INSTITUTE VISION

"To be a preferred institution in Engineering Education by achieving excellence in teaching and research and to remain as a source of pride for its commitment to holistic development of individual and society"

INSTITUTE MISSION

"To continuously strive for the overall development of students by educating them in a state-of-the-art-infrastructure, by retaining the best practices, faculties and inspire them to imbibe real time problem solving skills, leadership qualities, human values and societal commitments, so that they emerge as competent professionals".

DEPARTMENT VISION

"To be a center of excellence in providing education in the field of Computer Science and Engineering to produce technically competent and socially responsible IT professionals"

DEPARTMENT MISSION

"To provide a theoretical foundation in computing with the exposure of latest tools and technologies, IT infrastructure and encourage students for continuous learning to make them competent professionals"

PROGRAM EDUCATIONAL OBJECTIVES (PEO's) :

1. ***Pursue a successful career in the field of Computer Science & Engineering utilizing his/her knowledge and contribute to the profession as an excellent employee, or as an entrepreneur.***
2. ***Apply the knowledge of mathematics & computer science fundamentals to analyze & formulate the solution to solve real time problems.***
3. ***Exhibit the professional and ethical values, communication & teamwork skills, lifelong learning, multidisciplinary approach to address computer engineering and societal issues.***

PROGRAM OUTCOMES (PO's) :

1. ***Engineering knowledge:*** *Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.*
2. ***Problem analysis:*** *Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.*
3. ***Design/development of solutions:*** *Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.*
4. ***Conduct investigations of complex problems:*** *Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.*
5. ***Modern tool usage:*** *Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.*
6. ***The engineer and society:*** *Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.*

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

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

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

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

11. ***Project management and finance:*** *Demonstrate knowledge and understanding of the engineering 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.*

PROGRAM SPECIFIC OUTCOMES (PSO's) :

PSO1: *Uunderstand, design and analyze computer programs in the areas related to Algorithms, System Software, Web design, Bigdata Analytics, Machine Learning and Networking.*

PSO2*: Make use of modern computer tools for creating innovative career paths to be an entrepreneur and desire for higher studies.*

Contents

1.0 Student Help Desk

Sl. No.	Purpose	Contact Person	
		Faculty	Instructor
1	Head of Department ,NBA Criteria1 Coordinator ,Module Coordinator, NAAC Criteria 2 Coordinator , Computer Center Lab Incharge, VTU/LIC Coordinator Students Mentor	Dr. K. B. Manwade	Mr. A. R. Bhiste
2	Website Coordinator ,Feedback Coordinator , NBA Criteria 4 Coordinator, NAAC Criteria 2,3,5 Co-Coordinator, Module Coordinator, Students Mentor	Dr. Mahesh. G. Huddar	Mr. A. K. Badakar
3	Dept. ED Cell Coordinator , NBA Criteria 6 Coordinator, Module Coordinator,, Class Teacher for VII Sem, Microprocessor Lab Incharge, Students Mentor	Prof. N K Honnagoudar	Mr. A. K. Talwar
4	Innovation Club Coordinator, Dept. NBA Coordinator, AICTE/NIRF activity point Coordinator, NBA Criteria7 and 10 Coordinator, NAAC Criteria 4 Coordinator , Research Center Coordinator , Module Coordinator, Project Lab Incharge, Students Mentor	Prof. S. V. Manjaragi	Mr. Suyash Badi
5	EMS/IA Coordinator, Alumni Coordinator , NBA Criteria 3 Coordinator, NAAC Criterian-7 Co-Coordinator, Dept. Time table Coordinator / Meeting Coordinator, Module coordinator ,Students Mentor	Prof. A A Daptardar	Miss. S. B. Vairagi
6	Department Association Coordinator (STAC) ,Dept. T&P coordinator, Technical magazine / Newsletter Professional body Coordinator ,(IEEE/ISTE), NBA Criteria 5 Coordinator , NACC Criteria 1,5 Co-coordinator, Students Mentor	Prof. Prasanna. G. Patil	Miss. S. G. Gurav
7	Project/KSCST Coordinator, NBA Criteria 2 Coordinator, Class Teacher for III Sem A-DIV, Web Programming Lab Incharge, Students Mentor	Prof. S. I. Mane	Miss. S. B. Vairagi
8	NBA Criterion 9 Coordinator, Class Teacher for V Sem Conference / FDP / Workshop, IIIC/Internship Coordinator, Student Registration Coordinator Students Mentor	Prof. M. G. Ganachari	Mr. A. B. Bennoli
9	Final year seminar Coordinator, System Programming Lab Incharge, GATE/Pre-placement Coaching Coordinator, Class Teacher for III Sem B-DIV, Students Mentor	Prof. Sapna Patil	Miss. S. G. Gurav
10	Dept. Library	Mr. A. R. Bhiste	
Institute Level			
12.	Dean Student Welfare Convener	Dr. Mahesh G. Huddar (7411043272)	
13.	Dean Placements and III Cell	Prof. P. V. Patil (9731104059)	
14.	Anti Ragging Convener	Prof. Girish Zulapi (9480213587)	
15.	Anti Squad Convener	Prof. Girish Zulapi (9480213587)	
16.	Internal Complaint Committee Convener	Prof. S. S. Kamte (9008696825)	
17.	Grievance Redressal Convener	Prof. S. S. Tabhaj (9901398134)	
18.	Sports & Cultural/Extra-Curricular Activities Convener	Sri. S.B. Sarawadi (9739109383)	

2.0 Departmental Resources

Department of Computer Science and Engineering was established in the year 1996 and is housed in a total area of ***1206 Sq. Mtrs.***

2.1 Faculty Position

Sl.No.	Category	No. in Position	Average experience (in years)
1.	Teaching Faculty	09	12.5
2.	Technical Supporting Staff	07	15
3.	Helper Staff	03	19

