriate	e functions for each of	the above operations								
5	Singly	Linke	d List ((SLL)of Int	teger D	Data									
	≻Cr	eate S	LL sta	ck of N int	eger.										
	≻ Di	splay o	of SLL	1	-										
	≻Li	near se	earch.												

SCHEN	<u>/IE: 2</u>	2023 DATE:22-05-2024														
		Create a SLL queue of N Students Data Concatenation of two SLL of integers.														
6		Design,	Devel	op an	d Imple	ement a	a menu	drive	n Prog	rammi	ng C fe	or the	followi	ng		
		opera	tions o	n Bina	ary Sea	rch Tr	ee (BS	T) of I	nteger	s	C			C		
		≻ Cre	eate a H	ST o	f N Inte	egers										
		≽ Tra	verse t	he BS	ST in Ir	n-order	, Preor	der an	d Post	Order						
7		Design,	Devel	op an	d imple	ement	a progr	am in	C for	the foll	lowing	opera	tions o	n Graț	ph (G)	of
		Create a Graph of N cities using Adjacency Matrix.														
		Print all the nodes reachable from a given starting node in a diagraph using DFS/BFS method														
8		Design and develop a program in C that uses Hash Function H: K->L as H(K)=K														
		Mod m (reminder method) and implement hashing technique to map a given key K to the														
address space L. Resolve the collision (if any) using linear probing.																
PAKI-B																
A team of two students developed a prototype using the C/C++ language to demonstrate the use of data structures in real-time applications. For example, they used trees to index search results																
		uata str	to navi	o in re gate i	blaces	araphi	for re	s. For	examj endati	ons an	d mat	a trees	s to m	uex se	for m	essage
		passing	. spell	and g	ramma	r chec	kers. a	nd mat	trices t	o gene	erate si	irvev i	insight	s. Thei	ir inno	vative
		applicat	ions of	data	structu	res atti	acted 1	nigh m	arks.	- 6			8			
		(Ref:	https://	www	.geeksf	orgeek	s.org/r	ealtim	e-appl	ication	-of-da	ta-stru	ctures/).		
Instr	ucti	ons for	condu	ction	of prac	ctical p	part:									
• LAB Activities: Conduct laboratory exercises, prepare lab reports, observations and analyze results,																
pe	rfor	n lab te	sts, and	d worl	k on de	sign aı	nd imp	lement	tation t	asks.						
• Ex	xper	iential	Learni	ing: S	Students	s will	be eval	luated	based	on the	eir crea	ativity	and pr	actical	l probl	em-
so	lvin	g skills.	This i	nclud	es prog	ram-sp	pecific	requir	ements	s and v	video-b	based s	emina	rs, pres	sentati	ons,
or demonstrations.																
III. COURSE OUTCOMES: At the end of this course, students will be able to																
СО	1	Apply v	various	linear	r and no	on-line	ar data	struct	ures.							
CO	02	Demon	strate t	he wo	rking n	ature o	of diffe	rent ty	pes of	data s	tructur	es and	their a	pplica	tions.	
CO	3	Analyz	e appro	priate	e search	ing an	d sortii	ng algo	orithm	s for th	e give	n scen	ario.			
CO	94	Analyz	e the ap	propi	riate da	ta stru	cture fo	or solv	ing rea	ıl worl	d prob	lems.				
				IV.	CO-P	PO-PS	O MA	PPINO	G (mar	k H=3	; M=2	; L=1)				
PO/PS	5 1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2	3											2		
CO2	2	1	2	1										2		
CO3	2	1	2	1										2		
CO4	2	1	2	1										2		
					V.	Asse	essmen	t Deta	ils (C	IE & S	SEE)					
Gener	ral F	ules: R	efer A	nnexu	re-1 se	ction 4	ŀ									
Conti	inuo	us Inte	ernal	Evalu	ation	(CIE)	: Refe	er Anr	nexure	-1sect	ion 4					
Semes	ster	End Exa	minati	on (S	EE): Rei	fer Ani	nexure	-1 sect	ion 4							
						VI.	Le	arning	g Reso	urces						
VII(a)): Te	xtbook	s: (Ins	ert or	delete 1	ows a	s per re	equirer	nent)							
Sl. No.	Т	Title of the BookName of the authorEdition and YearName of the publisher										he r				

SCHEN	1E: 2023		DATE:22-05-2024							
1	An Introduction to	Jean-Paul Tremblay &	2nd edition, 1 st July 2017	Tata McGraw Hill						
	Data Structures	Paul G. Sorenson								
	with Applications									
2	Data Structures	Aaron M. Tanenbaum	2nd edition, 2005	PHI Learning						
	using C & C++									
3	Data and File	Reema Thareja	2nd edition ,2014	Oxford University						
	Structures using C Pres									
VII(b): Reference Books: (Insert or delete rows as per requirement)										
1	Handbook of Data	Dinesh P Mehta, and	2nd edition ,28 October 2004	Chapman and						
	Structures and	SartajSahni		Hall/CRC						
	Applications,									
VII(c)	: Web links and Vide	eo Lectures (e-Resources	s):							
•	https://www.geeksf	orgeeks.org/realtime-appl	ication-of-data-structures							
VIII:	Activity Based Learr	ing / Practical Based Le	arning/Experiential learning:							
case st	case studies, mini projects, self-study activities, group discussions, etc									



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BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060

(Department of Artificial Intelligence and Machine Learning)

Semester:	III	Course Type:		ETC										
Course Title:	Course Title: Object Oriented Programming with Java													
Course Co	Credits:	3												
Tea {O -	- Other p	lours/Week (L:T edagogies, mentic	(:P:O) on @}	3:0:0:0	Total Hours:	40								
CIE Mark	s: 50 SEE Marks: 50		50	Total Marks:	100									
SEE Typ	e:	Γ	Theory		Exam Hours:	03								

Pre-requisite: Basic understanding of programming concepts and proficiency in any programming language

I. Course Objectives:

- To Acquire proficiency in fundamental constructs of the Java programming language.
- To Comprehend and apply the principles of Object-Oriented Programming (OOP) in Java.
- To Acquire expertise in advanced Java concepts including packages, multithreaded programming, and exception handling.

II. Teaching-Learning Process (General Instructions):

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

- 1. **Diverse Teaching Methods**: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
- 2. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
- 3. **Collaborative Learning**: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
- 4. **Higher Order Thinking (HOT) Questions**: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
- 5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
- 6. **Multiple Representations**: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
- 7. **Creative Problem Solving**: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
- 8. **Real-World Application**: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.
- □ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

COURSE CONTENT								
Theory								
Module-1								

SCHEN	/IE: 2	023											DA	TE:22-0	05-202	4
Overvi	view of Java: Object-Oriented Programming (Paradigms, Abstraction, Three OOP Principles), Code															
Blocks,	ocks, Lexical Issues (Whitespace, Identifiers, Literals, Comments, Separators, Java Keywords). Data															
Types,	Vari	ables,	Array	s: Prir	nitive	Types	(Integ	gers, F	loating	g-Point	Туре	s, Cha	racters	, Bool	leans),	Туре
Conver	ersion and Casting, Automatic Type Promotion, Arrays, Type Inference with Local Variables.															
Operato	perators: Arithmetic, Relational, Boolean Logical, Assignment, Operator Precedence, Parentheses Usage.															
Control	Stat	ement	s: Sele	ection	(11, SW	itch),	Iteratio	on (wh	ile, do	-while	, for, I	or-Ea	ch Loo	op, Ne	sted L	oops),
Textbo	Textbook: 1 Chapter: 2, 3, 4 5															
RRT I	evel	спа с• L1	L2	, J, т .	9											
KD11	Module-2 & Hrs															
Introducing Classes: Class Fundamentals. Declaring Objects. Assigning Object Reference Variables																
Introducing Methods, Constructors, This Keyword, Garbage Collection Methods and Classes.																
Overloa	Overloading Methods, Objects as Parameters, Argument Passing, Returning Objects, Recursion Access												cess			
Control	l, und	lerstan	ding s	tatic, ii	ntrodu	cing fi	nal, Int	roduci	ng Ne	sted ar	d Inne	r Class	ses.		·	
Textb	ook:	1 Cha	pter:	6,7		-			-							
RBT I	Level	s: L1,	L2													
						Mo	dule-3							8	8 Hrs	
Inheri	tanc	e: Inh	eritanc	e Basi	cs, us	ng su	ber, cro	eating	a Mul	tilevel	Hieran	rchy, V	When (Constru	uctors	Are
Execut	ted, 1	Metho	d Ove	rriding	g, Dyn	amic 1	Metho	1 Disp	atch,	Using	Abstra	ict Cla	usses, 1	Using	final v	vith
Inherit	ance	, Loca	ıl Vari	able T	ype In	ferenc	e and	Inheri	tance,	The C	bject	Class.	Interf	aces:	Interfa	ces,
Defaul	t Inte	erface	Metho	ods, Us	e statio	e Meth	ods in	an Inte	erface,	Privat	e Inter	face M	[ethods	5.		
Textb	ook:	1 Cha	pter:	8,9												
RBUI	Jevel	s: L1,	L2,L	3												
						Mo	dule-4							8	3 Hrs	
Packa	Packages: Packages, Packages and Member Access, Importing Packages. Exceptions: Exception-															
Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch																
Clause	s, ne	sted t	ry Stat	tement	s, thro	w, thro	ows, fi	nally,	Java's	Built	in Exe	ception	is, Cre	ating Y	Your C)wn
Except	Exception Subclasses, Chained Exceptions.															
1 extbook: 1 Chapter:9,10																
KBII	Jever	s: L1,	L2, L	3												
						Mo	dule-5		1					8	Hrs	
Multit	hrea	ded P	rogra	mming	g: The	Java 🛙	hread	Mode	I, The	Main	Thread	l, Crea	ting a	Thread	l, Crea	ting
Multip		hread	ls, Us	sing is	SAlive	() and	1 JOIN	(), 11 Stan	nread	Thread	ties,	Synchi	onizat	10n, I Three	nterthi	read
Fnum	erati	anon, ons '	Susp Tyne '	Wrant	, res iers a	nd A	, and itohov	ing, I	ping Fnume	rations	is, U (Enu	merati	ig a on Fui	ndame	u s - Si ntale - '	ale. The
values	\cap an	d valu	eOf ()	Metho	ods)	nu Ai	110004	ing. i		ations) (Lillu	meran	on ru		mais,	The
varaes	() un	u vuit		Wieune	<i>(</i> us),											
Textb	ook:	1 Cha	pter:1	1,12												
RBT I	Level	s: L1,	L2, L	.3												
		CC	URSI	E OUT	сом	ES: A	t the er	nd of t	nis cou	ırse, st	udents	will be	e able 1	to		
COL	Ι)emor	strate	profic	ciency	in w	riting	simple	e prog	grams	involv	ving b	ranchi	ng an	d loop	oing
	s	tructu	res.													
CO2		Design	a clas	s invol	ving d	ata me	mbers	and m	ethods	s for th	e givei	1 scena	ario.			
CO3	A	pply	the con	ncepts	of inhe	eritanc	e and i	nterfac	es in s	solving	real w	orld p	roblem	ns.		
		nnly	the cor	ncent o	f nack	ages a	nd exc	ention	handli	ng in s	olvino	comn	lex nro	hlem		
CO4		трргу						<u></u>	nanun	ing in s		. comp				
CO5	F	Apply	concep	ots of n	nultith	reading	g, auto	boxing	g and e	numer	ations	ın prog	gram d	evelop	ment	
				III.	CO-F	O-PS	O MA	PPINO	G (mar	∙k H=3	; M=2	; L=1)				
PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
0																
CO1	2												1			1
CO2		3												1	1	
003		3														

SCHE	ME: 2	023											0	DATE:22	2-05-	-2024	4
CO4			2	2	2								1				
CO5	1													1		1	1
					IV.	Asse	ssment	Deta	ils (C	IE & S	SEE)						
Gener	General Rules: Refer Annexure-1 section 1																
Conti	Continuous Internal Evaluation (CIE): Refer Annexure-1section 1																
Semester End Examination (SEE): Refer Annexure-1 section 1																	
1	V. Learning Resources																
VII(a)	VII(a): Textbooks:																
SI. No.	Tit	le of tl	of the Book Name of the author Edition and Year						Name of the publisher			ie					
1	Java Refe	: The (rence	Compl	ete	Her	bert Sc	hildt	1	2 th Ed	lition, N	Noven	nber 2021 McGraw-Hill, ISBN: 9781260463422					2
VII(b)): Ref	erence	e Book	s:									•				
1	Prog	gramm Jav	ing wi a	ith	E Ba	alaguru	samy		6th	Editio	n Mar	-2019		McGraw Hill Education, ISBN: 9789353162337.			ill BN: 337.
2	Th	inking	in Jav	a	B	ruce Ec	kel		Fo	urth Ed	lition,	2006		Pr	entic	e Ha	ı11
VII(c)	: Wel	b links	and V	Video	Lectur	res (e-F	Resourc	ces):					•				
 Java Tutorial: <u>https://www.geeksforgeeks.org/java/</u> Introduction To Programming In Java (by Evan Jones, Adam Marcus and Eugene Wu): https://ocw.mit.edu/courses/6-092-introduction-to-programming-in-java-january-iap-2010/ Java Tutorial: <u>https://www.w3schools.com/java/</u> Java Tutorial: https://www.javatpoint.com/java-tutorial 																	
v 111:	ACUV	пу ва	seu Le	arnir	ig / rra		Dased	Leari	nng/F	Lxperie	mual	iearni	ng:				
Assign	nment	s, Quiz	zzes ar	nd Ser	ninar												



S.

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(Department of Artificial Intelligence and Machine Learning)

Semester:	III	Course Type:	ETC										
Course Title:	Python f	for Data Science	•										
Course Co	le:	23AIE312			Credits:	3							
Teaching Hou {O – Other ped	rs/Weel agogies	x (L:T:P:O) , mention @}		3:0:0:0	Total Hours:	40							
CIE Mark	s: 5	0 SEE M	arks:	50	Total Marks:	100							
SEE Typ	e:	ſ	Theory		Exam Hours:	03							
Pre-requisite:	Pre-requisite: Basic understanding of programming concepts and proficiency in any programming language												
I. Course Objectives:													
• To Uno	lerstand	ing Python constru	ucts an	d their application in p	rogram developmen	t.							
• To Ana	alysing v	arious conditiona	l stater	nents and their practica	al usage in programm	ning.							
• To Lea	rning an	a applying basic of	ata su	through file data process	agina								
• To Der	nonstrat	a utilization of div	ations	ata turas within a data	ssing.	r							
• 10 Gia	sping in Leernin	g Process (Conor	rol Inc	tructions).	analytics frameworf	ζ.							
The full					0 11: 1 1 1								
The following	are som	e of the strategie	s that	teachers can employ to	o facilitate the achie	evement of various							
course outcome	course outcomes:												
1. Diverse Teaching Methods: Instead of relying solely on traditional lecture methods, can explore													
alterna	tive and	effective teaching	g appro	baches. These might in	clude interactive dis	cussions, hands-on							
2 Visual	es, or m	ultimedia presenta	ations.	ations to alusidate cor	nnlav aanaanta Via	ual representations							
enhanc	e unders	standing and engage	gemen	t among students	inplex concepts. Vis	sual representations							
3. Collab	orative eamwor	Learning: Encou k. communication	arage g	group learning within deeper grasp of subject	the classroom. Coll	aborative activities							
4. Higher	· Order	Thinking (HOT)) Ques	tions: Pose at least thr	ee thought-provoking	ng questions during							
class. ' inform	These quation.	uestions stimulate	critic	al thinking and encou	rage students to an	alyze and evaluate							
5. Proble	m-Base	d Learning (PBL): Imp	lement PBL, which nur	tures analytical skill	s. PBL goes beyond							
rote me	emorizat	ion by challenging	g stude	nts to design solutions,	, evaluate evidence,	and think critically.							
6. Multip	le Repr	esentations: Intro	oduce	topics using various r	epresentations. Visu	als, diagrams, and							
real-wo	orld exar	nples cater to dive	erse lea	arning styles.		11 5							
7. Creati	ve Prob	lem Solving: Pre	sent d	ifferent approaches to	solving the same p	roblem. Encourage							
student	s to thin	k outside the box	and de	evise their own innovat	ive solutions.	namias Connecting							
o. Keal-v	ical kno	wledge to real-wo	rld cor	texts enhances student	es to practical sce	narios. Connecting							
□ Chalk & '	Talk \square S	Stud. Assignment		\circ Resources \Box LCD/Sr	nart Boards 🗆 Stud.	Seminars							
			COU	RSE CONTENT									
				Theory									
]	Modu	e-1		8 Hrs							
Introduction t	o pythoi	n: Python Languag	ge Esse	entials: Core componen	ts of the Python lang	uage. Python Block							
Structure: Unde	erstandir	ng the structure of	Pythor	1 code blocks. Variable	s and Assignment St	atements: Concepts							
related to varia	bles and	assignment stater	nents i	n Python. Data Types	in Python: Exploring	g various data types							
available in Python. Operations in Python: Overview of different operations supported by Python. Input/Output in Python: Utilizing simple input and output operations, including print statements. Formatting Print Statements: Techniques for formatting output using print statements in Python. Text Book 1: Chapter 3 (3.2, 3.3, 3.4, 3.6, 3.7, 3.9 and 3.10) **RBT Levels: L1, L2** Module-2 8 Hrs Decision structure: Forming Conditions: Creating conditional expressions to control program flow. If Statement: Understanding the basic if statement for conditional execution. If-Else and Nested If-Else: Exploring conditional branching with if-else statements, and nested if-else constructs for multiple conditions. Looping Statements: Introduction to Looping: Understanding the concept and necessity of loops in programming. Python Built-in Functions for Looping: Exploring built-in functions such as range() and enumerate() for efficient looping. Loop Statements: Implementing loop statements like for and while loops for repetitive tasks. Jump Statements: Understanding jump statements like break, continue, and pass for altering loop behaviour. Text Book 1: Chapter 4 (4.2 to 4.6), Chapter 5 (5.1 to 5.4) **RBT Levels: L1. L2** Module-3 8 Hrs Lists: Introduction to Lists: Understanding list concepts and structure in Python. Operations on Lists: Exploring list operations like appending, removing, and accessing elements. **Tuple:** Introduction to Tuples: Understanding tuple basics and their immutability. Operations on Tuples: Exploring tuple operations such as concatenation and repetition. Set: Introduction to Sets: Understanding set data structure and creation methods. Operations in Sets: Exploring set operations like union, intersection, and difference. Dictionary: Understanding dictionaries as key-value pairs. Operations on Dictionaries: Exploring dictionary operations like adding, updating, and deleting elements. Nested Dictionaries: Understanding and working with nested dictionaries. Looping Over Dictionaries: Iterating over dictionary elements using for loops. Practical Applications: Understanding how to use loops for dictionary manipulation and data processing. Text Book 1: Chapter 7 (7.2 to 7.3), Chapter 8 (8.1 to 8.4) and Chapter 9(9.1 to 9.3, 9.7 to 9.12) RBT Levels:L1,L2,L3 Module-4 8 Hrs The NumPy: Ndarray: Understanding fundamental data structure. Basic Operations: Exploring mathematical and logical operations. Indexing, Slicing, and Iterating: Techniques for element manipulation. Conditions and Boolean Arrays: Utilizing Boolean arrays for filtering. Array Manipulation: Reshaping, resizing, and concatenating arrays. General Concepts: Overview of broadcasting and universal functions. Reading/Writing Array Data: Techniques for file operations. Pandas: Data Structures: Overview of Series and DataFrame. Functionalities on Indexes: Exploring hierarchical indexing. Operations Between Data Structures: Merging, joining, and concatenating. Function Application and Mapping: Applying functions for data transformation Text Book 2: Chapter 3 and Chapter 4. RBT Levels: L1, L2, L3 Module-5 8 Hrs The pandas: Introduction to Pandas I/O tools. Reading CSV and Textual Files. Reading/Writing HTML Files. Reading Data from XML Files. Reading Data from Excel Files. Reading JSON Data. Pickle Serialization. Pandas Data Manipulation: Data Preparation: Techniques for cleaning and preprocessing. Concatenating Data: Combining datasets. Data Transformation: Sorting, filtering, and replacing values. Text Book 2: Chapter 5 and Chapter 6 RBT Levels: L1, L2, L3 COURSE OUTCOMES: At the end of this course, students will be able to Explain the Python programming constructs comprehensively. **CO1** Apply looping and conditional constructs proficiently in program development. CO₂ Apply data structures effectively to solve real-world problems. **CO3** Implement NumPy constructs proficiently for matrix manipulations. **CO4**