2.2 Major Laboratories

Sl.No.	Name of the laboratory	Area in Sq. Mtrs	Amount Invested (Rs. in Lakhs)
1.	System Programming Lab.	70	12.65
2.	C Programming Lab/ Algorithms/ Network Lab.	70	19.34
3.	Project Laboratory	70	20.06
4.	Microprocessors Lab.	70	22.14
5.	Web Programming/DBA Lab.	70	09.56
6.	Computer Center	220	234.79

Total Investment in the Department **Rs. 318.54 Lakhs**

3.0 Teaching Faculty Details

Sl. No.	Name	Designation	Qualification	Specializ -ation	Professional Membership	Teaching Exp (in yrs)	Phone No.
1	Dr. K. B. Manwade	Assoc. Prof	M. Tech, Ph.D	CSE	LMISTE,CSI	17.06	8412968254
2	Dr. Mahesh. G. Huddar	Assoc. Prof	M. Tech, Ph.D	CSE	LMISTE	13.00	7411043272
3	Prof. N K Honnagoudar	Asst. Prof.	M.E	ECE	LMISTE	19.06	9449495302
4	Prof. S. V. Manjaragi	Asst. Prof.	M.Tech.(Ph.D)	CSE	LMISTE	18.06	9986658309
5	Prof. A A Daptardar	Asst. Prof	M. Tech.	CSE	LMISTE	15.06	9620851002
6	Prof. Prasanna. G. Patil	Asst. Prof	M. Tech	CSE	LMISTE,CSI,IE	09.1	9743202717
7	Prof. S. I. Mane	Asst. Prof	M. Tech	CNE	--	8.00	9743202717
8	Prof. M. G. Ganachari	Asst. Prof	M. Tech	IE	-	12.00	8904879471
9	Prof. Sapna Patil	Asst. Prof	M. Tech	DE	--	1.00	9740875627

4.0 Institute Academic Calendar

ACADEMIC CALENDAR OF EVENTS-02 (CoE-02) OF III & V SEM FOR THE AY: 2023-24

Ref:
1. VTU CoE Notification No.: VTU/BGM/ACA/2023-24/3252, Dated 30th Sept. 2023
2. VTU CoE Notification No.: VTU/BGM/ACA/2023-24/2668, Dated 25th Aug. 2023
3. HSIT/NDS/HOD-Meeting-25/2022-23, Dated: 16th Oct. 2023

Calendar

October -2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

November -2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

December -2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

January -2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

February -2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29		

March -2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Date	Events & Holidays
28th Sept.2023	GH: Eid-Milad
2nd Oct. 2023	GH: Gandhi Jayanthi
14th Oct.2023	GH: Mahalaya Amavasya
17th Oct. 2023	Fresher's day: A Welcome Function for 1st year students
23rd -24th Oct. 2023	GH: Mahanavami, Ayudhapooja, Vijayadasami
25th Oct. 2023	Commencement of III Semester Classes
25th Oct to 23rd Nov. 2023	V Sem Innovation/Entrepreneurship / Societal Internship (2021 Scheme)
28th Oct. 2023	Valmiki Jayanti
1st Nov. 2023	GH: Kannada Rajyothsava
14th Nov. 2023	GH: Balipadyami, Deepavali
25th Nov. 2023	Commencement of V Semester Classes
30th Nov. 2023	GH: Kanakadasa Jayanti
4th-6th Dec.2023	1st IA Test for III Semester
6th Dec. 2023	1st Feedback on Teaching-Learning (III Sem.)
11th Dec. 2023	Display of 1st IA Test Marks (III Sem)
8th-9th Dec. 2023	International Conference
25th Dec. 2023	GH: Christmas
29th -30th Dec. 2023	Lab IA Test-I (III Sem. 2022 Scheme)
12th Jan. 2024	National Youth Day
26th Jan. 2024	Republic Day
8th-10th Jan.2024	2nd IA Test for III Sem. & 1st IA Test for V Sem.
10th Jan. 2024	2nd Feedback on Teaching-Learning (III Sem) & 1st Feedback on Teaching-Learning (V Sem)
15th Jan. 2024	Display of 1st (V Sem.) & 2nd IA Test Marks (III Sem.)
5th-7th Feb.2024	3rd IA Test for III Sem. & 2nd IA Test for V Sem.
7th Feb. 2024	2nd Feedback on Teaching-Learning (V Sem.)
8th -9th Feb. 2024	Lab IA Test-II (III Sem. 2022 Scheme) & Lab IA Test-I (V Sem. 2021 Scheme)
9th Feb. 2024	Display of 3rd & 2nd IA Test Marks (III & V Semesters)
10th Feb. 2024	Last Working Day of the III Semester
12th-22nd Feb. 2024	III Semester VTU Practical Examination
26th Feb.to15th March 23	III Semester VTU Theory Exams (SEE)
1st & 2nd March 2024	Lab IA Test-II (V Sem. 2021 Scheme)
5th -7th March 2024	3rd IA Test for V Sem
9th March 2024	Display of 3rd IA Test Marks
8th March 2024	Mahashivaratri
9th March 2024	Last Working Day of the V Semester
11th-20th March. 2024	V Semester Practical Examination
18th March 2024	Commencement of IV Semester
22nd March-20th April 24	V Semester VTU Theory Exams (SEE)
22nd April 2024	Commencement of VI Semester
29th March 2024	Good Friday

GH: General Holiday, LH: Local Holiday

Dr.S.N.Topannavar
IQAC Coordinator & Dean (Academics)

Dr.S.C.Kamate
Principal

Nidasoshi, Taq: Hukkeri, Dist: Belgaum, Karnataka - 591 236
Phone:+91-8333-278887, Fax:278886, Web:www.hsit.ac.in, Mail:principal@hsit.ac.in

5.0 Department Academic Calendar

DEPARTMENT ACADEMIC CALENDAR OF EVENTS (CoE) OF III & V SEM FOR THE AY: 2023-24

Calendar

October -2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

November -2023

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			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