SCHEME: 2023

III. CO-PO-PSO MAPPING (mark H=3; M=2; L=1) PO/PS 1 2 3 4 5 6 7 8 9 10 11 12 S1 S2 S3 S4 CO1 3 2 0 1	SCHEIVI	SCHEWIE: 2023 DATE: 22-05-2024															
III. CO-PO-PSO MAPPING (mark H=3; M=2; L=1) PO/PS 1 2 3 4 5 6 7 8 9 10 11 12 S1 S2 S3 S4 OO 3 2 3 4 5 6 7 8 9 10 11 12 S1 S2 S3 S4 CO1 3 2 1	CO	5 A	pply P	Panda c	onstr	ucts ade	eptly fo	or data a	nalyt	ics pu	rposes.						
PO/PS 1 2 3 4 5 6 7 8 9 10 11 12 S1 S2 S3 S4 CO1 3 2 1		III. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)															
O I	PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1 3 2 1	0																
CO2 3 3 1	CO1	3	2											2	1	1	1
CO3 3 3 1	CO2	3	3											1	1	1	1
CO4 3 3 1	<u>CO3</u>	3	3											1			1
V. Assessment Details (CIE & SEE) General Rules: Refer Annexure-1 section 1 Continuous Internal Evaluation (CIE): Refer Annexure-1 section 1 Semester End Examination (SEE): Refer Annexure-1 section 1 Semester End Examination (SEE): Refer Annexure-1 section 1 V. Learning Resources VII(a): Textbooks: Sl. Title of the Book Name of the author Edition and Year Name of the publisher 1 Python S. Sridhar, J. Ist edition 2023. Pearson publishers 2 Python Data Analytics Fabio Nelli 1st Edition, 2015. Apress, Publishing, Analytics VII(b): Reference Books: Ist edition 2020. Pearson Publisher 1 Intro to Python for Computer Science Adited 1st edition 2020. Pearson Publisher VII(c): Web links and Video Lectures (e-Resources): VII(c): Web links and Video Lectures (e-Resources): VII(c): SHX88ht7 VIII: Activity Based Learning / Practical Based Learning/Experiential learning: Assignments, Quizzes and Seminar	C04	3		3	2									1	2	1	1
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Semester End Examination (SEE): Refer Annexure-1 section 1 V. Learning Resources VII(a): Textbooks: Name of the author Edition and Year Name of the publisher 1 Python S. Sridhar, J. 1st edition 2023. Pearson publishers 2 Python Data Analytics Fabio Nelli 1st Edition, 2015. Apress, Publishing, VII(b): Reference Books: Paul Deitel and Harvey deitel 1st edition 2020. Pearson Publisher 1 Intro to Python for Computer Science and Data science https://www.youtube.com/watch?v=tA42nHmmEKw&list=PLh2mXjKcTPSACrQxPM2_10jus SHX88ht7 VIII: Activity Based Learning / Practical Based Learning/Experiential learning: Assignments, Quizzes and Seminar Seminar Seminar	Contin	uous	Inter	nal Ev	aluat	tion (Cl	(E): R	efer Anr	exur	e-1sec	tion 1						
V. Learning Resources VII(a): Textbooks: Sl. No. Title of the Book Name of the author Edition and Year Name of the publisher 1 Python Programming, Programming, Indumathi, V.M. Hariharan 1st edition 2023. Pearson publishers 2 Python Data Analytics Fabio Nelli 1st Edition, 2015. Apress, Publishing, VII(b): Reference Books: 1st edition 2020. Pearson Publisher 1 Intro to Python for Computer Science and Data science Paul Deitel and Harvey deitel 1st edition 2020. Pearson Publisher VII(c): Web links and Video Lectures (e-Resources): Pearson Publisher VII(c): Web links and Video Lectures (e-Resources): • Nptel: Introduction to Python for Data Science https://www.youtube.com/watch?v=tA42nHmmEKw&list=PLh2mXjKcTPSACrQxPM2_10jus SHX88ht7 YIII: Activity Based Learning / Practical Based Learning/Experiential learning: Assignments, Quizzes and Seminar Practical Based Learning/Experiential learning:	Semest	ter Er	id Exa	minati	on (S	EE): Ref	er Anr	nexure-1	sect	ion 1							
VII(a): Textbooks: Sl. No. Title of the Book Name of the author Edition and Year Name of the publisher 1 Python S. Sridhar, J. Indumathi, V.M. Hariharan 1st edition 2023. Pearson publishers 2 Python Data Analytics Fabio Nelli 1st Edition, 2015. Apress, Publishing, VII(b): Reference Books: 1st edition 2020. Pearson Publisher 1 Intro to Python for Computer Science and Data science Paul Deitel and Harvey deitel 1st edition 2020. Pearson Publisher VII(c): Web links and Video Lectures (e-Resources): Pearson Publisher • Nptel: Introduction to Python for Data Science https://www.youtube.com/watch?v=tA42nHmmEKw&list=PLh2mXjKcTPSACrQxPM2_10jus SHX88ht7 VIII: Activity Based Learning / Practical Based Learning/Experiential learning: Assignments, Quizzes and Seminar	V. Learning Resources																
Sl. No.Title of the BookName of the authorEdition and YearName of the publisher1Python Programming,S. Sridhar, J. Indumathi, V.M. Hariharan1st edition 2023.Pearson publishers2Python Data AnalyticsFabio Nelli1st Edition, 2015.Apress, Publishing,1Intro to Python for Computer Science and Data sciencePaul Deitel and Harvey deitel1st edition 2020.Pearson PublisherVII(c): Web links and Video Lectures (e-Resources):PublisherVII(c): Web links and Video Lectures (e-Resources):•Nptel: Introduction to Python for Data Science https://www.youtube.com/watch?v=tA42nHmmEKw&list=PLh2mXjKcTPSACrQxPM2_10jus SHX88ht7VIII: Activity Based Learning / Practical Based Learning/Experiential learning:	VII(a): Textbooks:																
1 Python S. Sridhar, J. 1st edition 2023. Pearson publishers 2 Python Data Indumathi, V.M. Hariharan Apress, Publishing, 2 Python Data Fabio Nelli 1st Edition, 2015. Apress, Publishing, VII(b): Reference Books: Paul Deitel and Harvey deitel 1st edition 2020. Pearson Publisher 1 Intro to Python for Computer Science and Data science Paul Deitel and Harvey deitel 1st edition 2020. Pearson Publisher VII(c): Web links and Video Lectures (e-Resources): Ist edition 2020. Pearson Publisher • Nptel: Introduction to Python for Data Science https://www.youtube.com/watch?v=tA42nHmmEKw&list=PLh2mXjKcTPSACrQxPM2_10jus SHX88ht7 SHX88ht7 VIII: Activity Based Learning / Practical Based Learning/Experiential learning: Assignments, Quizzes and Seminar	Sl. No.	Titl	e of tl	he Boo	k	Name	of the	f the author Edition and Year Name of public			ne of t ıblishe	the er					
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VII(b): Reference Books: 1 Intro to Python for Computer Science and Data science Paul Deitel and Harvey deitel 1st edition 2020. Pearson Publisher VII(c): Web links and Video Lectures (e-Resources): VII(c): Web links and Video Lectures (e-Resources): VII(c): Web links and Video Lectures (e-Resources): • Nptel: Introduction to Python for Data Science https://www.youtube.com/watch?v=tA42nHmmEKw&list=PLh2mXjKcTPSACrQxPM2_1Ojus 5HX88ht7 VIII: Activity Based Learning / Practical Based Learning/Experiential learning: Assignments, Quizzes and Seminar	2	Pythe Anal	on Dat ytics	ta		Fa	abio N	elli		1:	st Editi	on, 20	15.	A	press,	Publisl	ning,
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Nptel: Introduction to Python for Data Science https://www.youtube.com/watch?v=tA42nHmmEKw&list=PLh2mXjKcTPSACrQxPM2_10jus 5HX88ht7 VIII: Activity Based Learning / Practical Based Learning/Experiential learning: Assignments, Quizzes and Seminar	VII(c):	Web	links	and V	ideo	Lectur	es (e-l	Resourc	es):								
VIII: Activity Based Learning / Practical Based Learning/Experiential learning: Assignments, Quizzes and Seminar	•	 Nptel: Introduction to Python for Data Science https://www.youtube.com/watch?v=tA42nHmmEKw&list=PLh2mXjKcTPSACrQxPM2_1Ojus 5HX88ht7 															
Assignments, Quizzes and Seminar	VIII: A	Activi	ty Ba	sed Le	arnin	ng / Pra	ctical	Based I	learı	ning/E	xperie	ntial l	earnin	g:			
	Assign	ments	s, Quiz	zzes an	d Ser	ninar											

S.



Jai Sri Gurudev || Sri Adichuuchanagiri Shikshana Trust (R) nstitute of Technology



BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060 Approved by AICTE, New Delhi. Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015 Recognized by UGC, New Delhi with 2(f) & 12 (B)

(Department of Artificial Intelligence and Machine Learning)

Semester:	III	Course Type:			ETC				
Course Title: Introduction to Big Data Analytics									
Course Co	de:	23AIE313			Credits:	3			
Tea {O -	- Other p	lours/Week (L:T edagogies, mentio	(:P:O) on @}	3:0:0:0	Total Hours:	40			
CIE Mark	s: 50	SEE M	arks:	50	Total Marks:	100			
SEE Typ	e:	1	Гheory		Exam Hours:	03			
Pre-requisite: Basic understanding of programming concepts and proficiency in any programming language									
I. Course Objectives:									
• Understan	d fundar	nentals and applic	cations	of Big Data analytics					
Explore the second	he Hadoo	op framework and	l Hado	op Distributed File sys	tem and essential Had	oop Tools			
• Illustrate	the conc	epts of NoSQL us	sing Mo	ongoDB and Cassandra	a for Big Data				
Employ N	ЛарRedu	ice programming	model	to process the big data					
Understand various machine learning algorithms for Big Data Analytics, Web Mining and Social									
Network Analysis									
II. Teaching-Learning Process (General Instructions):									
The following are some of the strategies that teachers can employ to facilitate the achievement of various									
course outcomes:									
 Course outcomes: Diverse Teaching Methods: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students. Collaborative Learning: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter. Higher Order Thinking (HOT) Questions: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information. Problem-Based Learning (PBL): Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically. Multiple Representations: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles. Creative Problem Solving: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions. 									
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				i neory		0.11			
]	Modul	e-1		8 Hrs			

SCHEME	: 202	23											DATE	: 22-0	5-2024	
Introdu	ctio	n to	Big E	Data A	Analyt	ics: B	ig Da	ta, Sc	alabili	y and	Paral	lel Pro	ocessir	ng, De	signin	g Data
Architec	ture	, Data	a Sour	ces, Q	Quality	, Pre-	Proces	sing a	nd Sto	oring,	Data S	Storage	and	Analy	sis, Bi	g Data
Analytics Applications and Case Studies.																
Textboo	ok 1:	Chaj	pter 1:	: 1.2 -1	.7											
RBT L	evel	s: L1,	L2													
						Mo	dule-2	2							8 H	rs
Introdu	ictio	on to l	Hadoo	n (T1)	: Intro	ductio	n. Had	- loop ai	nd its I	Ecosyst	tem. H	adoop	Distril	outed F	File Sv	stem.
MapRe	duce	Fran	neworl	k and	Progra	ammin	g Mo	del, H	adoop	Yarn,	Hado	op Eco	osystei	n Too	ls. Ha	doop
Distrib	uted	l File	Syste	m Ba	sics (7	Г 2): Н	DFS I	Design	Featu	res, C	ompon	ents, I	HDFS	User	Comm	ands.
Essenti	al H	[adoo]	p Tool	ls (T2)	: Usin	g Apa	che Pig	g, Hive	, Sqoo	p, Flur	ne, Oo	zie, Hl	Base.			
Textbo	ok 1	: Cha	pter 2	2 :2.1-2	2.6 Tex	xtbook	2: Ch	apter	3, Ch	apter 7	7 (exce	pt wal	k thro	oughs)		
RBT L	evel	s: L1,	L2													
						Mo	dule-3	6						8	Hrs	_
NoSQL	Big	Data	Mana	gemen	t, Mon	igoDB	and C	assand	lra: Int	roducti	ion, No	SQL I	Data S	tore, N	loSQL	Data
Archite	cture	e Patt Dotob	erns, I	NoSQI	to M	lanage	Big I	Jata, S	shared	-Nothi	ng Arc	chitecti	ire for	Big I	Jata I	asks,
Textbo	DD, mk	Datat 1: Ch	ases, (anter :	3: 3.1-	dia Da 3.7	ilabase	5.									
DDTI	ovol		12													
NDI L	ever	S. L1,														
						Mo	dule-4	ļ						8	8 Hrs	
Introdu	ctior	n, Map	Redu	ce Maj	o Task	s, Red	uce Ta	isks an	d Map	Reduc	e Exec	ution,	Comp	osing 1	MapRe	educe
for Calc	culat	10ns a	nd Alg	gorithn	ns, Hiv	ve, Hiv	eQL, I	Pig.								
Textbo	OK I	: Cha	ipter 4	: 4.1-4	1.0											
RBT L	evel	s: L1,	L2													
						Mo	dule-5	;						8	8 Hrs	
Machir	Machine Learning Algorithms for Big Data Analytics: Introduction, Estimating the relationships,															
Outliers	s, Va	riance	es, Pro	babilit	y Distr	ibution	ns, and	Corre	lations	, Regre	ession a	analysi	s, Finc	ling Si	milar li	tems,
Similar	ity o Voh	1 Sets	and C	ollabo nk on	rative	Filterii	ng, Fre work	quent	Itemse	ts and	Associ	lation I	tule N	lining. Wah M	lining	Web
Content	t and	t Weł	n Usac	n k, a n re Ana	lytics	Page	Rank	Struc	ture of	Weh	and a	nalvzin	nnig, σaW	/eh Gr	anh S	ocial
Networ	k as	Grapl	is and	Social	Netwo	ork Ar	alytics	Strue			und u	1141 y 211	ig u n	00 01	upii, o	oolui
Textbo	ook 1	1: Ch	apter	6: 6.1	to 6.5	Textb	ook 1:	Chap	ter 9:	9.1 to 9	9.5					
RBT L	evel	s: L1,	L2, L	3												
		CO	DURS	E OU	ГСОМ	IES: A	At the e	end of	this co	urse, s	tudents	s will b	e able	to		
CO1	Ex	rplain	funda	mental	s and a	applica	ations of	of Big	Data a	nalytic	s					
		naluze	Hado	on fra	newor	·k Had	loon D	istribu	ted Fil	e svete	m and	escent	ial Ha	doon to	2016	
CO2			, mauo	opna	ine woi	K, 11a	loop D	isti iou	icu i n	c sysic	iii allu	essem	141 114	uoop u	5015.	
CO3	A	pply t	he con	cepts o	of NoS	QL us	ing Mo	ongoD	B and	Cassan	idra foi	r Big E	Data.			
664	D	emons	strate t	he Ma	pRedu	ice pro	ogram	ning n	nodel	to proc	cess th	e big d	lata al	ong w	ith Ha	doop
CO4	to	ols.			1	1	0	0		1		0		0		1
CO5	A	pply N	Machir	ne Lean	ming a	algorith	nms fo	r real v	world	oig dat	a, web	conte	nts and	1 Socia	al Netv	vorks
COS	to	provi	de ana	lytics	with re	elevant	visual	izatior	1 tools.							
				III.	CO-	PO-PS	SO MA	APPIN	G (ma	rk H=3	3; M=2	2; L=1)				
PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
0																
CO1	3				1							1	1			
CO2	2	1	2		1							1		2		
CO3		2	3	1	1							-			1	
CO4	2	1	3		1										1	1
05	1	2	3		1						<u> </u>	2				
					IV	. Ass	essme	nt Det	ails (C	CIE &	SEE)					
General	Ru	les: R	efer A	nnexu	re-1 se	ction 1										
			*													

Continuous Internal Evaluation (CIE): Refer Annexure-1section 1

Semester End Examination (SEE): Refer Annexure-1 section 1

V. Learning Resources								
VII(a)): Textbooks:							
Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher				
1	Big Data Analytics Introduction to Hadoop, Spark, and Machine Learning	Raj Kamal and Preeti Saxena,	2018	McGraw Hill Education, ISBN: 9789353164966				
2	Hadoop 2 Quick- Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem	Douglas Eadline,	1st Edition, 2016.	Pearson Education, ISBN13: 978- 9332570351				
VII(b): Reference Books:								
1	Hadoop: The Definitive Guide	Tom White	4 th Edition, 2015	O"Reilly Media, ISBN-13: 978- 9352130672				
2	Professional Hadoop Solutions	Boris Lublinsky, Kevin T Smith, Alexey Yakubovich	1 st Edition, 2014	Wrox Press, ISBN-13: 978-8126551071				
3	Hadoop Operations: A Guide for Developers and Administrators	Eric Sammer	1 st Edition, 2012	O'Reilly Media				
4	Big Data Analytics: A Hands-On Approach	ArshdeepBahga, Vijay Madisetti	1 st Edition, 2018	VPT Publications,				
VII(c)): Web links and Vide	eo Lectures (e-Resources):					
 <u>https://www.youtube.com/watch?v=n_Krer6YWY4</u> <u>https://onlinecourses.nptel.ac.in/noc20_cs92/preview</u> <u>https://www.digimat.in/nptel/courses/video/106104189/L01.html</u> <u>https://web2.qatar.cmu.edu/~mhhammou/15440-f19/recitations/Project4_Handout.pdf</u> VIII: Activity Based Learning / Practical Based Learning/Experiential learning: 								
Assig	nments, Quizzes and S	eminar.						
8	,							

S

S



Jai Sri Gurudev || Sri Adichunchanagiri Shikshana Trust (R) titute of Technology



8 Hrs

BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060 Approved by AICTE, New Delhi. Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015 Recognized by UGC, New Delhi with 2(f) & 12 (B)

(Department of Artificial Intelligence and Machine Learning)

Semester:	III	Co	ourse Type:			ETC			
Course Title: Introduction To Cyber Security									
Course Co	de:	2	3AIE314			Credits:	3		
Teaching Hours/Week (L:T:P:O){O – Other pedagogies, mention @}				:P:O) on @}	3:0:0:0	Total Hours:	40		
CIE Mark	CIE Marks: 50 SEE Marks:			arks:	50	Total Marks:	100		
SEE Typ	e:		Т	Theory		Exam Hours:	03		
Pre-requisite:									
 I. Course Objectives: To familiarize cybercrime terminologies and ACTs Understanding cybercrime in mobiles and wireless devices along with the tools for Cybercrime and prevention Understand the motive and causes for cybercrime, cybercriminals, and investigators Understanding criminal case and evidence, detection standing criminal case and evidence 									
II. Teaching-Learning Process (General Instructions):									
The following course outcom	are som es:	e of t	he strategies	that to	eachers can employ to	facilitate the achiev	vement of various		
 Divers alterna activiti Visual enhance Collab foster 1 Higher class. 	se Teach tive and ies, or m Aids: U ce under: oorative teamwor r Order These qu	ning M effect ultime Jtilize standin Learn k, com Thin uestion	Aethods: Institute teaching edia presenta videos and ng and engag ning: Encou nmunication king (HOT) ns stimulate	stead o appro- tions. anima gement rage g , and a Quest critica	of relying solely on tra aches. These might inc tions to elucidate com t among students. roup learning within t deeper grasp of subject tions: Pose at least thre al thinking and encour	ditional lecture met lude interactive disc plex concepts. Visu he classroom. Colla et matter. ee thought-provoking age students to ana	hods, can explore cussions, hands-on al representations borative activities g questions during lyze and evaluate		
5. Proble beyond critical	ation. e m-Base d rote mo lly. ble Rep i	d Lea emoriz	arning (PB) zation by cha ations: Intro	L): Im allengi	plement PBL, which ng students to design s	nurtures analytical olutions, evaluate ev presentations. Visua	skills. PBL goes vidence, and think		
7. Creati	orld examine Prob	nples lem S	cater to dive Solving: Pres	erse lea sent di	rning styles. fferent approaches to s	solving the same pro-	oblem. Encourage		
studen 8. Real-V theoret	ts to thir Vorld A tical kno	ik outs Applic wledg	side the box ation: Discu e to real-wo	and de uss ho rld cor	vise their own innovat w each concept relate atexts enhances student	ive solutions. es to practical scen s' comprehension a	arios. Connecting nd retention.		
□ Chalk &	Talk 🗆 S	Stud. A	Assignment	🗆 Weł	Resources 🗆 LCD/Sr	nart Boards 🗆 Stud.	Seminars		
				COUI	RSE CONTENT				
					Theory				