December -2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

January -2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

February -2024

ın	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29		

March -2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Date	Events & Holidays
25th Oct to 23rd Nov. 2023	V Sem Innovation/Entrepreneurship/Societal Internship (2021 Scheme)
28th Oct. 2023	Valmiki Jayanti
1st Nov. 2023	GH: Kannada Rajyothsava
14th Nov. 2023	GH: Balipadyami, Deepavali
15th Nov. 2023	Commencement of III Semester Classes
25th Nov. 2023	Commencement of V Semester Classes
30th Nov. 2023	GH: Kanakadasa Jayanti
8th-9th Dec. 2023	International Conference
8th Dec. 2023	Box Cricket
15th Dec. 2023	Technical Talk by Industry Experts on Latest Technology
25th Dec. 2023	GH: Christmas
21st-23rd Dec.2023	1st IA Test for III & V Semesters
23rd Dec. 2023	1st Feedback on Teaching-Learning (III & V Sems.)
27th Dec. 2023	Display of 1st IA Test Marks (III & V Sems.)
30th Dec. 2023	Inauguration of STAC Activities for the AY 2023-24 & Welcome function to 3rd Sem Students
1st -5th Jan, 2024	5 Days Workshop on Angular JS and Node JS
5th Jan, 2024	Cooking Without Fire Competition
12th Jan, 2024	Webinar on Latest Technology
15th Jan. 2024	GH: Uttarayana Punya Kala Sankrathi (Tentative)
19th -20th Jan. 2024	Lab IA Test-I (III Sem. 2022 Scheme & V Sem. 2021 Scheme)
22nd-24th Jan. 2024	2nd IA Test for III & V Semesters
24th Jan. 2024	2nd Feedback on Teaching-Learning (III & V Sems.)
26th Jan. 2024	Republic Day
29th Jan. 2024	Display of 2nd IA Test Marks (III & V Sems.)
2nd Feb, 2024	Coding Competition- "Codeathon-2023"
9th Feb, 2024	Industrial Visit to III & V Sem Students
9th -10th Feb. 2024	Lab IA Test-II (III Sem. 2022 Scheme)
15th-17th Feb. 2024	3rd IA Test for III Semester
16th Feb, 2024	Technical Essay Writing Competition
19th Feb. 2024	Display of 3rd IA Test Marks (III Sem.)
20th Feb. 2024	Last Working Day of the III Semester
23rd Feb, 2024	Infosys Spring Board Certification Course
21st -29th Feb. 2024	III Semester VTU Practical Examination
1st Mar, 2024	Mini Project Exhibition and Competition- Sem V
04th -23rd March. 2024	III Semester VTU Theory Exams (SEE)
1st & 2nd March 2024	Lab IA Test-II (V Sem. 2021 Scheme)
5th -7th March 2024	3rd IA Test for V Sem
9th March 2024	Display of 3rd IA Test Marks
8th March 2024	GH: Mahashivaratri & International Women's Day
9th March 2024	Last Working Day of the V Semester
11th-20th March. 2024	V Semester Practical Examination
1st April 2024	Commencement of IV Semester
22nd March-20th April 24	V Semester VTU Theory Exams (SEE)
22nd April 2024	Commencement of VI Semester
29th March 2024	GH: Good Friday

GH: General Holiday, LH: Local Holiday

30/11/23
Prof. Prasanna Patil
STAC Coordinator

30/11/23
Dr. K. B. Manwade
HoD CS&E

Nidasoshi, Taq: Hukkeri, Dist: Belgaum, Karnataka - 591 236
Phone:+91-8333-278887, Fax:278886, Web:www.hsit.ac.in, Mail:principal@hsit.ac.in

6.0 Scheme of Teaching & Examination

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
B.E. in Computer Science and Engineering
Scheme of Teaching and Examinations 2021
Outcome Based Education(OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2021 - 22)

V SEMESTER

Sl. No	Course and Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	S					
1	BSC 21CS51	Automata Theory and compiler Design	Any CS Board Department	3	0	0		03	50	50	100	3
2	IPCC 21CS52	Computer Networks		3	0	2		03	50	50	100	4
3	PCC 21CS53	Database Management Systems		3	0	0		03	50	50	100	3
4	PCC 21CS54	Artificial Intelligence and Machine Learning		3	0	0		03	50	50	100	3
5	PCC 21CSL55	Database Management Systems Laboratory with Mini Project		0	0	2		03	50	50	100	1
6	AEC 21XX56	Research Methodology & Intellectual Property Rights	TD: Any Departmen tPSB: As identified by university	2	0	0		02	50	50	100	2
7	HSMC 21CIV57	Environmental Studies	TD: Civil/ Environmenta l /Chemistry /Biotech. PSB: Civil Engg	1	0	0		1	50	50	100	1
8	AEC 21CS58X/21 CS58LX	Ability Enhancement Course-V	Concerne dBoard	If offered as Theory courses: 1	0	0		01	50	50	100	1
				If offered as lab. courses: 0	0	2		02				
								Total	**40 0**	**400**	**800**	**18**

Ability Enhancement Course - IV

21CSL581	Angular JS and Node JS	21CS583	
21CS582	C# and .Net Framework	21CS584	

Note: BSC: Basic Science Course, PCC: Professional Core Course, IPCC: Integrated Professional Core Course, AEC –Ability Enhancement Course INT –
Internship, HSMC: Humanity and Social Science & Management Courses.
L –Lecture, T – Tutorial, P- Practical/ Drawing, S – Self Study Component, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

Integrated Professional Core Course (IPCC): refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching – Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). Theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by CIE only and there shall be no SEE. For more details the regulation governing the Degree of
Bachelor of Engineering /Technology (BE/B.Tech.) 2021-22 may be referred.

AutomataTheoryandCompilerDesign			
SubjectCode	**21CS51**	**CIEMarks**:IA-Tests(20)+Assignments(10)+ Quiz/GD/Seminar(20)	**50**
TeachingHours/Week(L:T:P:S)	**3:0:0:0**	**SEEMarks**	**50**
TotalHoursofPedagogy	**40**	Totalmarks(CIE+ SEE)	**100**
Credits	**03**	SEEHours	**03**

FACULTYDETAILS:		
Name: Prof.S.V.Manjaragi	**Designation:**AssistantProfessor	**Experience:**19 Yrs
No.oftimescoursetaught:1	**Specialization:**ComputerScienceandEngineering	

1.0 PrerequisiteSubjects:

Sl. No	Branch	Semester	Subject
01	CSE	I	ProblemSolvingthroughProgramminginC
02	CSE	IV	MathematicalFoundationsforComputing

2.0 CourseObjectives

CLO1.IntroducethefundamentalconceptsofAutomataTheory,FormalLanguagesandcompilerdesign
CLO2.PrinciplesDemonstrateApplicationofAutomataTheoryandFormalLanguagesinthefieldofcompiler design
CLO3.DevelopunderstandingofcomputationthroughPushDownAutomataandTuringMachines CLO 4.
Introduce activities carried out in different phases of Phases compiler
CLO5.Identifytheundecidabilityproblems.

3.0 CourseOutcomes[C301]

Attheend of thecourse thestudentwillbeableto:

CO	CourseOutcome	Cognitive Level	POs
C301.1	Acquirefundamentalunderstandingofthecoreconceptsinautomata theory and Theory of Computation.	L1,L2	1,2,3,8,10
C301.2	Designanddeveloplexicalanalyzers,parsersandcodegenerators.	L2,L3	1,2,3,8,10

C301.3	Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models ofComputation (Regular, Context Free) and their relative powers.	L2,L3	1,2, 3,8,10
C301.4	AcquirefundamentalunderstandingofthestructureofaCompilerand ApplyconceptsautomatatheoryandTheoryofComputationtodesign Compilers	L1,L2,L3	1,2,3,8,10
C301.5	Design computations models for problems in Automata theoryand adaptation of such model in the field of compilers	L2,L3	1,2,3,8,10

4.0 CourseContent

Module-1

Introduction to Automata Theory: Central Concepts of Automata theory, Deterministic Finite Automata(DFA), Non- Deterministic Finite Automata(NFA) ,Epsilon- NFA, NFA to DFA Conversion, Minimization of DFA
Introduction to Compiler Design: Language Processors, Phases of Compilers
Textbook1:Chapter1–1.5,Chapter2–2.2,2.3,2.5Chapter4–4.4
Textbook2:Chapter1–1.1and1.2

Module-2

Regular Expressions andLanguages: RegularExpressions,FiniteAutomataandRegularExpressions,Proving Languages Not to Be Regular
Lexical Analysis Phase of compiler Design: Role of Lexical Analyzer, Input Buffering , Specification of Token, Recognition of Token.
Textbook1:Chapter3–3.1,3.2,Chapter4-4.1
Textbook2:Chapter3-3.1to 3.4

Module-3

Context Free Grammars: Definition and designing CFGs, Derivations Using a Grammar, Parse Trees, Ambiguity and Elimination of Ambiguity, Elimination of Left Recursion, Left Factoring.
SyntaxAnalysisPhaseofCompilers:part-1: RoleofParser,Top-DownParsing Textbook 1:
Chapter 5 – 5.1.1 to 5.1.6, 5.2 (5.2.1, 5.2.2), 5.4
Textbook2:Chapter4 –4.1,4.2,4.3(4.3.2to4.3.4),4.4

Module-4

PushDownAutomata: DefinitionofthePushdownAutomata,TheLanguagesofaPDA.
SyntaxAnalysisPhaseofCompilers: Part-2:Bottom-upParsing,IntroductiontoLRParsing:SLR,MorePowerful LR parsers
Textbook1:Chapter6 –6.1, 6.2
Textbook2:Chapter4–4.5,4.6,4.7(Upto4.7.4)

Module-5

IntroductiontoTuringMachine: ProblemsthatComputersCannotSolve,TheTuringmachine,problems, Programming Techniques for Turing Machine, Extensions to the Basic Turing Machine
Undecidability: AlanguageThatIsNotRecursivelyEnumerable,AnUndecidableProblemThatIsRE.
OtherPhasesofCompilers: SyntaxDirectedTranslation-Syntax-DirectedDefinitions,EvaluationOrdersfor SDD"s. Intermediate-Code Generation- Variants of Syntax Trees, Three-Address Code.
CodeGeneration-IssuesintheDesignofaCodeGenerator Textbook1:
Chapter 8 – 8.1, 8.2,8.3,8.4 Chapter 9 – 9.1,9.2
Textbook2:Chapter5–5.1,5.2,Chapter6-6.1,6.2Chapter8-8.1

5.0 Relevancetofuturesubjects

S.No	Semester	Subject	Topics
01	V	DatabaseManagementSystems	TransactionManagement
02	VI	SoftwareEngineering&Project Management	SoftwareDesign

6.0 RelevancetoRealWorld

S.No	RealWorldMapping
01	Developmentofmodernlanguagedevelopment,compilerdesign,digitalcircuitdesignetc

7.0 GapAnalysisandMitigation

S.No	DeliveryType	Details
01	E-content	E-learning.https://www.tutorialspoint.com/automata_theory/index.htm
02	MOOC	https://archive.nptel.ac.in/courses/106/106/106106049/

8.0 BooksUsedandRecommendedtoStudents

TextBooks

1. JohnEHopcroft,RajeevMotwani,JeffreyD.Ullman,"IntroductiontoAutomataTheory,Languagesand Computation", Third Edition, Pearson.
2. AlfredV.Aho,MonicaS.Lam,RaviSethi,JeffreyD.Ullman,"CompilersPrinciples,TechniquesandTools", SecondEdition,Perason.

ReferenceBooks

1. ElainRich,"Automata,Computabilityandcomplexity",1stEdition,PearsonEducation,2018.
2. K.L.PMishra,NChandrashekaran,3rdEdition,,,TheoryofComputerScience",PHI,2012.
3. PeterLinz,"AnintroductiontoFormalLanguagesandAutomata",3rdEdition,NarosaPublishers,1998.
4. KMuneeswaran,"CompilerDesign",OxfordUniversityPress2013.