Module-1

Introduction to Cybercrime: Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, who are Cybercriminals? Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000. Textbook1:Ch1 (1.1 to 1.8). RBT Levels: L1, L2	ion									
Security, who are Cybercriminals? Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000. Textbook1:Ch1 (1.1 to 1.8). RBT Levels: L1, L2										
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Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000. Textbook1:Ch1 (1.1 to 1.8). RBT Levels: L1, L2	Cybercrime: The Legal Perspectives,									
Textbook1:Ch1 (1.1 to 1.8). RBT Levels: L1, L2	Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000.									
KB1 Levels: L1, L2	1 extDook1:Ch1 (1.1 to 1.8).									
Madula 2 9 Ilua	ND1 LUUIS, L1, L2									
Module-2 8 Hrs										
Cyber offenses: How Criminals Plan Them: Introduction, How Criminals Plan the Attacks, Socia	.1									
Engineering, Cyber stalking,										
Textbook1: Ch2 (2.1 to 2.7).										
RBT Levels: L1, L2										
Module-3 8 Hrs										
Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing	;,									
Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Stegenegraphy, DeS and DDeS Attacks, Attacks on Windows Networks										
Textbook1: Ch4 (4.1 to 4.9, 4.12).										
RBT Levels: L1, L2										
Module-4 8 Hrs										
Understanding the people on the scene: Introduction, understanding cyber criminals, understanding	g									
cyber victims, understanding cyber investigators.										
Ine Computer Investigation process: investigating computer crime. Understanding Cybercrime Provention: Understanding Network Security Concents Understanding	a									
Basic Cryptography Concepts, Making the Most of Hardware and Software Security	3									
Textbook 2: Ch3, Ch 4, Ch 7										
RBT Levels: L1, L2										
Module-5 & Hrs										
Cybercrime Detection Techniques: Security Auditing and Log Firewall Logs, Reports, Alarms, and	d									
Alerts, Commercial Intrusion Detection Systems, Understanding E-Mail Headers Tracing a Domain Name	e									
or IP Address.										
Collecting and preserving digital Evidence: Introduction, understanding the role of evidence in a ariminal area collecting digital avidence preserving digital avidence.	a									
documenting evidence.	,									
Textbook 2:Ch 9, Ch 10.										
RBT Levels: L1, L2	-									
COURSE OUTCOMES: At the end of this course, students will be able to										
COURSE OUTCOMES: At the end of this course, students will be able to CO1 Describe the cybercrime terminologies										
COURSE OUTCOMES: At the end of this course, students will be able to CO1 Describe the cybercrime terminologies CO2 Analyze cybercrime in mobiles and wireless devices along with the tools for Cybercrime and	1									
COURSE OUTCOMES: At the end of this course, students will be able to CO1 Describe the cybercrime terminologies CO2 Analyze cybercrime in mobiles and wireless devices along with the tools for Cybercrime and prevention CO2 Analyze the motive and causes for cybercrime, cybercriminals, and investigators	1									
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COURSE OUTCOMES: At the end of this course, students will be able to CO1 Describe the cybercrime terminologies CO2 Analyze cybercrime in mobiles and wireless devices along with the tools for Cybercrime and prevention CO3 Analyze the motive and causes for cybercrime, cybercriminals, and investigators CO4 Apply the methods for understanding criminal case and evidence, detection standing criminal case and evidence, detection standing criminal case and evidence. III. CO-PO-PSO MAPPING (mark H=3; M=2; L=1) PO/PS 1 2 3 4 5 6 7 8 9 10 11 12 S1 S2 S3 S2 CO1 3 1	d 1 34									
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COURSE OUTCOMES: At the end of this course, students will be able to CO1 Describe the cybercrime terminologies CO2 Analyze cybercrime in mobiles and wireless devices along with the tools for Cybercrime and prevention CO3 Analyze the motive and causes for cybercrime, cybercriminals, and investigators CO4 Apply the methods for understanding criminal case and evidence, detection standing criminal case and evidence, detection standing criminal case and evidence. III. CO-PO-PSO MAPPING (mark H=3; M=2; L=1) PO/PS 1 2 3 4 5 6 7 8 9 10 11 12 S1 S2 S3 S2 CO1 3 1	d 									

DATE: 22-05-2024

Continuous Internal Evaluation (CIE): Refer Annexure-1section 1

Semester End Examination (SEE): Refer Annexure-1 section 1

	V. Learning Resources								
VII(a): Textbooks:								
Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher					
1	Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	SunitBelapure and Nina Godbole,	2013	Wiley India Pvt Ltd, ISBN: 978-81- 265- 21791					
2	Scene of the cybercrime	Debra Little John Shinder and Michael Cross	2nd edition, 2008	Syngress publishing Inc, Elsevier Inc					
VII(b	VII(b): Reference Books:								
1	Software Forensics	Robert M Slade,	2005	Tata McGraw Hill, New Delhi					
2	Cybercrime	Bernadette H Schell, Clemens Martin	2004	ABC – CLIO Inc, California,					
3	Computer Forensics and Investigations	Nelson Phillips and EnfingerSteuart,	2009	Cengage Learning, New Delhi					
4	Incident Response and Computer Forensics	Kevin Mandia, Chris Prosise, Matt Pepe	2006	Tata McGraw -Hill, New Delhi					
VII(c)): Web links and Vide	eo Lectures (e-Resources):						
 <u>https://www.youtube.com/watch?v=czDzUP1HclQ</u> <u>https://www.youtube.com/watch?v=qS4ViqnjkC8</u> <u>https://www.trendmicro.com/en_nz/ciso/21/h/cybercrime-today-and-the-future.html</u> 									
VIII:	Activity Based Learn	ing / Practical Based Le	arning/Experiential learning	g:					
Assig	nments, Quizzes and Se	eminar.							



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Department of Artificial Intelligence and Machine Learning

Semester:	III Course	Туре:		AEC				
Course Title: Da	ta Visualisation	and Analysis W	ith Power BI					
Course Code	: 23AI	[AE31		Credits:	01			
Tea {O	ching Hours/W – Other pedagog	eek (L: T: P: O) gies, mention @}	1:0:0:3	Total Hours:	40			
CIE Marks:	50	SEE Marks:	50	Total Marks:	100			
SEE Type:		Theory		Exam Hours:	2.00 Hrs			
Pre prerequisite: Basic understanding of data analysis concepts and familiarity with spreadsheet software like Excel. Additionally, knowledge of SQL for data querying and manipulation would be beneficial for advanced data analysis tasks in POWER BI.								
I. Course Objec	tives:							
 To gain a foundational understanding of Power BI, including Power BI Desktop and the Power BI website. To create various data visualizations, including stacked and clustered bar charts, waterfall charts, scatter plots, filled maps, and 3D maps. To prepare and transform data using Power Query for acquisition, grouping, binning, merging, joining, and transformation. To design and build interactive reports and dashboards, utilizing bookmarks, buttons, and KPIs for enhanced user interactivity. To perform advanced data analysis with DAX, creating measures, calculated columns, and using functions like SUMX IF FILTER DatesInPeriod DatesBetween and WeekToDate 								
II. Teaching-Le The following ar	earning Process ((General Instruc	tions): hers can employ t	o facilitate the achi	evement of various			
course outcomes:	e some of the su	futegies that teach	iers can employ c	s nuclinate the ucli	evenient of various			
 Course outcomes: Diverse Teaching Methods: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students. Collaborative Learning: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter. Higher Order Thinking (HOT) Questions: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate 								
 Problem-Based Learning (PBL): Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically. Multiple Representations: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles. Creative Problem Solving: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions. Real-World Application: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention. 								
⊔ Chalk & Ta	Ik 🗆 Stud. Assig	nment 🗆 Web Res	sources 🗆 LCD/Sr	nart Boards 🗌 Stud.	. Seminars			

DATE:22-05-2024

III. COURSE C	CONTENT
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Module-1: Power BI Essentials

8 Hrs

Utilize POWER BI Desktop and its web counterpart, acquiring data from various sources including CSV files and folders. Master data transformation with Power Query, create visualizations, and distinguish between dashboards and reports for effective data presentation. Textbook1: **RBT Levels: L1, L2, L3, L4 Module-2: Visualization in POWERBI** 8 Hrs Advanced visualization techniques in POWER BI, including various chart types, map visualizations, and interactive features like slicers, bookmarks, and buttons. Additionally, explore data grouping, binning, and Key Performance Indicators (KPIs) for effective data analysis and presentation. Textbook1: RBT Levels: L1,L2,L3, L4 **Module-3: Basic Data Transformation in Power BI** 8 Hrs Power Query basics, data preparation, and importing data from Excel and Azure SQL Database. Understand the difference between reference vs duplicate and append vs merge in POWER BI for effective data transformation. Textbook1: RBT Levels: L1, L2, L3,L4 **Module-4: Advanced Data Transformation in Power BI** 8 Hrs Advanced data manipulation techniques in POWER BI, including merge join types, pivot operations, grouping, exception reporting, flawless date conversion, and numeric division. These skills enhance ability to handle diverse data scenarios efficiently. Textbook1: RBT Levels: L1, L2, L3,L4 **Module-5: Power BI Modeling And DAX** 8 Hrs Advanced data modelling and calculation techniques in POWER BI, including sorting, data preparation, relationship management, and using measures versus calculated columns. Explore functions like SUM vs SUMX, IF and FILTER, and address DAX time zone issues, enhancing data analysis skills. Textbook 1: RBT Levels: L1, L2, L3,L4 COURSE OUTCOMES: At the end of this course, students will be able to Apply Power BI Desktop and its web counterpart to acquire, prepare, and transform data from **CO1** various sources, including CSV files and Azure SQL Database, using Power Query. Apply advanced visualization techniques, including various chart types, map visualizations, and **CO2** interactive features like slicers, bookmarks, and buttons, for effective data presentation. Implement data modeling techniques, including designing star schemas, managing relationships, **CO3** and differentiating between measures and calculated columns. Perform advanced data analysis and calculations with DAX, using functions like SUM vs SUMX, **CO4** IF, FILTER, and handling DAX time zone issues. Develop an interactive reports and dashboards, publish reports, and pin them to dashboards in the **CO5** PowerBI.com service, utilizing KPIs for performance tracking. IV. CO-PO-PSO MAPPING (mark H=3; M=2; L=1) PO/PSO 1 2 3 4 5 6 7 8 9 10 11 12 **S**1 S2 S3 S4 CO1 3 3 1 3 2 CO2 3 2 CO3 2 1 1 CO4 3 3 CO5 2 2 2 1 V. Assessment Details (CIE & SEE)

General Rules: Refer Annexure-1 section 5

Continuous Internal Evaluation (CIE): Refer Annexure-1section 5

Semester End Examination (SEE): Refer Annexure-1 section 5

VII(a): Textbooks:								
Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher				
	Power BI Cookbook:							
1	Creating Business	Brett Powell	Second edition 2018	Packt Publishing				
	Intelligence Solutions of							
	Analytical Data Models,							
	Mastering Microsoft Power			Packt Publishing				
2	BI: Expert techniques for	Brett Powell	Third Edition 2020	I dekt I donsning				
2	effective data analytics and	Diewien						
	business intelligence							
	Power BI 10-Day Pass: A							
3	Practical Guide to Building	Paul Turley	First Edition 2019	Independently				
VII/b	• Reference Books•			published				
V II(U). Reference books.			1				
1	M is for (Data) Monkey: A	Ken Puls and Miguel	First Edition 2015	Holy Macro! Books				
	Guide to the M Language in Excel Power Query	Escobar						
2	Analyzing Data with Power	Alberto Ferrari and	Second Edition 2017	Microsoft Press				
	BI and Power Pivot for Excel	Marco Russo						
VII(c)	: Web links and Video Lect	ures (e-Resources):		•				
•	[Microsoft Power BI Offici	al Website] (https://powe	rbi.microsoft.com/)					
•	[Power BI Tips] (https://po	werbi.tips/)	,					
•	[Guy in a Cube] (https://gu	yinacube.com/)						
•	[Power BI Blog] (https://po	werbi.microsoft.com/en-	<u>us/blog/</u>)					
•	[Enterprise DNA] (https://v	vww.youtube.com/channe	el/UCiNm8KMJWggC4iI	RrxtnkovA)				
VIII:	Activity Based Learning / P	ractical Based Learning	/Experiential learning:					

Assignments, Quizzes and Seminar, Mini projects



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Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015 Recognized by UGC, New Delhi with 2(f) & 12 (B)

Department of Artificial Intelligence and Machine Learning

Semester:	III	Course 7	Гуре:	NCMC						
Course Title: Skilful Futures: Empowering Aptitude and Soft skills										
Course Code	:	23PD	23PDSN03			PP/NP				
Tea {C	aching) – Oth	Hours/We er pedagogi	ek (L: T: P: O) es, mention @}	0:0:0:2	Total Hours:	24				
CIE Marks:		50	SEE Marks:	NA	Total Marks:	50				
SEE Type:		Theory/p	oractical/other as	sessment	Exam Hours:	NA				
Pre prerequisite:										

I. Course Objectives:

- To strengthen logical and analytical thinking skills required to solve quantitative problems.
- To discuss the importance of ethical considerations in leadership and negotiation, emphasizing integrity, fairness, and accountability in decision-making and interactions.
- To apply problem-solving strategies to real-world situations.
- To crafting Effective Openings and Closings.
- To develop a systematic approach to creative problem solving

II. Teaching-Learning Process (General Instructions):

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

- 1. **Diverse Teaching Methods**: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
- 2. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
- 3. **Collaborative Learning**: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
- 4. **Higher Order Thinking (HOT) Questions**: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
- 5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
- 6. **Multiple Representations**: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
- 7. **Creative Problem Solving**: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
- 8. **Real-World Application**: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.
- □ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

III. COURSE CONTENT	
Module-1: Quantitative Aptitude-1	6 Hrs
Problems on Permutation and Combination. Problems on Surds and Indices	
Module-2: Visualiz Leadership and Negotiation skills	4 Hrs
Leader skills, Persuasion Skills, Negotiation Skills and Conflict Resolving Skills	
Module-3: Quantitative Aptitude – 02	6 Hrs
Problems on Percentage, Problems on Profit and Loss, Problems on cubes and Dices	

SCHEME: 2023 DATE:22-05-2024																
Module	-4: I	Lette	r and '	Writir	ig Skil	ls									4 H	rs
Writing	S	kills,	Forr	nal,	Inform	nal L	etters,	Sam	ple	Letters,	Bus	iness	Profe	essiona	l wri	tings
and Ada	ptab	ility	in writ	ing sty	le											
Module	-5: I	logic	al Rea	sonin	g	1									4 H	íS
Syllogis	Synogism Concepts and Logical Deduction															
COURS	E O	UTC	OMES	S: At t	he end	of this	course	e, stud	ents y	will be a	ble to					
CO1	Solve complex problems related to Arithmetic, algebra, geometry, Statistics Permutation and Combination, demonstrating a strong understanding of the concepts.															
CO2	Ap	ply S	burds a	nd Ind	ices co	oncepts	profic	eiently	to so	lve math	nemati	cal pro	blems	with p	recisio	n.
CO3	De coi	velop	leado resolu	ership tion te	skills chniqu	, inclu ies.	ding e	effectiv	ve co	ommunio	cation,	persu	asion,	negot	tiation,	and
CO4	De sho	mons	strate p sing qu	oroficie antitat	ency in tive ap	n solvir titude.	ng Perc	centag	e, Pro	ofit and 1	Loss, a	and cu	bes an	d Dice	s probl	ems,
CO5	En wr	hance itings	e writin s, and a	ng skil idaptin	ls by e 1g writ	ffective ing sty	ely con les to c	nposin liffere	g for nt co	mal and intexts.	inform	al lette	ers, bus	siness p	orofess	ional
				IV.	CO-	PO-PS	O MA	PPIN	G (m	ark H=3	; M=2	; L=1)				
PO/PSO	1	1 2 3 4 5 6 7 8 9 10 11 12 S1 S2 S3 S4										S4				
CO1	2	2						2				1	1		2	1
CO2								2	2			2		2		
CO3	2	2						2				2			1	
CO4						ļ				2		2				2
CO5	05 2 2 1 1 1 1 1															
					V.	Ass	essmei	nt Det	ails (CIE & S	SEE)					
General	Rul	es: R	efer A	nnexu	e-1 se	ction 8										
Continu	ous	Inter	nal Ev	aluati	on (C	IE): Ro	efer Ar	nnexur	e-1se	ection 8						
Semeste	r End	d Exa	minati	ion (SE	E): Re	fer Anr	nexure	-1 sect	tion 8	3						
						VI.	Le	earnin	ig Re	sources						
VII(a):	ext	book	s:													
SI. No.		Title	of the	Book		Name	of the	autho	or	Edition	and h	Year	Nar	ne of t	he put	olisher
) . f .		Deal													
1 VII(D):		rence ntitat	ive An	s: titude	for	P	S Agar	wal			2017			S (hand	
1	Con	nnetit	ive exa	aminat	ion	K	5 Agai	vv ai		4	2017			50	Jiiaiiu	
2	Are	we le	eading	?	·	Kaush	ik Mah	aputh	ra		2020			Notio	on pres	s
4	A modern approach to R S Agarwal 2019 S Chand															
logical reasoning																
VII(c): V	Veb	links	and V	Video	Lectu	res (e-l	Resour	ces):								
• 1	ittps	://swa	ayam.g	gov.in/	explor	er_										
• <u>1</u>	<u>ittps</u>	://npt	el.ac.in	n/cours	ses											
VIII: Ac	VIII: Activity Based Learning / Practical Based Learning/Experiential learning:															

Assignments, Quizzes and Seminar, group discussions etc.