AdditionalStudymaterial&e-Books

1. E-Book:https://www.cs.utexas.edu/~ear/cs341/automatabook/AutomataTheoryBook.pdf
2. https://www.geeksforgeeks.org/compiler-design-tutorials/

9.0 RelevantWebsites(ReputedUniversitiesandOthers)forNotes /Animation/VideosRecommended

WebsiteandInternetContentsReferences

1)https://archive.nptel.ac.in/courses/106/106/106106049/

10.0 Magazines/JournalsUsedandRecommendedtoStudents

S.No	Magazines/Journals	website
1	Journals	*www.jalc.de*
2	Journals	*https://www.journals.elsevier.com/theoretical-computer-science/*

11.0 ExaminationNote

AssessmentDetails (bothCIE andSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

ContinuousInternalEvaluation(CIE)

ThreeUnitTestseachof **20Marks(Duration01 hour**):

1) First Test at the end of **5**th week of the semester, 2) Second Test at the end of the **10**th week of the semester, 3) Third test at the end of the **15**thweek of the semester

TwoAssignmentseachof**10Marks:**

4. Firstassignmentattheendof**4**thweekofthe semester
5. Secondassignment attheendof**9**thweekofthesemester

Groupdiscussion/Seminar/quizanyoneofthreesuitablyplannedtoattaintheCOsandPOsfor**20 Marks** (**Duration:01hours**)attheendofthe **13**thweekofthe semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks.**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

SemesterEndExamination(SEE)

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**Duration: 03 hours)**

1. Thequestionpaperwillhave**Ten**questions.Eachquestionissetfor20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **will have a mix of topics** under that module. **The students have to answer 5 full questions, selecting one full question from each module.**

12.0 CourseDelivery Plan

Module	Lecture No.	ContentofLecture		% of Portion
		PART-A	**Teaching-LearningProcess**	
1	1	**IntroductiontoAutomataTheory:**CentralConceptsof Automatatheory.	Chalk and board, Active Learning,Problembased learning	20
	2	DeterministicFiniteAutomata(DFA)		
	3	Non-DeterministicFiniteAutomata(NFA)		
	4	Epsilon-NFA		
	5	NFAtoDFAConversion		
	6	MinimizationofDFA		
	7	**IntroductiontoCompilerDesign:**LanguageProcessors		

	8	PhasesofCompilers		
2	9	**Regular Expressions and Languages:** Regular Expressions	Chalk and board, Active Learning, Demonstration	20
	10	FiniteAutomataandRegularExpressions		
	11	FiniteAutomataandRegularExpressions		
	12	ProvingLanguagesNottoBeRegular		
	13	**LexicalAnalysisPhaseofcompilerDesign:** Roleof LexicalAnalyzer		
	14	InputBuffering		
	15	SpecificationofToken		
	16	RecognitionofToken		
3	17	**ContextFreeGrammars:** DefinitionanddesigningCFGs	Chalk and board, Problembasedlearning, Demonstration	20
	18	DerivationsUsingaGrammar		
	19	ParseTrees		
	20	AmbiguityandEliminationofAmbiguity		
	21	EliminationofLeftRecursion		
	22	LeftFactoring		
	23	**SyntaxAnalysisPhaseofCompilers:part-1:** Roleof Parser		
	24	Top-DownParsing		
4	25	**PushDownAutomata:** DefinitionofthePushdown Automata	Chalk&board,Problem based learning	20
	26	TheLanguagesofaPDA		
	27	**SyntaxAnalysisPhaseofCompilers:** Part-2:Bottom-up Parsing		
	28	Bottom-upParsing		
	29	Bottom-upParsing		
	30	IntroductiontoLRParsing		
	31	SLR		
	32	MorePowerfulLRparsers		
5	33	**Introduction to Turing Machine:** Problems that ComputersCannotSolve,TheTuringmachine	Chalkandboard,MOOC	20
	34	Problems,ProgrammingTechniquesforTuringMachine		
	35	ExtensionstotheBasicTuringMachine		
	36	**Undecidability:** AlanguageThatIsNotRecursively Enumerable		
	37	AnUndecidableProblemThatIs RE		
	38	**OtherPhasesofCompilers:** SyntaxDirected Translation-Syntax-DirectedDefinitions,EvaluationOrdersforSDD″s		
	39	Intermediate-CodeGeneration-VariantsofSyntaxTrees, Three-AddressCode.		
	40	**CodeGeneration**-IssuesintheDesignofaCode Generator		

13.0 Assignments,Quiz,GD,MiniProject,Seminars

S. No.	Title	Outcome expected	Related Study	Week No.	Individual / Groupactivity	Reference: book/website /Paper
1	**Assignment-1:** Introduction to ComputerHardware& Software.(**10Marks**)	Studentsstudythe Topic and write the Answers.	Chapter-1of Module-2	4	IndividualActivity.	Book1,2ofthe reference list.
2	**Assignment-2:** CharacterArray& Stings including problems.(**10Marks**)	Studentsstudythe Topics and write the Answers.	Chapter-2of Module-3	9	IndividualActivity.	Book1,2ofthe reference list.
3	Quiz/Seminar/GD (**20Marks**)	Studentsstudythe Topicsandanswer theQuiz/present seminar.	Will be Notifiedlater.	13	Individual/Group activity.	Book1,2ofthe reference list.