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Department of Mathematics

Semester:	IV Co	urse Type:	BSC							
Course Title:	Probabili	ity Distribution	s and Statistical M	ethods						
Course Code	: 23AIT	401		Credits:	3					
Teaching Ho	urs/Week	(L:T:P:O)	2:2:0:@	Total Hours:	40					
CIE Marks:	50	SEE Marks	: 50	Total Marks:	100					
SEE Type:	Theory			Exam Hours:	3					
I. Course Objectives:										
 This course will To facili Understa Learn th 	 This course will enable students to : To facilitate the students with a concrete foundation of probability distributions. Understand the concepts of sampling distributions. Learn the concepts of curve fitting and statistical techniques. 									
II. Teaching-L	earning F	Process (Genera	l Instructions):							
 In additi State the Grading Encourage 	on to the t need for l assignmen ge the stud	raditional lecture Mathematics wit nts and quizzes a lents for group le	e method, innovative h Engineering Studi nd documenting stu earning to improve t	e teaching methods sha les and Provide real-lif dents' progress. heir creative and analy	Il be adopted. e examples. rtical skills.					
		III. CO	OURSE CONTENT	ſ						
Module-1: Cur	ve fitting	and Statistical	Fechniques		8Hrs					
Curve fitting by method of least squares: $y = ax+b$, $y = ax^2 + bx+c$ and $y = ab^x$, Correlation–Karl Pearson's coefficient of correlation, Regression analysis – lines of regression (without proof)- problems, Rank correlation. Applications of multiple regression in performance tuning and optimization in software engineering. * Application problems to be excluded for SEE										
Textbook1: Chapter 24(24.4 to 24.6, 24.8) ,Chapter 25(25.12 to 25.14, 25.16).										
Self Learning:	Angle bet	ween two regress	sion lines, problems	, Fitting of the curve y	= ax ^b					
RBT Levels:L1, L2 and L3										
Module-2: Pro	Module-2: Probability Distributions8Hrs									

Review mass a distribu deviati Applic * Appl Textbe	v of basic probability theory. Random Variables (Discrete and Continuous). Pr nd density functions. Mathematical expectation, Mean and varience. Discrete utions: Binomial, Poisson and Normal distributions (derivations for mean and s on for Binomial and Poisson distributions only)-Illustrative examples. ations to analyze the performance of the algorithms. lication problems to be excluded for SEE. pok1: Chapter 26.7 to 26.10, 26.14 to 26.17.	obability probability standard					
Self Lo	earning: Geometric distribution and Exponential distribution.						
KBI							
Modu	le-3: Two dimensional Random variables and Stochastic process	8Hrs					
Stocha Stocha Matrice Applic * Appl	tion coefficient. astic process: stic processes, probability vector, stochastic matrices, fixed points, regular stoc es, Markov chains, higher transition probability-simple problems. ations to rank web pages based on their importance. lication problems to be excluded for SEE).	ce, hastic					
Textbo	bok2: Chapter 31(31.1,31.2).						
Self L	earning: Conditional density function.						
RBT	Levels: L1, L2 and L3						
Modu	le_1. Sampling distributions	8Hrs					
WIUUU		01113					
hypoth distribu Textb Self Lo	tection to Sampling distributions, Standard error, Type-1 and Type-11 errors. Tes desis for means. Confidence limits for means, Student's t-distribution, Chi-squar ution as a test of goodness of fit. F-distribution. book1: Chapter 27 (27.1 to 27.8, 27.10 to 27.12, 27.14, 27.15, 27.17, 27.18 and earning: Point estimation and interval estimation.	re 27.19).					
RBT	Levels: L1, L2 and L3						
Modu	le-5: Design of Experiments & ANOVA	8Hrs					
Princip block o ANOV Textbo Self Lo	bles of experimentation in design, Analysis of completely randomized design, ra design. The ANOVA Technique, Basic Principle of ANOVA, One-way ANOV (A, Latin-square Design. bok3: Chapter 12(12.4, 12.5, 12.6). earning: Analysis of Co-Variance	andomized A, Two-way					
ND1							
	IV.COURSE OUTCOMES The student will be able to:						
CO1	Illustrate the basic concepts of statistics, probability and sampling theory.						
CO2	Apply the knowledge of statistical techniques and probability distributions of variables .	of Random					
CO3	3 Analyse the concepts of statistics, sampling techniques and probability distributions for models arising in the engineering field.						
CO4	Interpret the strength and limitations of statistical data, probability distrib sampling theory.	utions and					

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)																	
PC)/	1	2	3	4	5	6	7	8	9	10	11	12	S1		S2	S3
PS	0																
CO	1	3	2	1									1	1		2	
CO	2	3	2	1									1	1		3	
CO	3	3	2	1									1	1		3	
CO	4	3	2	1									1	1		2	
	VI. Assessment Details (CIE & SEE)																
Ger	General Rules: Refer CIE and SEE guidelines based on course type for autonomous scheme 2023																
Cor	ntinu	ious I	ntern	al Eva	aluatio	on ((CIE): 1	Refer	annex	ure se	ction	1					
Sen	iest	er En	d Exa	minat	ion (S	EE)	: Refe	er ann	exure	sectio	n 1						
							VII. I	Learı	ning R	esour	ces						
VII	(a):	Textb	ooks:														
SI No	l. D.	Title of the Book Name of the author Name of the publisher															
1		High	er Eng	gineer	ing Ma	ather	natics]	B.S. G1	rewal				Khanna Publishers			
2		Higher Engineering MathematicsB.V.RamanaTata Mc Graw-Hi									·Hill						
3		Prob Engi	abilit neers	y & S1 & Scie	tatistic: entists	s for]	Ronalo Raymo L Myer	1 E. W nd H∃ s & K	Valpole Myers Leying	e, 5, Sharo 5 Ye	on	Pearso	on l	Educa	tion
VII	(b):	Refe	ence	Books	5:												
1	Ad Ma	vance thema	d Eng atics	ineeri	ng	E	. Kreys	szig			J	lohn W Sons	iley &	è	10 ^t	^h Ed.,	2016
2	Ad Ma	vance thema	d Eng atics	ineeri	ng	C B	. Ray V arrett	Wylie	lie, Louis C. McGraw – Book Co.,				w – H Co.,	ill	6th	Ed., 2	2017
3	Pr for	obabil Engir	ity & neers &	Statis & Scie	tics entists	R R L	onald aymor Myers	E. Wa nd H s & K	alpole, Myers, Leying	Sharo Ye	on H	Pearson Educati	n ion		9th	Ed., 2	2023.
4	Lir Ap	near A plicat	lgebra ions	and i	ts	D	avid C	C Lay			I I	Pearson Publish	1 Iers		4th	1 Ed., 2	2018.
VII	(c):	Web	links	and V	ideo L	lectu	ıres (e	-Res	ources):							
	 http://nptel.ac.in/courses.php?disciplineID=111 http://www.class-central-central.com/subject/math(MOOCs) http://academiccarth.org/ VTU EDUSAT programme-20 																
VIII: Activity Based Learning																	
Ass	Assignments / Quiz / Presentation.																



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BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060

Recognized by UGC, New Delhi with 2(f) & 12 (B)

Department of Artificial Intelligence and Machine Learning

Semester:	IV	Course Typ	be:	PCC								
Course Title:	Analysis	s & Design of	Algorith	ims								
Course C	Course Code:23AIT402Credits:03											
Tea {O	ching H - Other p	lours/Week (L edagogies, me	L:T:P:O) ntion @}	3:0:0:0	Total Hours:	40						
CIE Mark	s:	50	SEE Marks:	50	Total Marks:	100						
SEE Type: Theory Exam Hours: 03												
Pre-requisites: Fundamental knowledge in the C/C++ programming language												

I. Course Objectives:

- To Understand how to analyze algorithms and evaluate their performance.
- To State algorithm efficiencies using asymptotic notations.
- To Apply various algorithm design techniques, including brute force, greedy, divide and conquer, decrease and conquer, transform and conquer, dynamic programming, backtracking, and branch and bound.
- To Choose appropriate data structures and algorithm design methods for specific applications.
- To Familiarize yourself with the P and NP complexity classes.

II. Teaching-Learning Process (General Instructions):

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

- 1. **Diverse Teaching Methods**: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
- 2. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
- 3. **Collaborative Learning**: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
- 4. **Higher Order Thinking (HOT) Questions**: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
- 5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
- 6. **Multiple Representations**: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
- 7. Creative Problem Solving: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
- 8. **Real-World Application**: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.

□ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

COURSE CONTENT

Theory

SCHEME: 2023 DATE:22-05-2024 Module-1 8 Hrs Introduction-Perspectives: In the field of computer science and algorithmic problem-solving, various business domains and applications benefit from algorithmic techniques. Business domain: Banking, Finance services, IT, Manufacturing, e-Commerce, Online services and marketing, Logistics and Supply Chain Management, Telecommunication. Applications: Communication & Networking, Search engines, Machine learning, Database management, Software tools development, Data organization, GPS navigation systems Introduction to Algorithms: Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Fundamentals of the Analysis of Algorithmic Efficiency: Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non-recursive and Recursive Algorithms. Brute force design technique: Selection Sort and Bubble Sort. **Textbook 1:** Chapter 1 (Sections 1.1,1.2), Chapter 2(Sections 2.1,2.2,2.3,2.4), Chapter 3(Section 3.1,3.2) **Textbook 2:** Chapter 1(section 1.1,1.2,1.3) RBT Levels: L1, L2, L3 Module-2 8 Hrs Divide and Conquer: Merge sort, Quicksort, Multiplication of Long Integers, Strassen's Matrix Multiplication. Decrease and Conquer: Insertion Sort, Depth First Search, Breadth First Search, Topological Sorting, Application of DFS and BFS. **Textbook 2:** Chapter 3(Sections 3.1,3.3,3.4,3.5,3.6) Textbook 1: Chapter 4 (Sections 4.1,4.2,4.3), Chapter 5(Section 5.1,5.2,5.3) RBT Levels: L1, L2, L3 Module-3 8 Hrs Transform and Conquer: Presorting, Heapsort, Problem reduction. Space and Time Tradeoffs: Sorting by Counting, Naive String Matching, Input Enhancement in String Matching: Horspool's and Boyer-Moore algorithm. Textbook 2: Chapter 4(Sections 4.1,4.3,4.5) **Textbook 1**: Chapter 9(Section 9.1,9.2,9.3,9.4), Chapter 6(section 6.4) **RBT Levels:L1,L2,L3** Module-4 8 Hrs Dynamic Programming: Computing a Binomial Coefficient, Warshall's and Floyd's Algorithms, Knapsack Problem and Memory Functions. Greedy Technique: Prim's Algorithm, Dijkstra's Algorithm, Huffman Trees and codes, Fractional Knapsack Problem. **Textbook 2**: Chapter 5 (Sections 5.1,5.2,5.4,5.9) Textbook 1: Chapter 8(Sections 8.2,8.4), Chapter 7 (Sections 7.1,7.2) RBT Levels: L1, L2, L3 Module-5 8 Hrs Backtracking: N-Queen's Problem, Sum of Subset Problem. Branch-and-Bound: Travelling Salesperson Problem, Assignment Problem Decision Trees: Decision Trees for Sorting NP and NP-Complete Problems: Basic Concepts, Non- Deterministic Algorithms, P, NP, NP Complete, and NP-Hard classes **RBT Levels: L1,L2,L3 COURSE OUTCOMES** Apply computing knowledge and mathematical principles to design algorithms. **CO1** Apply divide and conquer and decrease and conquer techniques to solve problems and analyze **CO2** their effectiveness. Demonstrate algorithmic principles and theory to model and evaluate computer-based solutions, **CO3** considering design trade-offs. Apply dynamic programming techniques to solve problems, enhancing algorithm time **CO4** efficiency even if it requires sacrificing space Analyze backtracking and branch-and-bound methods, and describe the concepts of P, NP, and **CO5** NP-Complete problems. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

SCHE	SCHEME: 2023 DATE:22-05-2024																
PO/PS	SO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S	2 S3	S4
CO1		2	2	2	1	2					1		2	2	2		
CO2		1	2	3	1	1					1		2	1	2		
CO3		2	2	3	1	2					1		2	1	1		
CO4		2	2	3	1	2					1		2	1	2		
CO5		1	2	3	1	1					1		2	2	1		
Asses	Assessment Details (CIE & SEE)																
Gen	eral	Rul	es: Re	efer A	nnexu	ire-1	section	1									
Conti	nuo	us I	nterna	al Ev	aluati	on (C	CIE): R	efer A	nnexur	e-1sec	tion 1						
Sem	este	r En	d Exa	mina	ation ((SEE): Refei	Anne	xure-1	sectio	n 1						
Learr	ning	Res	ource	S													
Textb	ook	s:															
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No.		I	itle of	the .	ROOK			Na	me or	the au	tnor		a	nd Yea	ar	publi	sher
1	Int	trodu	iction	to the	e Desi	gn	Anany	/ Levit	in				3rd	l Editio	on,	Pearson	, ISBN
	an	d An	alysis	of A	lgoritl	hms							20	12		13:978-	0-13-
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2	Co	ompu	iter Al	lgorit	hms/C	:++,	Ellis Horowitz, SatrajSahni and							2nd Edition,		Universi	ities
							Rajase	ekaran	,				20	14,		Press	
Refer	enco	e Bo	oks:														
1	Int	trodu	iction	to Al	gorith	ms	Thom	as H. (Corme	n, Chai	rles E.	C 1	3r	d Editi	on	PH	Π.
							Leiser	son, R	onal L	. Rives	st, Chi	Iord					
2	Int	trodu	iction	to Al	gorith	ms	Corm	en T H	Leis	erson (TE R	ivest	310	1 Editi	on	PH	Π
		nout	Cuon	10 1 11	gorin	1115	R.L.,	Stein C	2., De is	015011	э. ш. , к	1,000		2010.	<u>,</u>	ISBN:9	780262
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3	De	esign	and A	Analy	sis of		S. Sri	dhar								Oxford	Higher
	Al	gorit	hms													Educa	ation
VII(c)): W	eb l	inks a	nd V	ideo]	Lectu	res (e-]	Resou	rces):								
•	ht	ttp://	elearn	ing.v	tu.ac.i	n/eco	ntent/co	ourses/	/video/	CSE/0	6CS43	.html					
•	ht	ttps:/	/nptel	.ac.in	/cours	ses/10	6/101/1	06101	060/								
•	ht	ttp://	elearn	ing.v	tu.ac.i	n/eco	ntent/co	ourses/	/video/	FEP/A	DA.ht	ml					
•	ht	ttp://	cse01-	-iiith.	vlabs.	ac.in/											
 http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms 																	
VIII: Activity Based Learning / Practical Based Learning/Experiential learning:																	
1.	Α	ssig	nment	s, Qu	izzes a	and S	eminar										
2.	R	eal v	vorld j	proble	em sol	lving	and puz	zzles u	sing gi	oup di	scussio	on. E.g	., Fake	e coin i	iden	tification	,
	P	easai	ıt, wo	lf, go	at, cał	bage	puzzle	, Konig	gsberg	bridge	puzzle	e etc.,					
3.	3. Demonstration of solution to a problem through programming.																



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Department of Artificial Intelligence and Machine Learning

Semester:	IV	Course Type:	:	IPCC								
Course Title:	Introduc	ction to Artificial	Intellig	ence								
Course C	ode:	23AII403			Credits:	04						
Tea {O	- Other p	lours/Week (L:1 bedagogies, menti	[:P:O) on @}	3:0:2:0	Total Hours:	40+8-10 slots						
CIE Mark	s:	50 M	SEE larks:	50	Total Marks:	100						
SEE Тур	e:		Theory		Exam Hours:	03						
Pre-requisites:												
I. Course Objectives:												

- To impart artificial intelligence principles, techniques and its history
- To assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving engineering problems
- To develop intelligent systems by assembling solutions to concrete computational problems

II. Teaching-Learning Process (General Instructions):

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

- 1. **Diverse Teaching Methods**: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
- 2. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
- 3. **Collaborative Learning**: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
- 4. **Higher Order Thinking (HOT) Questions**: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
- 5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
- 6. **Multiple Representations**: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
- 7. **Creative Problem Solving**: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
- 8. **Real-World Application**: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.

□ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

COURSE CONTENT							
Theory							
Module-1 8 Hrs							

SCHEME	E: 2023 DATE:22-05-2024	
Introdu	iction- Evolution of AI, State of Art -Different Types of Artificial Intelligence- App	olications of AI-
Subfield	ls of AI-Intelligent Agents- Structure of Intelligent Agents-Environments	
Text bo	ook 1: Chapter 1- 1.1, 1.2, 1.3 Chapter 2- 2.1, 2.2, 2.3, 2.4	
RBT I	Levels: L1, L2	
	Module-2	8 Hrs
Problem search, limited Text bo	n Solving based on Searching : Introduction to Problem Solving by searching Meth Uninformed Search Methods – Uniform Cost Search, Breadth First Search- Depth First search, Iterative deepening depth-first, Informed Search Methods- Best First Search, bok 1: Chapter 3- 3.1, 3.2, 3.3, 3.4, 3.5	ods-State Space st Search-Depth- A* Search
RBT I	Levels: L1,L2, L3	
	Module-3	8 Hrs
Local	Search and Adversarial Search: Local Search algorithms – Hill-climbing se	arch. Simulated
annealin players Text bo	ng, Genetic Algorithm, Adversarial Search: Game Trees and Minimax Evaluation, I games: tic-tac-toe, Minimax with Alpha-Beta Pruning. ook 1: Chapter 4- 4.1, 4.2, 4.3, 4.4, 4.5, Chapter 5: 5.1, 5.2,5.3,5.4	Elementary two-
RBT I	Levels: L1,L2, L3	
	Module-4	8 Hrs
Logic a in First Text bo	nd Reasoning: Introduction to Logic and Reasoning -Propositional Logic-First Order Order Logic- Unification, Forward Chaining, Backward Chaining, Resolution. bok 1: Chapter 7- 7.1, 7.4, Chapter 8: 8.1, 8.2,8.3,8.4, Chapter 9: 9.2, 9.3, 9.4, 9.5	Logic-Inference
RBT I	evels: L1,L2, L3	
	Module-5	8 Hrs
availabl Text Bo Textboo	e AI Ethics tools, Methods and Research to Translate principles into Practices. pok 1: Chapter 13-13.1, 13.2, 13.3, 13.4, 13.5, 13.6, Text Book 2: Chapter 20 pk 3: Chapter 3, Chapter 4, Chapter 9, Chapter 10	new of publicity
RBT I	Levels: L1,L2, L3	
	III(b). PRACTICAL PART.	
SI.	RACTICAL COMPONENT	
No.	NOTE: Programs need to be implemented in python	
1	Implement and Demonstrate Depth First Search Algorithm on Water Jug Problem	
2	Implement and Demonstrate Best First Search Algorithm on Missionaries-Canniba using Python	als Problems
3	Implement A* Search algorithm	
4	Implement AO* Search algorithm	
5	Solve 8-Queens Problem with suitable assumptions	
6	Implementation of TSP using heuristic approach	
7	Implementation of the problem-solving strategies: either using Forward Chaining Chaining	or Backward
8	Implement resolution principle on FOPL related problems	
9	Implement Tic-Tac-Toe game using Python	
10	Build a bot which provides all the information related to text in search box	
11	Implement any Game and demonstrate the Game playing strategies	
 Instru LA perf Exposition 	ctions for conduction of practical part: B Activities: Conduct laboratory exercises, prepare lab reports, observations and an form lab tests, and work on design and implementation tasks. Deriential Learning : Students will be evaluated based on their creativity and prace ring skills. This includes program-specific requirements and video-based seminars, pr	nalyze results, tical problem- esentations, or
den	nonstrations.	,

SCHEN	/IE: 2023	E: 2023 DATE:22-05-2024														
CO	1 Ab	vility t nciple	to ass es.	ess va	rious	Artific	cial Int	telliger	nce (A	I) metl	nods a	nd exp	plain t	heir	foundat	tional
СО	2 Ap	plying ceptio	g funo on, kn	damen 10wled	tal A ge rej	I princ	iples to ation, a	o solve and lea	probl rning.	ems in	volvin	g prob	olem-so	olvin	g, infer	ence,
СО	$03 \mid \begin{array}{c} \mathrm{De} \\ \mathrm{wo} \end{array}$	mons rld ch	trate r allen	easoni ges.	ng, u	ncertaii	nty, and	d know	ledge	represe	ntation	n, esse	ntial fo	r ado	dressing	real-
CO	An An	alyze	the ci	ritical	role o	of searc	h algor	ithms	in prol	olem-so	olving.					
CO	5 Ap	ply A	I prin	ciples	in pra	actical	situatio	ons.			C					
	CO-PO	-PSO	MAI	PPINC	G (ma	rk H=3	; M=2;	; L=1)		1		1	1	I		
PO/PS	SO 1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	2 S3	S4
CO1	3		1		2								1	1	1	1
CO2	2	1	3		2									1	2	2
<u>CO3</u>	3		2	2	2			2							2	
C04	3		2	3	2			1						2	_	2
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Seme	ster End	Exam	ninati	on (SE	E): Re	efer An	nexure	-1 sect	ion 2							
Learn	ing Res	ource	es													
Textbooks:																
Sl. No.	Т	Title of the BookName of the authorEdition and YearName of the publisher														
1	Artific	ial Int	ellige	ence		Stuart	J. Rus	sell an	d Pete	r Norv	ig	3rd 20	l Editic 15	on,	Pearson	1
2	Artific	cial In	tellig	ence		Elaine	e Rich,	Kevin	Knigł	nt		3 rd 20	Editio 13	n	Tata M Hill	cGraw
3	Ethics.	gove	rnanc	e and		Lucia	no Floi	ridi, Sp	oringer	,		1st	Editio	n	Oxford	
	Policie	s in A	rtific	ial				1	U	·		202	21,		Interne	t
	Intellig	gence										doi	.orght	tps	Institut	e,
												/10	.1007/	97	Univer	sity of
												8-3	-030-		ixford,	UK
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Refer	ence Bo	oks:										202	21.			
1	Artific	ial Int	ellige	ence		Georg	e F Lu	lgar.				5tl	n Editio	on.	Pearso	n
	Structu	ire and	d strat	tegies	for	00012	,- I Du	,					2011	,	Educat	ion
2	Funda	nenta	ls of A	Artific	ial	K. R.	Chowo	lhary,				202	20		Spri	nger
	Intellig	gence						-							-	
3	Introdu Learni	ntroduction to MachineAlpaydin, E.2nd Edition,MIT Press.Learning.2010.														
4	Princip Intellig	oles of gence	f Artif	ficial		Nils J	. Nilss	on,					1980		Elsevie	r
5	Artific	ial Int	ellige	ence		Saroj	Kaush	ik					2014		Cengag learnin	ge g
6	Ethics the Mo	hics and AI: Navigating Aaron Aboagye														

VII(c): Web links and Video Lectures (e-Resources):

- https://www.kdnuggets.com/2019/11/10-free-must-read-books-ai.html
- https://www.udacity.com/course/knowledge-based-ai-cognitive-systems--ud409
- https://nptel.ac.in/courses/106/105/106105077/

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- 1. Assignments, Quizzes and Seminar
- 2. Activity Based Learning /Practical Based learning
- 3. Group discussion on Real world examples
- 4. Project based learning
- 5. Simple Strategies on gaming, reasoning and uncertainty etc



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Department of Artificial Intelligence and Machine Learning

Semester:	IV	(Course Type:	IPCC							
Course Title: OPERATING SYSTEMS											
Course Code: 23AII404 Credits: 0											
Teaching Hou	rs/W	eek (L:	T: P: O)	3:0:2:0	Total Hours:	40+8 -10 slots					
CIE Marks:		50	SEE Marks:	50	Total Marks:	100					
SEE Type: Theory Exam Hours: 3											
Pre prerequisite: Computer Organisation, C language											

I. Course Objectives:

- To Learn how operating systems manage hardware resources, schedule tasks, and provide userfriendly interfaces.
- To Explore efficient strategies for handling CPU, memory, storage, and input/output devices.
- To Demonstrate key APIs and commands for process control, memory allocation, and file system management.
- To Address security risks, including malware and unauthorized access, to maintain system stability and integrity.

II. Teaching-Learning Process:

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

- 1. Diverse Teaching Methods: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
- **2.** Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
- **3.** Collaborative Learning: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
- 4. Higher Order Thinking (HOT) Questions: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
- 5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
- 6. Multiple Representations: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
- 7. Creative Problem Solving: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
- 8. Real-World Application: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.

□ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

III COURSE CONTENT	
III(a). Theory PART	
Module-1:	8 Hrs
Introduction to operating systems, System structures: What operating systems of	do; Computer
System organization; Computer System architecture; Operating System structure; Operati	rating System
operations; Process management; Memory management; Storage management; P.	rotection and
Security; Distributed system; Special-purpose systems; Computing environments.	

SCHEME: 2023

Operating System Services: User Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System debugging, Operating System generation; System boot. Textbook 1: Chapter - 1 (1.1-1.12), 2 (2.2-2.11) RBT Levels: L1, L2, L3 Module-2 8 Hrs Process Management: Process concept; Process scheduling; Operations on processes; Inter process communication Multi-threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Thread scheduling: Multiple-processor scheduling, Textbook 1: Chapter 3 (3.1-3.4), 4 (4.1-4.4), 5 (5.1-5.5) RBT Levels: L1, L2, L3 Module-3 8 Hrs Process Synchronization: Synchronization: The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. Textbook 1: Chapter - 6 (6.1-6.6), 7 (7.1 -7.7) RBT Levels: L1, L2, L3 Module-4 8 Hrs Memory Management: Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation. Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing. Textbook 1: Chapter -8 (8.1-8.6), 9 (9.1-9.6) RBT Levels: L1, L2, L3 Module-5 8 Hrs File System, Implementation of File System: File system: File concept: Access methods; Directory and Disk structure; File system mounting: File sharing; File system structure; File system implementation; Directory implementation; Allocation methods; Free space management. Comparison and Unix and windows. Secondary Storage Structure, Protection: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix. Textbook 1: Chapter - 10 (10.1-10.5),11 (11.1-11.5),12 (12.1-12.5), 14 (14.1-14.4) **RBT Levels: L1, L2, L3** III(b). PRACTICAL PART. Sl. No. **Experiments** PART-A 1. Execute the basic commands of Unix 2. Develop a C program to implement the process system calls (fork(), exec(), wait(), create process, terminate process) Develop a C program that simulates process scheduling algorithms (FCFS and SJF for 3. demonstration). Develop a C program to simulate producer-consumer problem using semaphores. 4. 5. Develop a C programs demonstrating inter-process communication (IPC) using Pipes and Shared Memory. Develop a C program to simulate the following contiguous memory allocation Techniques: 6. a) Worst fit b) Best fit c) First fit. 7. Develop a C program to simulate Bankers Algorithm for Dead Lock Avoidance. Develop a C program to simulate page replacement algorithms: 8. a) FIFO b) LRU 9. Develop a C program to simulate SCAN disk scheduling algorithm.

 Instruct LAI resu Exp prob pres 	etions B Acti Its, per erient blem-se entatio	for con ivities: rform l ial Le olving ons, or	nducti Cond ab test earnin skills. demor	on of luct la ts, and g: Str This nstrati	pract aborat l work udents inclu ons.	tical particular tory examples to on de to will des pro-	art: xercise esign a be ev ogram	s, prej nd imp valuate -specif	pare blem d ba fic re	lab rep entation ased on equirem	ports, n task n thei nents	obse s. ir cre and v	rvatio ativit ideo-	ons an y and based	d ana l pract semir	lyze tical nars,
0.01		1 0		. 1		COU	RSE C		OM	ES						
COL	Appl	y the f	undam	iental	comp	onents	and ro	bles of	an c	peratin	g syst	tem.	CDI	т		
CO_2	Appl	y suita	ble sci	neduli	ng aig	gorithn	ns to o	ptimiz	e tas	k exect	nrovo	on the	dand	J.		
CO_{3}	Impl	yze iec ement	strateo	tes fo	mana r effic	ging co	emoru	alloc	ation	and ut	ilizati	on	ueau	IUCKS.		
C05	Dem	onstrat	e strat	egies	for or	oanizii	ng and	acces	sing	files an	d sec	ondar	v sto	rage		
COS Demonstrate strategies for organizing and accessing files and secondary storage. II. CO-PO-PSO MAPPING																
PO/PS O	PO/PS 1 2 3 4 5 6 7 8 9 10 11 12 S1 S2 S3 S4 0 1															
CO1																
CO2	3 2 2 3 3 2 3 2 2 3 3 2															
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CO5	CO4 3 2 3 2 3 1 CO5 2 3 3 2 2 2															
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Continu	ious II	nterna	I Eval	uatio	n (CI	E): Re	fer An	nexure	e-Ise	ection 2						
Semeste	er End	Exami	nation	n (SEE): Refe	er Ann	exure-	1 secti	on 2							
					Г	V.	Learı	ning R	esou	irces						
VII(a):	Textb	ooks			-											
SI. No	.]	fitle of	f the B	look	N	lame o	of the a	author	•	Editi	on an	d Ye	ar	Na p	me of ublish	the er
1.	Op Pr	peratin inciple	g Syste s	em	Abr Pete Gag	aham er Baei gne	Silbers r Galvi	schatz, n, Gre	g	8 th edit	ion, 2	015		Wiley	/-India	L
VII(b):	Refer	ence B	ooks:													
Sl. No	. 1	Fitle of	f the B	Book	N	ame o	of the a	author	•	Editi	on an	d Ye	ar	Na pi	me of ublish	the er
1.	Ur Or	ndersta peratin	nding g syste	em	Anı Fyli	n McH nn	oes Id	a M		6 th edit	ion			Cenga Learn	age ing	
2.	Or A ap	peratin concep proach	g syste ot-base	ems: ed	DN	1 Dhar	ndhere	;		3 rd , 20	13			McGı	raw	
3.	Op	beratin	g syste	ems	Wil	liam S	stalling	S		6 th				Pears	on	
VII(c):	Web l	inks a	nd Vic	leo L	ecture	es (e-R	lesour	ces):					·			
 <u>http:</u> http: TMI http: kO 	<mark>s://you</mark> s://ww ROYE s://ww	u <u>tu.be/v</u> w.you g_f w.you	v <u>BUR</u> tube.co tube.co	<u>Ft97E</u> om/wa om/wa	<u>kA</u> atch?v atch?v	7=783	KAB-t IMeeX	uE4& Y&lis	list= t=PI	PLIeml L3pGy4	F3uoz łHtqw	zcAK vD0n7	ГgsC 7bQfl	j82 vo HjPnsV	MK3 WzkeF	Rn6m
VIII: A	ctivity	Based	l Lear	ning	/ Prac	tical I	Based	Learn	ing/	Experi	ential	lear	ning:			

Assignments, Quizzes, Seminar



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Department of Artificial Intelligence and Machine Learning

Semester:	IV	Course Type:	PCC	L								
Course Title:	Analysis	& Design of Alg	gorithr	ns Lab								
Course Co	de:	23AIL405			Credits:	1						
Te : {O -	ching H Other p	lours/Week (L:T edagogies, mentio	':P:O) on @}	0:0:2:0	Total Hours:	20.00						
CIE Mark	s: 50	O SEE M	arks:	50	Total Marks:	100						
SEE Type: Practical Exam Hours: 3.00												
Pre-Prerequisite: Practical knowledge in the C/C++ programming language												
I. Course Obj	ectives:											
 To demons To solve p conquer, d branch and To learn th 	trate the roblems ecrease bound. e concep	efficiency of algo using various alg and conquer, tra ots of P and NP co	orithms orithm nsforn omplex	s using asymptotic nota a design methods, inclu a and conquer, dynam ity classes.	tions. Iding brute force, g lic programming, b	reedy, divide and backtracking, and						
II. Teaching-		g rrocess (Gener		$\frac{1}{1}$								
Note: The folio	owing pro	ograms should be	implei	$\frac{1}{2} = \frac{1}{2} = \frac{1}{2} = \frac{1}{2}$	lage							
				PART-A								
Sl. No.			List o	of Laboratory Experin	nents							
• Ir nor	St. No. List of Laboratory Experiments 1 Practice Programs: • Implementation and execution of simple programs to understand running time analysis of non-recursive algorithms • Finding maximum element in a given array. • Linear search, • Bubble sort, • Determine whether all the elements in a given array are distinct. • Given 2 NXN matrices, perform matrix multiplication using brute force approach. • Implementation and execution of simple programs to understand running time analysis of recursive algorithms • Find the Factorial of a given number. • Print Fibonacci series • Given a positive decimal integer n, find the number of binary digits in n's binary representation.											
Lab Program	s:(At-lea	st one applicatio	n fron	n each of the following	g group)							
1 Ap	oly divid	e and conquer stra Merge sort Quicksort	ategy t	o solve sorting problen	1							

SCHE	ME:	2023									DA	ATE:22	-05-20	24		
2		Apply	decrea	se and	l conqu	er stra	tegy to	solve	graph	proble	m					
		•	Bread	lth firs	t searc	h										
		٠	Topol	logical	sortin	g using	g depth	first	search							
4		Apply	transfo	orm an	d conq	uer str	ategy									
		•	Heap	sort	1 4	•		a								
5		• A nnly	input e	king e	iement	strated	eness al	lter p	ring m	ng atching	n nrohl	om				
5		 Apply input enhancement strategy to solve string-matching problem Horspool's algorithm 														
		• Bove	er – Mo	ore's	algorit	hm										
6		Apply	v dynar	nic pro	ogramr	ning st	rategy t	to sol	ve opti	mizati	on prol	olem				
		•Wars	shall -	Floyd'	's Algo	rithms	,		1		1					
		• Kna	psack	proble	m solu	tion us	sing me	mory	function	on.						
7		Apply	greed	y strat	egy to	solve g	graph pi	roble	m							
		• Dijk	stra's	algorit	hm											
		• Prin	n's alge	orithm	l		DA	חדי	n							
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		use of	f Desig	vo stud m and	Analy	sis of	Algorit	hm ii	pe usin 1 real-t	g the C	_/C⊤⊤ nlicati	ons F	or exa	mple 1	they us	sed
		trees	to inde	ex sea	rch res	ults, g	raphs t	o na	vigate 1	places,	graph	s for	recom	menda	tions a	and
		match	ı-makiı	ng, qu	eues fo	or mes	sage pa	assing	g, spell	and g	ramma	ar cheo	ekers,	and m	atrices	to
		gener	ate sur	vey i	nsights	. Thei	r innov	vative	applic	ations	of da	ita stri	actures	attrac	cted h	igh
Tre offer		marks	s. 	ation	.f	tion la										
	UCUU ARA	ns ior Ativiti	conuu	ction (01 prav Johorat	ctical p	part:	nren	ore lah	renort	a obse	munition	ne and	analv	79 recu	lte
pe	rforn	1 lab te	sts. an	d work	c on de	sign ar	nd imple	emen	tation t	asks.	s, 00sc	lvano	115 and	anary	Ze resu	1115,
• Ex	xperi	ential	Learn	ing: S	tudents	s will t	be evalu	iated	based	on the	ir creat	tivity a	and pra	actical	proble	em-
so	lving	skills.	This is	nclude	s prog	ram-sp	ecific r	equir	ements	and v	ideo-ba	ased so	eminar	s, pres	entatio	ons,
or	dem	onstrat	ions.	-== 0												
<u>III. C</u>	OUR	SE OL	JTCO.	MES:	to 001		tation	1				11~		1	atuata	~**
CC	D1	Devel	op pro	grams	to solv	/e com	putation	nai pi	oblems	susing	suitad	le algo	brithm	design	strate	gy.
C	02	Comp	are al	gorith	n desi	gn str	ategies	by o	levelop	ing ea	quivale	nt pro	grams	and	observ	ing
		runnii	ng time	$\frac{1}{1}$	inalysi	s (Emp	oirical).	<u>+1-</u>	to .1	-1		~				
CC	D3	Арргу	sunac		grated	deven	opment	toois	to deve	elop pi	ogram	s.				
CC	D4	Apply	v appro	priate	algorit	hm tec	hnique	s to s	olve co	mputa	tional a	and co	mplex	proble	ems.	
C(25	Demo	nstrate	and p	oresent	the de	velopm	ent o	f progr	am, its	execu	tion a	nd rum	ning ti	me(s)	and
	5	record	l the re	sults/i	nferen	ces.	•							-		
				IV.	CO-P	O-PS	O MAP	PIN	G(mark	к H=3;	M=2;	L=1)				
PO/PS	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
0																
<u>CO1</u>	2	2	2	1					+			2	2	2		
CO_2	2	3	2	$\frac{2}{2}$					+			2	1	2		
CO4	$\frac{2}{2}$	$\frac{2}{2}$	$\frac{3}{2}$	3								2	1	2		
CO5	2	2	2	3								2	2	1		
			1	-	V.	Asse	ssment	Deta	ails (CI	E & S	EE)					
Gener	al R	ules: R	efer A	nnexu	re-1 se	ction 4										
Conti	nuou	s Inter	nal Ex	aluat	ion (C	E). B	efer An	nevu	re-1sec	tion 4						
Semes	ster E	nd Exa	minati	ion (SE	E): Re	fer Anr	nexure-	1 sec	tion 4							
						VI	Loo	rnin		Iroos						
						V 1.	Lea	1 1111	g Resul	urces						
VII(a)): Te	xtbook	s:(Inse	ert or d	lelete r	ows as	per req	uirer	nent)							
SI. No	Ti	tle of t	he Boo	ok	Name	of the	author	r	Ec	lition	and Y	ear		Nam nul	ne of tl blisher	he r

	IVIL. 2025		DAIL.22-0	J-2024							
1	Introduction to the Design and Analysis of Algorithms	Anany Levitin	3rd Edition, 2012	Pearson, ISBN 13: 978-0-13-231681-1							
2	Computer Algorithms/C++,	Ellis Horowitz, SatrajSahni and Rajasekaran,	2nd Edition, 2014,	Universities Press							
Refer	ence Books:		·								
1	Introduction to Algorithms	Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein	3rd Edition	PHI.							
2	Introduction to Algorithms	Cormen T.H., Leiserson C.E., Rivest R.L., Stein C.,	3rd Edition, 2010,	PHI, ISBN:9780262033 848.							
3	Design and Analysis of Algorithms	S. Sridhar		Oxford Higher Education							
VII(c)): Web links and Vid	eo Lectures (e-Resources	s):								
	http://elearning.vtu. https://nptel.ac.in/cc http://elearning.vtu. http://cse01-iiith.vla http://openclassroor	ac.in/econtent/courses/vid ourses/106/101/106101060 ac.in/econtent/courses/vid ubs.ac.in/ n.stanford.edu/MainFolde	eo/CSE/06CS43.html)/ leo/FEP/ADA.html <u>r/CoursePage.php?course=Intro</u>	oToAlgorithms							
VIII:	Activity Based Learn	ning / Practical Based Le	earning/Experiential learning	:							
1. 2. 3.	 Assignments, Quizzes and Seminar Real world problem solving and puzzles using group discussion. E.g., Fake coin identification, Peasant, wolf, goat, cabbage puzzle, Konigsberg bridge puzzle etc., Demonstration of solution to a problem through programming. 										



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ecognized by UGC, New Deini with 2(1) & 12 (E

(Department of Artificial Intelligence and Machine Learning)

Semester:	IV C	Course Type:		ETC			
Course Title: Ad	lvanced J	Java & J2EE					
Course Code:		23AIE421		Credits:	3		
Teaching Hours / {O – Other pedag	Week (La ogies, me	: T:P:O) ntion @}	3:0:0:0	3:0:0:0 Total Hours:			
CIE Marks:	50	SEE Marks:	50	Total Marks:	100		
SEE Type:		Theory		Exam Hours:	03		

Pre-requisite:

I. Course Objectives:

• Understanding the fundamental concepts of Enumerations and Annotations

• Apply the concepts of Generic classes in Java programs

- Demonstrate the fundamental concepts of String operations
- Design and develop web applications using Java servlets and JSP
- Apply database interaction through Java database Connectivity

II. Teaching-Learning Process (General Instructions):

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

- 1. **Diverse Teaching Methods**: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
- 2. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
- 3. **Collaborative Learning**: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
- 4. **Higher Order Thinking (HOT) Questions**: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
- 5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
- 6. **Multiple Representations**: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
- 7. **Creative Problem Solving**: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
- 8. **Real-World Application**: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.

□ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

COURSE CONTENT	
Theory	
Module-1	8 Hrs

				-	_						-	-				
Enume	ratio	ns, A	utobox	xing ai	nd An	notati	ons: E	numer	ations,	Enum	eratior	funda	menta	ls, the	values	() and
valueO	t() me	ethods	, Java	enume	erations	s are c	lass typ	bes, en	umera	tions ir	herits	Enum	, exam	ple, ty	pe wra	ppers
Autobo	xing,	Auto	boxing	g meth	lods, A	Autobo	xing/U	Jnboxi na hal	ng oco	curs in	Expre	essions	, Auto	oboxin	g/Unbo	oxing
Annote	ii and	· Anr	otatio	n basi	Autobo	cifvin	JIIUUXI a reten	ng ner	ps prev	obtaini	iois, A	woru	or war ns at i	ning run tin	hy i	
reflectio	on A	 1s: Annotation basics, specifying retention policy, obtaining annotations at run time by use of Annotated element interface, using default values, Marker Annotations, Single member 5, Built in annotations 1: Chapter12 														
annotat	ions,	Built	in ann	otation	IS	1400,	asing	uoiuu	it vui		luinei	1 11110	uuron	, ong	510 111	• • • • • •
Textbo	ok 1:	Chap	oter12													
RBT I	Levels	s: L1,	L2,L3	3												
						Мо	dule-2	2							8 Hı	.s
Gener	ics: V	What a	ire Gei	nerics,	A Sim	ple Ge	enerics	Exam	ple, A	Gener	ic Clas	s with	Two 7	Гуре Р	aramet	ters,
The G	eneral	1 Forn	n of a (Generi	c Class	s, Bou	nded T	ypes,	Using	Wildca	urd Arg	gumen	ts, Bou	inded V	Wildca	rds,
Creatin	ng a (Generi	c Met	hod, G	eneric	Interf	aces, F	Raw ty	pes an	d Lega	cy cod	e, Ger	eric C	lass H	ierarch	nies,
Erasur	e, An	nbigui	ty erro	ors, Soi	me Gei	heric k	Cestrici	tions								
RBT I	evel	<u>: Cha</u> s: L1.	L2.L3	.4 }												
		51 11,	,			Mo	dule-3							8	Hrs	
String	Hai	ndling	g: The	e Strir	ng Co	nstruct	tors, S	String	Lengt	h, Spe	cial S	tring	Opera	tions.	Chara	cter
Extrac	tion, S	String	Comp	arison	, Searc	hing S	trings,	Modi	fying a	String	, Data	Conve	rsion U	Using v	valueO	ef (),
Chang	ing th	ne case	e of ch	aracter	s with	in a St	ring, S	tring H	Buffer,	String	Build	er		U		
Textb	ook 1	: Cha	pter 1	5				-		-						
RBT I	Levels	s: L1,	L2, L	3												
						Мо	dulo 4							C	Ura	
	NOUN	<u>д. т</u> ь	o lifo	avala	of a sa	wylot:	A gim	nla co	mulate t	ha com	ulat A	<u>ЭІ. Т</u> Ь	iovos		o TIIS	
Doolog		u: 111	e me	cvcie i			A SHU			ne ser	viet Al	71, 110	z javaz	(.SCI VI	st pack	age
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General Rules: Refer Annexure-1 section 1

Continuous Internal Evaluation (CIE): Refer Annexure-1section 1

Semester End Examination (SEE): Refer Annexure-1 section 1

	V. Learning Resources											
VII(a)): Textbooks:											
Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher								
1	JAVA the Complete Reference	Herbert Schildt	9 th Edition	Tata McGraw-Hill								
2	The Complete Reference J2EE,	Jim Keogh	7 th Edition	Tata McGraw-Hill								
VII(b): Reference Books:											
1	Introduction to JAVA Programming	Y. Daniel Liang	7th Edition, 2007	Pearson Education								
VII(c)): Web links and Vide	eo Lectures (e-Resources):										
•	https://nptel.ac.in/co	ourses/106/105/106105191/	https://nptel.ac.in/courses/1	06/105/106105225/								
VIII:	Activity Based Learn	ing / Practical Based Lear	ning/Experiential learning	g:								
Assig	nments, Quizzes and S	eminar.										



Jai Sri Gurudev || Sri Adichunchanagiri Shikshana Trust (R)



Approved by AICTE, New Delhi. Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015

Recognized by UGC, New Delhi with 2(f) & 12 (B)

BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060

(Department of Artificial Intelligence and Machine Learning)

Semester:	IV	Course Type:			ETC							
Course Title: Introduction to TensorFlow												
Course Code:23AIE422Credits:3												
Teach	ing Ho {0−0	urs/Week (L:T: ther pedagogies, ment	P:O) ion @}	3:0:0:0	Total Hours:	40						
CIE Mark	s: 5	0 SEE Ma	arks:	50	Total Marks:	100						
SEE Typ	e:	Т	heory		Exam Hours:	03						
Pre-requisite	:											

I. Course Objectives:

- To Understand the fundamentals of TensorFlow and its applications in artificial intelligence.
- To Dive deeper into TensorFlow concepts such as computation graphs, sessions, and fetches.
- To Learn how to work with text and sequence data.
- To Explore TensorFlow's high-level API, contrib.learn.
- To Learn about distributed computing in TensorFlow and how to export and serve models using TensorFlow Serving.

II. Teaching-Learning Process (General Instructions):

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

- 1. **Diverse Teaching Methods**: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
- 2. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
- 3. **Collaborative Learning**: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
- 4. **Higher Order Thinking (HOT) Questions**: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
- 5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
- 6. **Multiple Representations**: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
- 7. **Creative Problem Solving**: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
- 8. **Real-World Application**: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.

□ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

COURSE CONTENT

Theory

Page 58

SCHEM	E: 20	2023 DATE:22-05-2024														
						Mo	dule-1								8 Hr	S
Introdu	ictio	n to T	ensor	Flow a	nd AI	Syste	ms: G	oing D	eep, U	sing T	ensorF	low fo	r AI S	ystems	, Gene	rating
rich nat	ural l	langua	ge des	criptio	ns for	image	s, Text	summ	arizati	on, Te	nsorFl	ow: W	hat's ii	, 1 a Nai	ne? A	High-
Level (Overv	view, (Ğo wi	th the	Flow:	Up a	nd Rui	ning	with T	ensorF	low, I	nstalli	ng Ter	nsorFlo	ow, M	NIŠT,
Softma	x Reg	gressic	on			1		U			,		U		,	,
Text bo	ook 1	Cha	pter1.	, Chap	ter 2											
RBT	Leve	els: Li	1, L2	<u> </u>												
						Mo	dule-2								8 Hı	s
Under	stan	ding '	Tenso	rFlow	Basic	s: Co	mputat	ion G	raphs.	Graph	s. Ses	sions.	and F	etches	. Flov	ving
Tensor	s. No	odes A	re Op	eration	s. Edge	es Are	Tenso	r Obie	cts. Set	ting at	tribute	s with	source	operat	ions. I	Data
Types,	casti	ing, Te	ensor A	Arrays	and Sł	napes,	Names	s, Vari	ables, l	Placeh	olders,	and S	imple	Optimi	zation	
Convo	lutio	nal N	eural	Netwo	rks: Ir	ntroduc	ction to	CNN	s, MN	IST: T	ake II,	CIFA	R10	1		
Text b	ook	1: Ch	apter3	, Chaj	oter-4				-		,					
RBT	Leve	els: L	1, L2,	L3												
						Mo	dule-3							8	Hrs	
Text 1	Proce	essing	with	Tenso	rFlow	: Te	xt I: V	Worki	ng witl	h Text	and	Sequer	nces, a	nd Te	nsorBo	oard
Visual	izatio	on, Th	e Impo	ortance	of Sec	quence	Data,	Recur	rent Ne	eural N	letwor	ks, RN	N for '	Text S	equenc	ces.
Text I	I: W	ord V	ectors.	, Adva	nced R	NN, a	nd En	ıbeddi	ng Vis	ualizat	tion, W	ord E	mbedd	ings, V	Word2	vec,
Pretrai	ned I	Embed	ldings.	, Adva	nced R	NN			-		,			5 /		,
Text b	ook	1: Ch	apter	5, Cha	pter 6											
RBT	Leve	els: L	1, L2,	L3												
						Mo	dule-4							8	Hrs	
Tenso	rFlov	w Ab	stracti	ions a	nd Si	mplifi	cation	s: con	trib.lea	arn, L	inear	Regres	sion,	DNN	Classi	fier,
Feature	e Col	umn,	Home	made (CNN w	ith co	ntrib.le	earn, T	FLearr	ı						
Queue	s, T	hread	ls, an	d Rea	ding	Data:	The	Input	Pipelin	ne, TF	Recor	ds, Qi	ieues,	Enqu	euing	and
Deque	uing,	Mu	ltithre	ading,	Coor	dinato	or and	1 Qu	eue I	Runner	, А	Full	Mult	ithread	ed In	nput
Pipelin	e,tf.t	rain.st	ring_i	nput_p	roduce	er() a	ind th	TFRe	cordR	eader()	,tf.trai	n.start	queue	_runn	ers()	and
Wrapp	ing U	Jp														
Text b	ook	1: Ch	apter	7, Cha	pter 8											
RBT	Leve	els: Li	1, L2,	L3												
						Mo	dule-5							8	Hrs	
Distrib	uted	Tens	orFlov	w: Dist	ributed	1 Com	puting	. Whe	re Doe	s the I	Paralle	izatior	ı Take	Place	?, Wha	at Is
the Goa	ıl of	Parall	lelizati	on?, T	ensorF	Flow E	Elemen	ts, Clu	isters a	and Se	rvers,	Replic	ating	a Com	putatio	onal
Graph A	Acros	ss Dev	vices, N	Manage	ed Sess	sions, l	Device	Place	ment, I	Distrib	uted É	xample	e, Ö		1	
Export	ing a	and S	erving	g Mod	els wit	h Ten	sorFlo	ow: Sa	vinga	nd Ex	porting	g Our	Model	. Intro	duction	n to
Tensorl	Flow	Servi	ng	,					0		1 4			,		
Text B	ook 1	l: Cha	pter -	9, cha	pter-1	0										
RBT	Leve	els: Li	1, L2,	L3												
		CO	URSE	E OUT	CON	IES: A	At the	end of	this co	ourse, s	tudent	s will l	oe able	e to		
	E	xplain	Tenso	orFlow	basics	for A	[appli	cations	, inclu	ding se	etting u	ıp, bui	lding s	imple	model	s like
	sc	ftmax	regre	ssion, a	and cre	ating i	mage	descrip	otions.	-	-	-	-	-		
	D	evelor	o expe	rtise w	ith Ter	sorFla	w's co	mputa	tion gr	aphs to	o const	ruct ar	nd refi	ie con	volutio	nal
CO2	ne	eural n	etwor	ks for i	mage	classif	ication		01	1 - 7						
					mage	inc	th man		1	aatura	120	nast	onos 1	toch :	au ac 1:	ka
CO3		ppiy s	MIIIS II	n text p	A Tam	ing W1	nd for	anel	ieurai i	letwor	ks, usi	ng adv	anced	tecnni	ques II	ĸe
	W	ora en		ings an	u rens		ru ior	anaiys	15		•	1 00	• .1		1 .	•.1
CO4		pply T	ensor	Flow to	o simp	lity co	mplex	model	ımple	mentat	tion an	d effic	iently	manag	e data	with
	pi	peline	s and	threadi	ng.											
C05	A	pply d	listribu	ited co	mputin	ıg in T	ensorF	flow to	impro	ve mo	del pei	forma	nce an	d scala	bility,	and
	le	arn me	odel ez	xportin	g and s	serving	g for p	ractica	l use.							
]	III. C	O-PC	P-PSC	MA	PPIN	G (ma	rk H=	3; M=	2; L=	1)	i	i	
PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
	2	1	3		$\frac{2}{2}$								1	1		1
<u>CO2</u>		1	3	2	3									1	1	
003				Ζ	3		L				L				1	1

CUENZE: 2022

SCHEIV	IE: 2023 DATE: 22-05-2024															
CO4	2	1			2									1	1	1
CO5		1	3		2											
IV. Assessment Details (CIE & SEE)																
General Rules: Refer Annexure-1 section 1																
Continuous Internal Evaluation (CIE): Refer Annexure-1section 1																
Semester End Examination (SEE): Refer Annexure-1 section 1																
V. Learning Resources																
VII(a): Textbooks:																
Sl. No.	Title of the Book		ok 1	Name of the author				Edition and Year				Name of the publisher				
1	Learn Tens	ning orFlov	V	T S L	Tom Hope, Yehezkel S. Resheff, and Itay Lieder				2017				C	O'Reilly Media, Inc. ISBN: 9781491978511		
VII(b): Reference Books:																
1	1 Hands-On Machine Learning with Scikit-Learn and TensorFlow			ne 1	Aurélien Géron				2017					O' Reilly Media, Inc		
VII(c): Web links and Video Lectures (e-Resources):																
 <u>https://www.youtube.com/watch?v=LLux1SWoM</u> <u>https://www.youtube.com/playlist?list=PL_Ig1a5kxu53IvHSkm9JWbA04lQ3H9eLC</u> <u>https://www.youtube.com/watch?v=q_IkJcPyNl0</u> VIII: Activity Based Learning / Practical Based Learning/Experiential learning: 																
Assignments, Quizzes and Seminar.																



S.



BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060 Approved by AICTE, New Delhi. Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015 Recognized by UGC, New Delhi with 2(f) & 12 (B)

|| Jai Sri Gurudev || Sri Adichunchanagiri Shikshana Trust (R)

ech

Institute o

(Department of Artificial Intelligence and Machine Learning)

Semester:	IV	Course Type:		ETC						
Course Title: Business Intelligence										
Course Coo	le:	23AIE423		Credits: 3						
Teach	ing Ho {0-0	urs/Week (L:T: ther pedagogies, ment	:P:O)	3:0:0:0	Total Hours:	40				
CIE Mark	s: 50	O SEE Ma	arks:	50	Total Marks:	100				
SEE Typ	e:	Т	Theory		Exam Hours:	03				
Pre-requisite	•									
I. Course Ob	jectives	S:								
• Explain the Decision Support systems and Business Intelligence framework.										
• Illustrate the significance of computerized Decision Support, and understand the mathematical										
Modeling behind decision support.										
• Explain Data warehousing, its architecture and Extraction, Transformation, and Load (ETL) Processes.										
Explore knowledge management; explain its activities, approaches and its implementation.										
• Describe the Expert systems, areas suitable for application of expert's system										
II. Teaching-Learning Process (General Instructions):										
The following are some of the strategies that teachers can employ to facilitate the achievement of various										
course outcomes:										
1. Diverse Teaching Methods : Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.										
2. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.										
3. Collaborative Learning : Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.										
 Higher Order Thinking (HOT) Questions: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information. 										
5. Problem-Based Learning (PBL): Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.										
6. Multip real-we	6. Multiple Representations : Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.									
7. Creative Problem Solving : Present different approaches to solving the same problem. Encourag students to think outside the box and devise their own innovative solutions.										
8. Real-World Application : Discuss how each concept relates to practical scenarios. Connectin theoretical knowledge to real-world contexts enhances students' comprehension and retention.										
□ Chalk &	Talk 🗆 S	Stud. Assignment	🗆 Weł	Resources 🗆 LCD/Si	mart Boards 🗆 Stud.	Seminars				
			COUR	SE CONTENT						
ī

							T	heory	Y							
						Mo	dule-1								8 Hı	s
Decisio Compute An Early A frame Text Bo	n Su erize y Fra worl	appor ad Dec amewo a for H 1: Cha	t and cision S ork for Busine apter	Busin Suppor Comp ss Intel 1	ess In t, Man uterize lligenc	tellige aageria ed Dec e (BI),	nce: C l Decis ision S , A Wo	Dpenin sion M Support ork Sys	g Vigr aking, t, The (tem V	nette, (Comp Concep ïew of	Changi uterize ot of D Decisi	ing Bu ed Supp ecisior ion Suj	siness port for Supp pport.	Enviro r Decis ort Sys	onmen sion M stems (ts and aking, DSS),
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						Mo	dule-2								8 Hr	s
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RBT I	leve	ls: Li	1, L2													
						Mo	dule-3							8	8 Hrs	
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KB1 I	leve	IS: L	I, L2													
						Mo	dule-4							8	3 Hrs	
Implem Text Be RBT I Expert	enta bok Leve Syst	tion. 1: Ch ls: L tems:	apter 1, L2 Basic	11 Conce	pts of]	Mo Expert	dule-5	ms, Ap	oplicati	ions of	Exper	t Syste	ms, St	ructure	<u>3 Hrs</u> e of Ex	pert
System System Text B	s, Kı s, Be ook	nowle enefits 1: Ch	dge E s, Limi apter	nginee tations 12	ring, P , and C	Problem	n Área l Succe	s Suita ess Fac	able fo tors of	or Expe f Exper	ert Sys t Syste	tems, l ems.	Develo	opment	t of Ex	pert
RBT I	leve	ls: L	1, L2													
		CO	URSE	E OUT	COM	1ES: /	At the	end of	this co	ourse, s	tudent	ts will	be able	e to		
CO1	Aj In	pply t tellige	he bas ence fr	sics of amewo	data a ork.	nd bu	siness	to und	erstan	d Deci	sion S	Support	syster	ms and	d Busin	ness
CO2	Do Ui	escrib	e the s and th	ignific e math	ance of ematic	f Com al moo	puteriz deling	ed Deo behind	cision S decisi	Suppor ion sup	t, appl port.	y the b	asics c	of math	nematic	es to
CO3	Pr	ocess	Data es.	wareh	ousing	, its a	rchitec	ture a	nd Ext	raction	i, Trar	istorm	ation,	and Lo	oad (E	IL)
CO4	Ai in	nalyze	e the in entatio	nportai	nce of]	knowl	edge n	nanage	ment a	ind exp	lain its	s activi	ties, ap	oproac	hes and	d Its
CO5	Do of	escrib expei	e the E ts syst	Expert attem.	system	is and	analyz	e its de	evelop	ment, o		s areas	suitab	le for a	applica	tion
]	III. C	O-PC)-PSC) MAI	PPINO	ے (ma	rk H=	3; M=	2; L=	1)		1	
PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO2	2	1	2										1	2		1
CO3	2	1											1		1	1
CO4	2	3	3	1									1	2	2	
CO5	3	1	2										1		1	1

		IV. Assessment Det	tails (CIE & SEE)	
Gener	ral Rules: Refer Annez	xure-1 section 1		
Conti	nuous Internal Evalu	ation (CIE): Refer Annexu	are-1section 1	
Seme	ster End Examination	(SEE): Refer Annexure-1 see	ction 1	
		V. Learnin	ng Resources	
VII(a): Textbooks:			
Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Business Intelligence, A managerial Perspective on Analytics.	Sharda, R, Delen D, Turban E.	2014	Pearson.
VII(b): Reference Books	:		
1	Data Mining Techniques. For Marketing, Sales and Customer Relationship Management	Berry M.&Linoff G.	2004	Wiley Publishing Inc
2	Data Science for Business	Foster Provost and Tom Fawcett,	12013	O'Reilly Media, Inc
VII(c): Web links and Vi	ideo Lectures (e-Resour	rces):	
•	https://www.youtube https://www.youtube	e.com/watch?v=3DTFmMM e.com/watch?v=Hg8zBJ1D	<u>liGlg</u> hLQ	
VIII:	Activity Based Lea	rning / Practical Based	Learning/Experiential lea	arning:
Assia	ments Ouizzes and	Seminar		

Assignments, Quizzes and Seminar.





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(Department of Artificial Intelligence and Machine Learning)

|| Jai Sri Gurudev || hunchanagiri Shikshana Trust (R)

ec

Semester:	IV	Course Type:			ETC									
Course Title:	Block	chain Technolog	у											
Course Cod	le:	23AIE424			Credits:	3								
Teach	ing Ho {0-0	urs/Week (L:T: ther pedagogies, ment	P:O)	3:0:0:0	Total Hours:	40								
CIE Marks: 50 SEE Marks: 50 Total Marks: 100														
SEE Type	e:	Т	heory		Exam Hours:	03								
Pre-requisite	:													
 I. Course Objectives: Explain the fundamentals of distributed computing and blockchain Discuss the concepts in bitcoin Demonstrate Ethereum platform 														
II. Teaching	-Learn	ing Process (Ge	neral In	structions):										

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

- 1. Diverse Teaching Methods: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
- Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations 2. enhance understanding and engagement among students.
- 3. Collaborative Learning: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
- Higher Order Thinking (HOT) Questions: Pose at least three thought-provoking questions during 4. class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
- Problem-Based Learning (PBL): Implement PBL, which nurtures analytical skills. PBL goes 5. beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
- Multiple Representations: Introduce topics using various representations. Visuals, diagrams, and 6. real-world examples cater to diverse learning styles.
- 7. Creative Problem Solving: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
- 8. Real-World Application: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.

□ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

COURSE CONTENT	
Theory	
Module-1	8 Hrs

SCHEME:	2023										DA	TE:22-(05-202	4		
Blockch	ain 10	1: D	istri	buted	syste	ms, H	listory	of bl	ockcha	ain, In	trodu	ction t	o bloc	ckchair	n, Typ	es of
blockcha	in, CA	P theo	oren	1 and l	olocke	hain, E	Benefit	is and l	imitati	ons of	block	chain.				
Decentra	alizatio	n an	d C	Crypto	graph	ny: De	ecentra	lizatio	n using	g bloc	kchaii	n, Metl	nods c	of dece	entraliz	ation,
Routes to	decen	traliza	atio	1, Dec	entrali	ized or	ganiza	tions.								
Textboo	k 1: Cl	apte	r 1,	2												
RBT L	evels:	L1, I	_2													
						Mo	odule-2								8 Hr	S
Introdu	ction t	o Cry	pto	graph	iy & C	Crypto	currei	ncies: (Cryptog	graphi	c Hasł	n Funct	ions, H	Iash Po	ointers	and
Data Str	uctures	s, Dig	ital	Signat	ures, l	Public	Keys a	as Iden	tities, A	A Sim	ple Cr	yptocui	rency,			
How Bi	itcoin	Achie	ves	Dece	ntraliz	zation	: Disti	ributed	conse	nsus,	Conse	nsus w	rithout	identi	ty usin	ig a
block ch	ain, In	centiv	ves a	ind pro	oot ot	work,	Putting	g it all	togethe	er,						
Textboo	<u>ok 2: C</u>	hapte	er I	, 2												
RRI L	evels:	LI, I	.2													
						Mo	dule-3							8	Hrs	
Mechan	nics of	Bitco	oin:	Bitco	in trai	nsactio	ons, Bi	itcoin	Scripts	, Appl	icatio	ns of I	Bitcoin	script	ts, Bito	coin
blocks,	The Bit	coin i	netv	vork, I		tions a	nd imp	provem	ents.	10.11	C.	G 1'		1 01	• • • • • • • • • • • • • • • • • • • •	
How to	Store a	ind U	se B	sitcoin	is: Sim	ipie Lo	ocal Sto	orage,	Hot and		Storag	ge, Spli	tting a	nd Sha	ring K	eys,
Toytha	wallet	s and	. EX r 2	chang	ges, Pa	aymen	i Serv	ices,	i ransao	cuon	rees,	Curren	cy Ex	cnange	e Mar	kets
DDT I	DKZ: CI	1 apte	r 3,	4												
KBIL	evels:	LI, I	_ _													
						Mo	dule-4							8	Hrs	
Bitcoin	Mining	g: The	e tas	k of B	itcoin	miners	s, Mini	ing Hai	dware,	, Energ	gy con	sumpti	on and	ecolog	gy, Mir	ning
pools, M	1ining i	incent	ives	and s	trategi	ies,										
Bitcoin	and A	nony	mit	y: An	onym	ity Ba	sics, I	How to	De-ai	nonym	ize B	itcoin,	Mixin	g, Dec	entrali	zed
Mixing,	Zeroco	oin an	d Ze	erocas	h,											
Textboo	ok2: Cl	hapte	r 5,	6												
RBT L	evels:	L1, I	_2													
						Mo	dule-5							8	Hrs	
Smart C	Contra	cts an	nd E	there	um 10	1: Sm	art Co	ntracts	: Defin	ition, l	Ricard	ian cor	tracts.			
Ethereu	ım 101	: Intr	odu	ction,	Ethere	um bl	ockcha	ain, Ele	ements	of the	Ether	eum bl	lockch	ain, Pr	ecomp	iled
contract	s.	-		~												
Textboo	ok 1: C	hapte	er 1	U												
RBTL	evels:	L1. I	2													
	C	OUR	SE	OUT	CON	TES:	At the	end of	this co	urse s	studen	ts will 1	be able	e to		
CO1	Desci	ribe th		oncept	s of D	istribu	ted co	mputin	g and i	its role	in Bl	ockcha	in	. 10		
	Dece	riha th			a of C	muntoa	mombre	andita	molo in	Dlaal	rahain					
CO2	Desci			oncept	.s or C	Typtog										
CO3	Expla	in the	e bei	nefits,	drawt	backs a	ind app	plicatio	ons of E	Blocke	hain					
CO4	Imple	ement	the	techn	ologie	s assoc	ciated v	with B	itcoin.							
CO5	Deve	loping	g blo	ockcha	ain app	olicatio	ons usi	ng the	Ethere	um pla	tform					
			т					DDINI	C (m a	"1. TT_	2. N/-	<u>э.т.</u>	1)			
	1 0			<u>n.</u> c	0-PC	J-PSC			J (mai		5; IVI-	-2; L-		62	62	C 4
PO/PSO	$\frac{1}{2}$ 1		3	4	5	6	1	8	9	10	11	12	2	<u>S2</u>	83	54
CO1	$\frac{3}{3}$ 1	1										1	$\frac{2}{2}$		1	1
CO2	$\frac{3}{2}$ 3		,			-						1	1	1	1	2
CO4	$\frac{2}{1}$ 1		3									-	1	-	1	-
CO5	2 1	3	3			1						1	1	1	1	2
			1		IV.	Asses	ssmen	t Deta	nils (C	IE &	SEE)					
Carry	Dula	Def				atic: 1		•••			,)					
General	Kules:	ĸete	r At	inexui	e-1 se											
Continu	ous Int	ernal	l Ev	aluati	on (C	IE): R	efer A	nnexu	e-1sec	tion 1						

SCHEME: 2023

DATE:22-05-2024

Semester End Examination (SEE): Refer Annexure-1 section 1

		V. Learni	ng Resources	
VII(a): Textbooks:			
Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained	Imran Bashir	Second Edition, 2017	Packt Publishing Ltd ISBN 978-1-78712- 544-5
2	Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction.	Arvind Narayanan, Joseph Bonneau, Edward W. Felten, Andrew Miller, Steven Goldfeder and Jeremy Clark	2016	Princeton University Press,
VII(b): Reference Books	:		
1	Mastering Bitcoins: Unlocking Digital Cryptocurrencies	Andreas Antonopoulos	2013	O'Reilly Media, Inc,
VII(c): Web links and V	ideo Lectures (e-Resou	rces):	
VIII:	http://bitcoinbook.c 86383721.16426884 https://nptel.ac.in/co https://ethereum.org https://developer.ibr Activity Based Lea	s.princeton.edu/?_ga=2.83 <u>162</u> purses/106/105/106105184 <u>z/en/developers/</u> n.com/components/hyperle urning / Practical Based	02578.1344744326.16426884 // edger-fabric/tutorials/ I Learning/Experiential le:	<u>62-</u> arning:
Assig	nments, Quizzes and	l Seminar.		

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|| Jai Sri Gurudev || Sri Adichunchanagiri Shikshana Trust (R) 0 ec



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Department of Artificial Intelligence and Machine Learning

Course Title: Azure AI Course Code: 23AIAE41 Credits: 01 Teaching Hours/Week (L: T: P: O) {O – Other pedagogies, mention @} 1:0:0:3 Total Hours: 40 CIE Marks: 50 SEE Marks: 50 Total Marks: 100	Semester:	IV Course Typ	e:		AEC	
Course Code:23AIAE41Credits:01Teaching Hours/Week (L: T: P: O) {O – Other pedagogies, mention @}1:0:0:3Total Hours:40CIE Marks:50SEE Marks:50Total Marks:100	Course Title: Az	ure AI				
Teaching Hours/Week (L: T: P: O) {O – Other pedagogies, mention @}1:0:0:3Total Hours:40CIE Marks:50SEE Marks:50Total Marks:100	Course Code:	23AIAE	41		Credits:	01
CIE Marks:50SEE Marks:50Total Marks:100	Tea {O	ching Hours/Week – Other pedagogies,	(L: T: P: O) mention @}	1:0:0:3	Total Hours:	40
	CIE Marks:	50	SEE Marks:	50	Total Marks:	100
SEE Type:TheoryExam Hours:2.00 Hrs	SEE Type:		Theory		Exam Hours:	2.00 Hrs

Pre prerequisite: Understand basic IT concepts, be familiar with cloud computing and Azure fundamentals, have some hands-on experience with cloud platforms, and be aware of career opportunities in cloud computing.

I. Course Objectives:

- To understand the fundamentals of computer vision. •
- To develop proficiency in using computer vision libraries.
- To gain the ability to develop and deploy computer vision applications.
- To acquire knowledge of advanced computer vision concepts.
- To gain hands-on experience with real-world projects.

II. Teaching-Learning Process (General Instructions):

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

- 1. Diverse Teaching Methods: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
- 2. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
- 3. Collaborative Learning: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
- Higher Order Thinking (HOT) Questions: Pose at least three thought-provoking questions during 4. class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
- 5. Problem-Based Learning (PBL): Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
- 6. Multiple Representations: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
- 7. Creative Problem Solving: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
- Real-World Application: Discuss how each concept relates to practical scenarios. Connecting 8. theoretical knowledge to real-world contexts enhances students' comprehension and retention.

□ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

III. COURSE CONTENT

8 Hrs

Module-1: Cloud Computing Fundamentals & Azure Overview Introduction: Cloud computing basics, benefits, and models (public, private, hybrid). Cloud storage and differences between providers. Microsoft Azure, its history, key services (VMs, V-Nets), and service types (IaaS, PaaS, SaaS).

RBT Levels: L1, L2, L3, L4 Module-2: AI Workloads & Machine Learning Basics on Azure 8 Hrs The features of common AI workloads, the guiding principles for responsible AI, the different types of machine learning core machine learning concepts and the capabilities of visual tools in Azure Machine																
Module-2: AI Workloads & Machine Learning Basics on Azure 8 Hrs The features of common AI workloads, the guiding principles for responsible AI, the different types of machine learning, core machine learning concepts, and the capabilities of visual tools in Azure Machine																
The features of common AI workloads, the guiding principles for responsible AI, the different types of machine learning, core machine learning concepts, and the capabilities of visual tools in Azure Machine Learning Studio. RBT Levels: L1,L2,L3, L4 Module-3: Computer Vision Workloads on Azure 8 Hrs																
RBT L	evels	: L1.	L2.L3	. L4												
Module	e-3: (Comp	puter V	Vision	Work	oads	on Az	ure						8	Hrs	
Commo	n typ	oes of	f com	outer v	vision s	olutio	ons, in	cludin	g imag	ge clas	sificat	ion, oł	oject d	etectio	on, opt	ical
characte	r rec	ogniti	ion (O	CR), fa	acial de	tectio	n, reco	gnitio	n, and	facial a	analysi	s.	-		-	
RBT L	evels	: L1,	L2, L	3,L4												
Module	e -4: A	Azuro	e Tool	s for C	Comput	er Vi	sion T	asks							8 Hrs	
Azure to	ols a	ind se	ervices	for co	mputer	visio	n tasks	s, inclu	ding tl	ne Con	nputer	Vision	n servio	ce, Cus	stom V	ision
service,	Face	servi	$\frac{1}{1}$	$\frac{1}{2}$	i Recog	nızer	service	e, and	their re	especti	ve cap	abilitie	es.			
Module	eveis	: LI, Natu	LL, L ral Lai	<u>, 1</u> 4 171197	Proce	ssino	Work	sheal	on Az	ure					8 Hrs	
The feat	tures	of c	ommo	n NLF	work	load s	scenari	os. Az	zure to	ols an	d serv	vices fo	or NL	P wor	kloads.	and
consider	ation	s for	conve	rsation	al AI s	olutio	ns on A	Azure.			•	-				
RBT L	BT Levels: L1, L2, L3,L4 DURSE OUTCOMES: At the end of this course, students will be able to															
COURS	COURSE OUTCOMES: At the end of this course, students will be able to															
C01	CO1 Explain cloud computing fundamentals and key Azure services.															
CO2	CO1 Principles and machine learning basics effectively on Azure.															
CO3	CO3 Analyze various computer vision solutions on Azure.															
CO4	CO4 Apply Azure tools for computer vision tasks proficiently.															
CO5	CO5 Apply NLP workload scenarios and Azure tools for NLP tasks efficiently.															
	IV. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)															
PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	2		2	3								1	2		2
CO_2	2	3	2	3										2		Z
CO4	2		3								3				2	
CO5			2								2	2			2	2
					v.	Ass	essme	nt Det	ails (C	IE &	SEE)					
General	Rul	es: R	efer A	nnexui	e-1 sec	tion 5	5									
Continu	lous	Inter	nal Ev	aluati	on (CI	E): R	efer A	nnexui	e-1sec	tion 5						
Semeste	er En	d Exa	minati	ion (SE	E): Ref	er Ani	nexure	-1 sec	tion 5							
						VI.	L	earnin	g Res	ources						
VII(a):	Text	book	s:												-	
SI. No.		Titl	e of th	e Bool	k	N	ame o	f the a	uthor	E	dition	and Y	ear	Na p	ume of oublish	the er
1 a	Comp and A	outer pplic	Vision ations	: Algo	rithms		Richa	rd Sze	liski	F	irst edi	tion 20	010	:	Spring	er
	Progra /ision lgori mage	ammi n witl thms s	ing Co h Pytho for an	mputer on: To alyzing	r ols and g		Jan E	rik So	lem	F	irst Edi	ition 2	012	O'R	eilly M	Iedia
3 I 3	Deep /isio	Learı n	ning fo	or Com	puter	Raj Sha	jalinga anmuga	ppaa amani		F	irst Edi	ition 2	018	Pack	t Publi	shing
VII(b):	Refe	rence	e Book	ks:												

SCHEME: 2023

DATE:22-05-2024

JUILI	/IL. 2023		DATE.22-03-20	24
1	Computer Vision: Models,	Simon J. D. Prince	First Edition 2012	Cambridge
	Learning, and Inference			University Press
2	Computer Vision: A Modern Approach	David A. Forsyth and Jean Ponce	First Edition 2002	Prentice Hall
VII(c)	: Web links and Video Lecture	s (e-Resources):		
•	OpenCV Documentation: [http Microsoft Learn - Azure AI and	s://docs.opencv.org/] 1 Machine Learning: [http	s://learn.microsoft.com/	/en-us/azure/ai/]
				-

- PyImageSearch:[https://www.pyimagesearch.com/](<u>https://www.pyimagesearch.com/</u>)
- Node.js Official Website [Link](<u>https://nodejs.org/</u>]
- Stanford University CS231n: Convolutional Neural Networks for Visual Recognition: [http://cs231n.stanford.edu/]

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

seminar, assignments, quiz, case studies, mini projects, industry visit, self-study activities, group discussions, etc



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Department of Artificial Intelligence and Machine Learning

Semester:	IV	Course 7	Гуре:		NCMC	
Course Title: M	indful	Mastery :	Aptitude And So	oft skill Integrati	ion	
Course Code	:	23PD	SN04		Credits:	PP/NP
Te: {C	24					
CIE Marks:		50	SEE Marks:	NA	Total Marks:	50
SEE Type:	NA					
Pre prerequisite	:					

I. Course Objectives:

- To gain a deep understanding of numerical concepts including place value, fractions, decimals, percentages, ratios, and proportions.
- To acquire skills to prioritize tasks and activities effectively based on their importance and urgency.
- To develop the ability to interpret and utilize various data representations, including tables, charts, graphs, and diagrams.
- To learn to interpret different body language signals and understand their underlying meanings in interpersonal communication.
- To acquire strategies for breaking down complex problems into manageable steps, enhancing problemsolving abilities.

II. Teaching-Learning Process (General Instructions):

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

- 1. **Diverse Teaching Methods**: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
- 2. Visual Aids: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
- 3. **Collaborative Learning**: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
- 4. **Higher Order Thinking (HOT) Questions**: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
- 5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
- 6. **Multiple Representations**: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
- 7. **Creative Problem Solving**: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
- 8. **Real-World Application**: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.
- □ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

III. COURSE CONTENT Module-1: Arithmetical Ability 6 Hrs Problems on Pipes Cisterns , Time , Work and Averages 4 Hrs Module-2: Time management and Presentation skills 4 Hrs

SCHEN	/IE:	2023	3									DA	TE:22-0)5-202	4		
Misco	Misconceptions of Time, Symptoms of Poor Time Management, the 'Five Time Zone' Concept, Elements of Effective Time Management. ABC of presentation / Accent and pronunciation / Practice to Perform / Impact of voice modulation, eye contact and body language during presentation. Evaluation, Feed back Module-3: Ouantitative section and Data Interpretation 6 Hrs																
of Eff	ecti	ve T	ime	Manag	gement	. ABC	of pre	sentati	ion / A	ccent	and pro	nuncia	ation /	Practic	e to P	erform	./
Impac	t of	V010	e m		ion, ey	e cont	act and	l body	langua	ige du	ring pre	esentat	10n. Ev	aluati	on, Fee		<u>K</u>
NIOU	uie-	3: Q	uan		e secu	on and	u Data	Inter	pretat	ion						0 H	rs
Simp probl	ole i lem	ntere	est a	nd cor	npoun	d inter	est pro	oblems	, Bar g	graphs	, Pie cl	narts a	nd Lin	e grap	hs cor	icepts	and
Mod	ule-	4: B	ody	langu	age an	d Pos	tures									4 H	rs
Facial	exp	oress	ions	, Gesti	ıres, H	andsh	akes, to	one of	voice,	Attitu	de, Uni	versal	vs. Cu	lture s	pecific	;	
Mod	ule-	5: N	lent	al abil	ity											4 H	rs
Puzzl	le ba	ased	ques	stion a	nd Psy	chome	etric ba	sed int	terview	v Ques	tion						
COU	RSF			OMES	S: At th	he end	of this	cours	e, stud	ents w	ill be a	ble to	ult on	A tra	10 0 0 0	houro	aging
CO)1	arit	hmet	tical at	n-solvi pility.	ing tec	nnique	es in P	npes, v	lsterr	is, 1 im	ie, wo	rk, and	1 Avei	rages,	snowc	asing
CO2 Develop efficient time management skills, recognizing misconceptions, symptoms, and implementing effective strategies.																	
CO3 Apply quantitative analysis and data interpretation, handling problems in simple interest, compound interest, and graphical data interpretation.																	
CO4 Apply effective body language and postures in communication, distinguishing universal cues from																	
CO4 Apply effective body language and postures in communication, distinguishing universal cues from culture-specific ones.																	
СО	CO5 Apply mental agility through puzzle-solving and psychometric interview preparation, refining problem-solving and cognitive abilities																
UD problem-solving and cognitive abilities.																	
IV. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)																	
PO/PS	SO 1 2 3 4 5 6 7 8 9 10 11 12 S1 S2 S3 S4 3 3 3 2 1 2 1 2 1 2																
C01	-	3 3 2 1 2 1 2 2 2 2 2 2 2															
CO3	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$																
CO4		-					2		2		2		2		2	2	1
CO5		2	2	3									3	1		2	2
						V.	Ass	essme	nt Det	ails (C	CIE & S	SEE)					
Gener	ral 1	Rule	s: R	efer A	nnexur	e-1 se	ction 8										
Conti	nuo	us I	nter	nal Ev	aluati	on (C	IE): R	efer Aı	nnexur	e-1sec	tion 8						
Semes	ster	End	Exa	minati	ion (SE	E): Re	fer Anr	nexure	-1 sect	ion 8							
							VI.	L	earnin	g Res	ources						
VII(a)): T	extb	ook	s:						8							
Sl. No.		Ti	itle o	of the	Book		Name	of the	autho	or	Editior	n and `	Year	Nan	ne of t	he pul	olisher
1																	
VII(b)): R	efer	ence	e Book	s:												
1	Qı Co	ianti mpe	tativ etitiv	re Apti re exan	tude fo ninatio	or on	R	S Agaı	rwal		2	2017			S C	Chand	
2	Ge La	estur ingua	es ar age	nd Boc	ly		Apar	na maj	umdar	•	2	2017			V& S	Publis	ner
3	A log	mod gical	ern a reas	approa soning	ch to		R	S Agaı	rwal		2	2019			S C	Chand	
VII(c)): W	eb l	inks	and V	video 1	Lectur	es (e-l	Resour	rces):	1							
٠	h	tps:/	//swa	ayam.g	ov.in/o	explor	er					-		-		-	
•	h	tps:/	//npt	el.ac.ii	n/cours	ses											
VIII.	Act	ivi+-	Ro	n I has	arnin	п / Рис	ctical	Racad	Loom	ning/E	vnaria	ntial l	ogrnin	σ٠			
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ASSIG	ime	шs,	QUIZ	zes ar	iu sem	mar, g	roup a	uscussi	ions et	<i>U</i> .							