14.0 QUESTIONBANK

Module-1

1. Withaneatdiagram,explainahierarchyofLanguageclassesinAutomatatheory(June-2018)
2. Definethefollowingtermswithexamples:i)Alphabetii)PowerofanAlphabetiii)Concatenationiv) Languages (Jan- 18)
3. DrawaDFAtoacceptstringsofa‟sandb‟sendingwith„bab‟
4. DesignaDFAtoacceptstringsmadeupofletters“CHARIOT”andrecognizethosestringscontaining word “ CAT” as a substring.
5. ObtainaDFAtogeneratesetofstringsnotcontainingmorethan3a‟sover∑={a, b}.
6. ObtainaDFAtogeneratesetofstringsof0‟sand1‟shavingsubstring000
7. DefineDFAwithanexample?
8. MentionthedifferencebetweenDFSMandNDFSM.
9. Definethefollowingterms,withanexampleforeach:i)Stringii)Alphabetiii)Powerset iv)Language
10. DesignaDFAwhichacceptsanynoofa‟sfollowedbyastringbafollowed byastringa‟sandb‟s.RE: a*ba (a+b)*.
11. Whatisatransitiongraphandtransitiontable?
12. ObtainaDFAtoacceptstringsofa‟sandb‟sexceptthosecontainingasubstring:aab.
13. DesignaDFAtoacceptstringshavinga)exactlyab)atleastoneac)notmorethan3a‟s.
14. ObtainaDFAtoacceptstringsstartingwith20‟sandendingwithatleast2 1‟s.
15. WhatisaNFA?WritetheproceduretoconvertDFAtoNFA.
16. ExplaintheLanguageProcessingSystem.
17. Explainthephasesofthecompilerindetail.Writedowntheoutputofeachphasesfortheexpressiona:=b+c *50.0
18. BrieflyexplaintheapplicationsofCompilerTechnology.

Module-2

1. Definearegularexpression&findaregularexpressionforthelanguage: L= {w |w ε {0, 1}*} where w has no pair of consecutive zeros
2. Showthatregularlanguagesareclosedundercomplementation.
3. ConstructanNFAhatacceptsthefollowinglanguages
   a. L(aa*+aba*b*)
   b. L(ab(a+ab)*(a+aa))

c. L(ab*aa+bba*ab)
d. 0*+1*2*

4. Showthatregularlanguagesareclosedundercomplementation&intersection.
5. LetG(V,T,P,S)berightlineargrammar.ProvethatL(G)isaregularlanguage.
6. FindRegularexpressionforthefollowinglanguageson{a,b}:
   a. L={a2nb2m:n>=0,m>=0}
   b. L={ w:|w|mod3=0andwϵ{a,b}*}
7. ProvethatifLandMareregularLanguages,thensoisL∩M.
8. Convertthe RE:(01+1)*toNFA.
9. Obtainregularexpressionsbyeliminationofstatesforeachofthefollowing DFA.
10. Defineandexplainthefollowingtermswithexamples:a)Tokenb)Patternc)Lexeme
11. Withneatsketch,explaintwo-bufferschemeforinputbuffering.
12. Givetheregulardefinitionfor1.Unsignednumbers2.Signednumbers3.Identifiers
13. Constructatransitiondiagramforrecognizingunsignednumbers.Sketch theprogramsegmenttoimplementit, showing the first two states and one final state
14. Constructatransitiondiagramforrecognizingrelationaloperators.Sketchtheprogramsegmenttoimplement it, showing the first two states and one final state
15. Whataretheadvantagesoftwo-bufferschemewithsentinels?Writeaprogramforlookaheadcodewith sentinels.

Module-3

1. ConsiderthegrammarG.
   SS+S |S*S|(S)|ashowthatthestringa+a*ahastwo
2. ParsetreesandLeftmostderivations.
3. DefineS-grammarandinherentlyambiguousgrammar.
4. Obtaintheleftlineargrammarforthe DFAshownbelow:
5. Writetheapplicationsofregularexpressions
6. ConstructtheDFAfromregulargrammargivenbelow S
   →aA|bs|EA→aA|bB|EB→aA|bc|EC→aC|bc
7. Defineleftmostandrightmostderivations.Giveexample
8. Writethelimitationsofregularlanguage
9. Provethatforalllanguagesdefinedbyaregularexpressiontheirexistsanequivalent,NFAwhichAccepts exactly the same language.
10. DefineCFG.ObtainCFGforthefollowingLanguages:
    i)L={wwR|wϵ{a,b}*,wRisthereversalofw}
    ii)L={w:whasasubstringab}
11. Whatisambiguousgrammar?Showthatthefollowinggrammarisambiguous.
    EE+E | E – E | E * E | E/E | (E) | awhere E is the start symbol.
12. WhatisParser?Explaintheroleofparser.
13. ListandExplaintheerrorrecoverystrategiesforparser.
14. ConsidertheGrammar:S→(L) |a L→L,S|S
    Constructtheleftmostderivationforthefollowingsentences:1)(a,a)2)(a,(a,a))
15. Eliminateleftrecursionfromthegrammar:
    S→ aB | aC | Sd | Se
    B→bBc|f C→g
16. Withneatsketch,Explainthemodelofatabledriven Predictiveparser.

Module-4

1. GivetheformaldefinitionofaPDA.Discussaboutthelanguagesacceptedbyapushdown automata. Design an NPDA for the language L= {w:anb2n}

2. ConstructanNPDAthatacceptsthelanguageacceptedbytheGrammar:
   S0S1|A
   A1A0|S|ϵ
3. Withneatdiagramshowtheworkingofpushdownautomata.
4. DesignaPDAtoacceptthelanguageL={anb2n|n>=1}
5. GivethegraphicalrepresentationforPDAobtainedin67.Showthemovesmadebythe PDA for the string:aabbbb.
6. ObtainaPDAequivalenttothefollowinggrammar:
   SaA
   AaA|bA|a|b
7. Explainthefollowing:i)languagesii)Instantaneousdescriptionofa PDA.
8. Givethebottom–upparsefortheinputstring:aaa*a++andgrammar:S→SS+|SS*|a
9. Withsuitablegrammarexamples,explainShift-ReduceconflictsduringBottom-UpParsing.
10. Giventhegrammar:
    S → L = R | R
    L→*R|id R
    → L
    a)ObtainthesetofCanonicalLR(0)itemsb)IsthegrammarSLR(1)?
11. Forthegrammar:S→SA|A A→a
    i) ObtainthesetofCanonicalLR(0)items.
    ii) IsthegrammarSLR(1)?
12. Showthatthefollowinggrammar:
    S→ AaAb | BbBa
    A→ϵ
    B→ϵ isnotSLR (1).

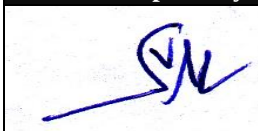
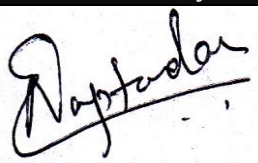
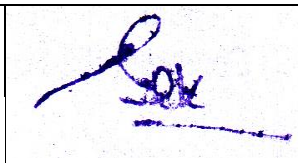
Module-5

1. WhatareTuringm/candmultitapeTuringm/c?Explainthegeneralstructureofmultitape Turing Machine.
2. Design a Turing M/C to accept the language L= {anbncn : n>=1}. AlsogivetheGraphicalrepresentationandIDfortheinput:aabbcc
3. WhatisTuringmachine?Withneatsketch,explaintheworkingofTuringmachine.
4. DesigntheTuringmachineforthefollowinglanguage.Writetransitiondiagramandgive ID oninput:aaaband L= {w : |w|is even wϵ(a+b)*}
5. Withadiagram,explaintheworkingofabasicTuringmachine.DesignaTuringmachinethatacceptsthe language L= {0n 1n: n > 0}
6. Explainthegeneralstructureofmulti-tapeandnon-deterministicTuringmachinesandshowthatthoseare equivalent to basic Turing machine.
7. ExplaintheroleofIntermediatecodegenerator.
8. Obtain theDAG for the expression: a+a*(b-c)+ (b-c)*d.Also givethe sequence of steps for constructing thesame
9. DefineaQuadruple.HowitisdifferentfromTriples.
10. Converttheexpintothreeaddresscode&Quadruple:S=(a+b)/(c-d)*(e+f)
11. Translatetheexp:–(a+b)*(c+d)+(a+b+c)into:a)Quadrupleb)Triplesc)Indirecttriples.
12. ConstructDAGandthreeaddresscodeforthefollowingexpression:a+a*(b–c)+(b–c)*d
13. ExplaintheRoleofCodeGenerator.
14. Discusstheissueinthedesignofacodegenerator.
15. Writethree-address-codeforthefollowingprogramsegment.Alsoconstructthebasicblocks: sum = 0;
    For(i=0;i<=10; i++)
    sum= sum+a[i];
16. ConstructtheDAGforthebasicblockbelow:

d=b*c
e=a+b
b=b*c a
= e-d

15.0 UniversityResult

Examination	S+	S	A	B	C	D	E	F	%Passing
-	-	-	-	-	-	-	-	-	-

Preparedby	Checkedby		
			
Prof.S.V. Manjaragi	Prof.A.A.Daptardar	HOD	Principal

SubjectTitle	**COMPUTERNETWORKS**		
CourseCode	**21CS52**	**CIEMarks**	50
TeachingHours/Week(L:T:P:S)	**3:0:2:0**	**SEEMarks**	50
TotalHoursofPedagogy	40T+20P	**TotalMarks**	100
Credits	04	**ExamHours**	03
CREDITS-			

FACULTYDETAILS:		
Name: Prof.MallikarjunG.Ganachari	**Designation:**Asst.Professor	**Experience:**13Years
No.oftimescoursetaught:1(includingpresent)	**Specialization:**IndustrialElectronics.	

1.0 PrerequisiteSubjects:

Sl.No	Branch	Semester	Subject
01	ComputerScienceandEngg	3	DSA

2.0 CourseObjectives

1. Fundamentalsofdatacommunicationnetworks.
2. Softwareandhardwareinterfaces.
3. Applicationofvariousphysicalcomponentsandprotocols.
4. Communicationchallengesandremediesinthenetworks.

3.0 CourseOutcomes

Aftersuccessfulcompletionofthiscourse,thestudentwillbeableto

	CourseOutcome	**Cognitive Level**	**Pos**
C302.1	Learnthebasicneedsofcommunicationsystem.	U	1,2,4,5,10,11
C302.2	Interpretthecommunicationchallengesanditssolution.	U	1,2,4,5,10,11
C302.3	Identifyandorganizethecommunicationsystemnetworkcomponents.	U	1,2,4,5,10,11
C302.4	Designcommunicationnetworksforuserrequirements.	U	1,2,4,5,10,11
TotalHoursof instruction		**50**	

4.0 CourseContent

Module–1 **10Hours**

Introductiontonetworks:Networkhardware,Networksoftware,Referencemodels,

PhysicalLayer: Guidedtransmissionmedia,Wirelesstransmission. Textbook

1: Ch.1.2 to 1.4, Ch.2.2 to 2.3

Module-2 **10Hours**

TheDatalinklayer: DesignissuesofDLL,Errordetectionandcorrection,Elementarydatalinkprotocols,Slidingwindow protocols.

Themediumaccesscontrolsublayer: Thechannelallocationproblem,multipleaccessprotocols.

Textbook1: Ch.3.1to3.4,Ch.4.1and4.2

Module-3 **10Hours**

TheNetworkLayer: NetworkLayerDesignIssues,RoutingAlgorithms,CongestionControlAlgorithms,QoS.

Textbook1:Ch5.1to5.4

Module-4 **10Hours**

TheTransportLayer: TheTransportService,Elementsoftransportprotocols,Congestioncontrol,Theinternettransport protocols.

Textbook1:Ch6.1to6.4and6.5.1to6.5.7

Module-5 **10Hours**

ApplicationLayer: PrinciplesofNetworkApplications,TheWebandHTTP,ElectronicMailintheInternet,DNS—The Internet's Directory Service.

Textbook2: Ch2.1to2.4

5.0 Relevancetofuturesubjects

Sl. No	Subject	Topics
1	Cryptography,networksecurityandcyberlaw	Networksecurity
2	Wirelessnetworksandmobilecomputing	TCP/IP
3	Storageareanetworks	SAN,NASReplication (topologies),FCProtocolStack,FCIP, Replication
4	CloudComputing	Cloudarchitecture,basicnetworkingconcepts
5	Projectwork	Networkrelatedconcepts

6.0 RelevancetoRealWorld

Sl.No	RealWorldMapping
01	MobileComputing,CloudComputing,StorageAreaNetworks,etc.