Jai Sri Gurudev || Sri Adichunchanagiri Shikshana Trust (R) SJB Institute of Technology BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060



ANNEXURE

Approved by AICTE, New Delhi. Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi

Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015 Recognized by UGC, New Delhi with 2(f) & 12 (B)

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CIE & SEE Evaluation strategy for Autonomous Scheme 2023 (Tentative)

Revised/updated on 29/06/2024; the update modifies the practical component evaluation of integrated courses & laboratory courses involving the mini projects or course projects.

1.5.15				10.21 10	10 Jan 1	1. A			(Continuous	Internal	l Evaluat	ion (CIE									5	emester	End E	xamina	tion (SE	E)		
			I. Theory Component								A States		ada da l	II. Prac	tical C	ompone	nt						Theory		P	ractical			Total
SI.	Course Type /Credits	Total	Min.			A. U	nit test	B. Fo	rmative ssments	Tat		Min	C. W Evalu	eekly lation	D.	Internal	Test	E. Prj	Tot marks	Total	n hrs.	Max.	Max.	min.	Max.	Max.	min.	Total	Marks
190.		marks	Eligty.	Marks	Eligty.	Nos.	Marks / Each	Nos.	Marks / Each	Theory marks (I)	Marks	Eligty.	Each week	Tot. marks	Nos.	Marks / Each	Total marks	Marks	(II)	marks	Dur. I	cond. marks	red marks	pass %	cond. marks	ered marks	pass %	marks	EE)
1	BSC/ESC/PCC/ETC/ PEC/OEC (3 or 4 Credit courses)	50	50%	50	50%	3	50	2	50	50 (avg. of 5)	-	-		-	-	-	-	-	-	50 (I)	03	100	50	40%	-	-	-	50	100
2	IBSC/IESC/IPCC (4 Credit courses)	50	50%	50	50%	3	50	-	- A	50 (avg. of 3)	50	50%	50	50 (Avg. of all)	1	50	50	50	50 (Avg. of C & [D or E])	50 (Avg. of I & II)	03	100	50	40%	-		-	50	100
3	IESC - CAED (4 credit course)	50	50%	-		-	-	-		(- 3)	50	50%	50	50 (Avg. of all)	1	50	50		50 (Avg. of C & D)	50	03			-	100	50	40%	50	100
4	PCCL (1 Credit courses)	50	50%	-	-		-	-		-	50	50%	50	50 (Avg. of all)	1	50	50	50	50 (Avg. of C & [D or E])	50 (11)	03	-			100	50	40%	50	100
5	AEC- IDT, Skill Development courses (1 credit course)	50	50%	50	50%	2	50	1	50	50 (Avg. of 3)	-	-	-		-	-	-		-	50 (I)	02	50	50	40%	-	-		50	100
6	HSMC- CIP, Env studies, SFH, UHV (1 credit course)	50	50%	50	50%	2	50	1	50	50 (Avg. of 3)	-	I	1	-	-	-	-	-	-	50 (I)	02	50	50	40%		H	-	50	100
7	HSMC - English, Kannada (No credits)	50	50%	50	50%	2	50	1	50	50 (Avg. of 3)	-	-	-		-	-	-	-	-	50 (I)	-		-						50
8	NCMC - Personality Development courses, PE, Yoga, NCC, NSS, IKS (No credits)	50	50%	50	50%	-	-	1	50	50	-	-		-	-		-	-		50 (I)	-	-	-			-	-	-	50

Formative (Successive) Assessments: Assignments/quiz/ seminars/field survey and report presentation/course project/etc. based on the faculty & dept. planning. # Practical Conduction: The conduction of each experiment/program per week should evaluate for 50 Marks and average of all shall be taken. # In case of Integrated course, minimum eligibility shall be attained as prescribed in both the theory and practical components. # Self Learning Courses (SLC) Courses, Internship, Mini project & Major Project: Rubrics & Methodology shall be defined separately

Academic Dear

Dr. BABU. N.V Prof. & Academic Dean SJB Institute of Technology BGS Health & Education City Kengeri, Bengaluru-560060

Principal

Principal SJB Institute of Technology # 67, BGS Health & Education City, Dr. Vishnuvardhan Road, Kengeri, Bengaluru - 560 060.



CIE and SEE guidelines based on course Type for Autonomous Scheme 2023

Revised/updated on 29/06/2024; the update modifies the practical component evaluation of integrated courses & laboratory courses involving the mini projects or course projects.

Note:

- > The CIE conduction coordination will be done by the office of Controller of Examination (COE).
- > The SEE will be conducted by the office of Controller of Examination (COE).

Continuous Internal Evaluation (CIE)	Semester End Examination (SEE)	Final Passing requirement
1. BSC/ESC/PCC/ ETC/PEC/OEC – Theory Course (03 &	04 Credit courses)	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Sen	nester End Exam (SEE) is 50%.	
The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50).	The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks).	The student is declared as a pass in the course if he/she secures a
Continuous Internal Evaluation:	Semester-End Examination:	minimum of 45% (45
CIE will be conducted by the department and it will have only 01	Duration of 03 hours and total marks of 100.	marks out of 100) in the
I. Theory component.	• The question paper will have ten questions.	SEE taken together.
Theory Component will consist of	Each question is set for 20 marks.	
A. Internal Assessment Test	• There will be 2 questions from each	
B. Formative assessments	module. Each of the two questions under a	

 week & 15th week, respectively. The question paper will have four questions (max of 3 sub questions) from the notified syllabus. Each question is set for 25 marks. The student must answer 2 full questions (one from 1st& 2nd questions and another from 3rd& 4th question). Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course. 	 module (with a maximum of 3 sub- questions), should have a mix of topics under that module. The students have to answer 5 full questions, selecting one full question from each module. Marks scored shall be proportionally reduced to 50 marks.
 B. Formative assessments: 02 formative assessments each of 50 marks shall be conducted by the course coordinator based on the dept. planning during random times. One formative assessment shall be completed before 5th week and second shall be completed before 12th week. The syllabus content for the formative assessment shall be defined by the course coordinator. The formative assessments include Assignments/ Quiz/ seminars/case study/field survey/ report presentation/ course project/etc. The assignment QP or Quiz QP shall indicate marks of each question and the relevant COc & DDT. 	
 The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs & POs and get it approved from academic dean. The final CIE marks will be 50: Average of all 05 events of Internal Assessment test and formative assessments. 	
The documents of all the assessments shall be maintained meticulously.	

2. IBSC/IESC/IPCC – Integrated with Theory & Practical (04 credit courses)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

 The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50). Minimum eligibility of 50% marks shall be attained separately in both the theory component and practical component. Continuous Internal Evaluation: CIE will be conducted by the department and it will have 02 component: Theory Component. Practical Component. I. Theory Component will consist of Internal Assessment Test Formative assessments (Not required for Integrated courses) A. Internal Assessment Test: There are 03 tests each of 50 marks conducted during 6th week, 10th week & 15th week, respectively. The question paper will have four questions (max of 3 sub questions) from the notified syllabus. Each question is set for 25 marks. It is suggested to include questions on laboratory content in the Internal Assessment Test Question papers. The student must answer 2 full questions (one from 1st& 2nd questions andanother from 3rd& 4th question). Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course. 	 The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks). Semester-End Examination: Only theory SEE for duration of 03 hours and total marks of 100. The question paper will have ten questions. Each question is set for 20 marks. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module. The laboratory content must be included in framing the theory question papers. The students have to answer 5 full questions, selecting one full question from each module. Marks scored shall be proportionally reduced to 50 marks. Note: CAED Course shall not be considered here, it shall be considered as in sl. No. 3 in the next row	The student is declared as a pass in the course if he/she secures a minimum of 45% (45 marks out of 100) in the sum total of the CIE and SEE taken together.
	the next row	

II. Practical Component:		
C. Conduction of each experiment/program should be evaluated for		
50 marks and average of all the experiments/programs shall be		
taken.(rubrics will be published by the lab conduction committee)		
D. One laboratoryInternal Assessment test will be conducted during		
the 14 th week for 50 marks.(rubrics will be published by the lab		
conduction committee)		
E. If the course project / mini project is involved in the laboratory		
component. The evaluation shall be completed by 14" week of		
the semester. The rubrics required for the evaluation of the		
project shall be defined by the departments along with mapping of		
relevant COs & POsand get it approved from academic dean.		
• If component 'E' is involved in the course either component 'D' or		
E along with component C shall be considered for average of item		
11. Otherwise components (C' & D' shall be considered for every of		× .
• Otherwise, components C & D shall be considered for average of item II		
item ii.		<i>n</i>
The final CIE marks will be 50 =		
Avg. {I [Avg. of 03 Internal assessment tests] + II [Avg. of (C&(Dor		
E))]}		
The documents of all the assessments shall be maintained		
meticulously.		
Note: CAED Course shall not be considered here, it shall be considered as		
In SI. No. 3 in the next row		
3. IESC: CAED Course (4 credits)		
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Sen	nester End Exam (SEE) is 50%.	
The minimum passing mark for the CIE is 50% of the maximum marks	The minimum passing mark for SEE is 40%	The student is declared
(25 marks out of 50).	of the maximum marks (20 out of 50	as a pass in the course if
• CIE shall be conducted for max. marks of 100 and shall be scaled	marks).	he/she secures a
down to 50 marks		minimum of 45% (45
• CIE component should comprise of both Manual and computer		marks out of 100) in the
drafting i.e. 50% manual and 50% computer drafting out of total 100	Semester-End Examination:	sum total of the CIE
marks	SEE for duration of 03 hours and total marks	and SEE taken together.
marko	of 100.	

• CIE component should comprise of Continuous evaluation of drawing work of students as and when the modules are covered based on below detailed weightage.

	Module	Evaluation Weightage i marks	
Module	Max. Marks	Computer display and print out	Manual Sketching
Module 1	20	10	10
Module 2	20	10	10
Module 3	20	10	10
Module 4	20	10	10
Module 5	20	10	10
TOTAL	100	50	50

At least one Test covering all the modules is to be conducted for 100 marks during 14thweek and the same is to be scaled down to 25 Marks.

- Assignments = 10 Marks from each module. (50 marks scaled down to 25 Marks)
- The final CIE 50 marks = Test (25 marks) + Assignment (25 marks).

- SEE shall be conducted and evaluated for maximum marks of 100 and shall be scaled down to 50 marks.
- Question paper shall be made available for each batch asper schedule.
- Evaluation shall be carried jointly by both theinternal & external examiners.
- Scheme of Evaluation: To be defined by both the examiners jointly.
- Maximum 3 questions shall be set as per the following pattern.

From Module		Marks Allotted	
Modu	Module 01 (Choice between Lines or Planes)		30
Moo	dule 02 (Cor question	npulsory)	40
Module 03 or Module 04 or Module 05		30	
	TOTAL		100
Q. No.	Manual Sketching	Computer display and print out	TOTAL MARKS
1	15	15	30
2	20	20	40
3	15	15	30
TOT.	50	50	100

4. PCCL: Laboratory course (01 credit course)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 50% of the maximum marks	The minimum passing mark for SEE is 40%	The student is declared
(25 marks out of 50).	of the maximum marks (20 out of 50	as a pass in the course if
	marks).	he/she secures a

		minimum of 45%
Continuous Internal Evaluation:		(45marks out of 100) in
CIE will be conducted by the department and it will have only 01	Semester-End Examination:	the sum total of the CIE
component:	Only laboratory SEE will be conducted	and SEE taken together.
I. Theory Component. (Not required for Laboratory course)	jointly by the internal examiner and external	
II. Practical Component.	examiner appointed by COE as per the	
	scheduled timetable for duration of 03	· · · · · · · · · · · · · · · · · · ·
II. Practical Component:	hours.	
C. Conduction of each experiment/program should be evaluated for	• The examination shall be conducted for	
50 marks and average of all the experiments/program shall be	100 marks and shall be reduced to 50	
taken (rubrics will be published by the lab conduction committee).	marks proportionately.	
D. One laboratory Internal Assessment test will be conducted for 50	• All laboratory experiments/programs are	
marks (rubrics will be published by the lab conduction	to be included for practical examination.	
committee).	• Breakup of marks (Rubrics) and the	
E. If the course project / mini project is involved in the laboratory	instructions printed on the cover page of	
component. The evaluation shall be completed by 14 th week of	the answer script to be strictly adhered to	
the semester. The rubrics required for the evaluation of the	by the examiners (OR) based on the course	
project shall be defined by the departments along with mapping of	requirement evaluation rubrics shall be	
relevant COs & POsand get it approved from academic dean.	decided jointly by examiners.	
Note:	• Students can pick one question	
• If component 'E' is involved in the course either component 'D' or	(experiment/program) from the questions	
'E' along with component 'C'shall be considered for average of item	lot prepared by the internal /external	
11.	examiners jointly.	
• Otherwise, components 'C' & 'D' shall be considered for average of	• Evaluation of test write-up/ conduction	
item II.	procedure and result/viva will be	
	conducted jointly by examiners.	
The final CIE marks will be $50 = Avg$. of (C &[D or E])	• General rubrics suggested for SEE:	
	writeup-20%, Conduction procedure and	
The documents of all the assessments shall be maintained	results -60%, Viva-voce 20% of maximum	
meticulously.	marks.	
	• Change of experiment is allowed only	
	once and shall be assessed only for 85% of	
	the maximum marks.	
5 AEC: Ability Enhancement Courses (01 credit courses)		
S. ALES. Adding Enhancement Courses (of credit courses)		
The million for the Literal E. 1. (CUE): 500/ 10.0		S

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 50% of the maximum marks The minimum passing mark for SEE is 40% The student is declared

(25 marks out of 50).	of the maximum marks (20 out of 50	as a pass in the course if
	marks).	he/she secures a
		minimum of 45%
Continuous Internal Evaluation:		(45marks out of 100) in
CIE will be conducted by the department and will have only 01	Semester-End Examination:	the sum total of the CIE
component:	Theory SEE will be conducted by COE as	and SEE taken together.
I. Theory component.	per the scheduled timetable for duration of	
Theory Component will consist of	02 hours and total marks of 50.	
A. Internal Assessment Test		
B. Formative assessments	 Multiple choice Question paper. 	
	• The students have to answer all questions.	
A. Internal Assessment Test:		
• There are 02 tests each of 50 marks conducted during 6 th week & 15 th		
week, respectively.		
• The question paper will be of Multiple-Choice Questions (MCQ).		
• The student must answer all questions.		
• Internal Assessment Test question paper shall be designed to attain		
the different levels of Bloom's taxonomy as per the outcome defined		é.
for the course		
B. Formative assessments:	á c	
•01 formative assessments of 50 marks shall be conducted by the		
Course coordinator based on the dept. planning before 14 th week.		
• The formative assessments include Assignments/seminars/case		
study/field survey/ report presentation/course project/etc.		
• The assignment QP shall indicate marks of each question and the		
relevant COs & RBT levels.		
• The rubrics required for the other formal assessments shall be defined		
by the departments along with mapping of relevant COs & POs.		
The final CIE marks will be 50:		
Average of all 03 events (02 Internal Assessment test and 01 formative		
assessment).		
The documents of all the assessments shall be maintained		
meticulously.		
6. HSMC: (01 credit course)		
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Sen	nester End Exam (SEE) is 50%.	

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 The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50). Continuous Internal Evaluation: CIE will be conducted by the department and will have only 01 component: I. Theory component. Theory Component will consist of A. Internal Assessment Test B. Formative assessments A. Internal Assessment Test: There are 02 tests each of 50 marks conducted during 6th week & 15th week, respectively. The question paper will be of Multiple-Choice Questions (MCQ). The student must answer all questions. Internal Assessments: O1 formative assessments of 50 marks shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course B. Formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc. The assignment QP shall indicate marks of each question and the relevant COs & RBT levels. The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs & RPOs. 	 The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks). Semester-End Examination: Theory SEE will be conducted by COE as per the scheduled timetable for duration of 02 hours and total marks of 50. Multiple choice Question paper. The students have to answer all questions. Marks scored shall be proportionally reduced to 50 marks. 	The student is declared as a pass in the course if he/she secures a minimum of 45% (45 marks out of 100) in the sum total of the CIE and SEE taken together.
Average of all 03 events (02 IA test and 01 formative assessment). The documents of all the assessments shall be maintained meticulously.		
7. HSMC: (0 credit courses)		

Page 8 of 10

The weightage is only for Continuous Internal Evaluation (CIE).		
The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50). Continuous Internal Evaluation: CIE will be conducted by the department and it will have only 01 component: I. Theory component.	• No Semester End Examination.	The student is declared as a pass in the course if he/she secures a minimum of 50% (25 marks out of 50) in the CIE.
Theory Component will consist of		
C. Internal Assessment Test		
D. Formative assessments		
A Internal Assessment Test		
• There are 02 tests each of 50 marks conducted during 6 th week & 15 th week, respectively.		
• The question paper will be of Multiple-Choice Questions (MCQ).		
• The student must answer all questions.		
• Internal Assessment Test question paper shall be designed to attain		
for the course		
B. Formative assessments:		
•01 formative assessments of 50 marks shall be conducted by the		
faculty based on the dept. planning during random times.		
•The formative assessments include Assignments/seminars/case		
study/field survey/ report presentation/course project/etc.		
• The assignment QP shall indicate marks of each question and the		
relevant COs & RBT levels.	D I W D W	
• The rubrics required for the other formal assessments shall be defined	2 14 11 13 16 11	
by the departments along with mapping of relevant COs & POs.	C. C. Sattania Sugar	
and 01 formative assessment) (02 IA test)	Potentias Transference	
The documents of all the assessments shall be maintained	al Qad-Anthinness and	
meticulously.		
8. NCMC: (0 credit course)		
The weightage is only for Continuous Internal Evaluation (CIE).		

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Page **9** of **10**

The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50).	No Semester End Examination.	The student is declared
Continuous Internal Evaluation:		as a pass in the course if
CIE will be conducted by the department and it will have only 01		minimum of 50% (25
component:		minimum of 50% (25)
I. Theory component.		CIE
Theory Component will consist of only 01 assessment		CIE.
A. Internal Assessment Test (not required for NCMC course).		
B. Formative assessments.	· · · · · · · · · · · · · · · · · · ·	
B. Formative assessments:		
• 01 formative assessments of 50 marks shall be conducted by the faculty based on the dept. planning during random times.		
• The formative assessments include Quiz/Assignments/seminars/case study/field survey/ report presentation/course project/etc.		
• The assignment QP shall indicate marks of each question and the relevant COs & RBT levels.		
• The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs		
&POs.		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
The final CIE marks will be 50		
The documents of all the assessments shall be maintained meticulously.		

Academic Dean DIDBABU NW Prof. & Academic Dean SJB Institute of Technology BGS Health & Education City Kengeri, Bengaluru-560060

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Dr. K V Mahendra Prashanth

Principal SJB Institute of Technology # 67, BGS Health & Education City, Dr. Vishnuvardhan Road, Kengeri, Bengaluru - 560 060.



Recognized by UGC, New Delhi with 2(f) & 12 (B)

Program Outcomes (POs)- Graduate Attributes

Engineering Graduates will be able to:

- 1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. **The engineer and society**: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- 9. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering 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.
- 12. 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.