7.0 GapAnalysisandMitigation

Sl.No	DeliveryType	Details
01	NPTEL	ComputerNetworks
02	NPTEL	DataCommunication

8.0 BooksUsedandRecommendedtoStudents

TextBooks
1. Computer-Networks-AndrewS.TanenbaumandDavidJ.Wetherall,PearsonEducation,5thEdition. (www.pearsonhighered.com/tanenbaum)
2. 2.ComputerNetworkingATop-DownApproach-JamesF.KuroseandKeithW.RossPearsonEducation7th Edition.
ReferenceBooks
1. BehrouzAForouzan,DataandCommunicationsandNetworking,FifthEdition,McGrawHill,IndianEdition
2. LarryLPetersonandBrusceSDavie,ComputerNetworks,fifthedition,ELSEVIER
AdditionalStudymaterial&e-Books

9.0 RelevantWebsites(ReputedUniversitiesandOthers)for Notes/Animation/Videos Recommended

WebsiteandInternetContentsReferences
1.https://www.digimat.in/nptel/courses/video/106105183/L01.html
2. http://www.digimat.in/nptel/courses/video/106105081/L25.html
3. https://nptel.ac.in/courses/106105081
4.VTUe-Shikshana Program

10.0 Magazines/JournalsUsedandRecommendedtoStudents

Sl.No	Magazines/Journals	Website
1	IEEE	http://ieeexplore.ieee.org/Xplore/home.jsp
2	CSI	http://www.csi-india.org/

11.0 ExaminationNote

ContinuousInternalEvaluation(CIE):20+10+20=50Marks

20marks-frominternalassessmenttest. 10

marks- from the assessments.

20marks–fromPracticalsession.

SchemeofEvaluationforInternalAssessment(50Marks)

a) Internal Assessment test is conducted for 50 marks in the same patternas that ofthe main examination. Average of all three Test marks will be taken and finally scale down to 20 marks.

b) Assignmentmarksforeachmoduleis25.Averageof5assignmentmarks willbe takenandfinallyscaledownto10 marks.

QuestionPaperPattern(IA):

1. TwomainquestionstobesetfromsyllabuscovereduptoIAtests.
2. Studenthastoanswertwofullmainquestionsandeachquestioncarries25.
   a. Q.NoIorQ.NoII =25 Marks
   b. Q.NoIIIorQ.NoIV =25 Marks
   c. Total =50Marks

QuestionPaperPatternandinstructions(MainExam):

1. ThequestionpaperwillhaveTENquestions.
2. TherewillbeTWOquestionsfromeachmodule.
3. Eachquestionwillhavequestionscoveringallthetopicsunderamodule.
4. ThestudentswillhavetoanswerFIVEfullquestions,selectingONEfullquestionfromeachmodule. Max. Marks: 100 and each question carries 20 marks. Exam Duration: 3 Hrs.

12.0 CourseDeliveryPlan

Module	Lecture No.	ContentofLecturer	%of Portion
		PART–A	
1	L1	NetworkHardware:LAN,MAN,WAN.	20
	L2	Wirelessnetworks,HomeNetworks,Internetworks.	
	L3	NetworkSoftware:ProtocolHierarchies,Designissueforthelayers	
	L4	ConnectionOrientedandConnectionlessServices,primitives,Serviceprotocol	
	L5	ReferenceModel:OSI,TCP/IP,ComparisonofOSIandTCP/IPModels,	
	L6	CritiqueoftheOSI,TCP/IP.GuidedTransmissionMedia:MagneticMedia,twisted	
	L7	Pair.Coaxialcableandfiberoptics.WirelessTransmission:Electromagneticspectrum, radioTransmission.	
	L8	MicrowaveTransmissionInfrared&Millimeter,Lightwavetransmission	
	P1	.ImplementThreenodespoint –to–pointnetworkwithduplexlinks between themfordifferenttopologies.	
	P1	1Setthequeuesize,varythebandwidth,andfindthenumberofpackets dropped forvariousiterations.	
2	L9	TheDataLinkLayer:DLLdesignissues,Services,framing.	20
	L10	ErrorControl,FlowControl.ErrorDetectionandCorrection.	
	L11	ElementaryDL:UnrestrictedsimplexprotocolStopandWaitProtocol,Simplexnoisy channel.	
	L12	Slidingwindowprotocol:1-bitsliding,ProtocolusingGoback N.	
	L13	ProtocolusingselectiveRepeat.	
	L14	TheMediumaccesscontrolsublayer:Static&dynamicchannelAllocationinLAN&MAN	
	L15	MultipleAccessControls:ALOHA,CarriersenseMAP,CollisionFreeProtocol.	
	L16	LimitedContentionProtocol,wavelengthDMAP,wirelessLANProtocol.	
	P2	ImplementsimpleESSandwithtransmittingnodesinwire-lessLANby simulationanddeterminethethroughputwithrespecttotransmissionofpackets	
	P3	Writeaprogramforerrordetectingcodeusing CRC-CCITT(16-bits).	
3	L17	NetworkLayer:DesignIssuestoreandforwardpacketswitching,serviceprovidedTL	20
	L18	ImplementationofConnectionlessconnectionorientedservices,comparisonsubnet.	
	L19	Routingalgorithms,principle,shortestpathrouting,flooding.	
	L20	Distancevector,linkstate,Broadcastrouting	
	L21	Multicast,routingformobilehosts,Adhocnetwork,NodelookupsP-Pnetworks.	
	L22	Congestioncontrolalgorithm:principle,preventionpoliciesVirtualCktsubnet,datagram subnet.	
	L23	Loadshedding,JitterControl.	
	L24	QOS:Requirements,TechniquesforAchievingGQoS.Differentiatedservices,Label switching&MPLS.	
	P4	Implement transmission of ping messages/trace route over a network topology consistingof6nodesandfindthenumberofpacketsdroppedduetocongestionin the network.	
	P5	Writeaprogramtofindtheshortestpathbetweenverticesusingbellman-ford algorithm.	
4	L25	TheTransformLayer:Serviceprovided toupperlayer,TSprimitives.	20
	L26	BerkeleySockets,Examples…	
	L27	ElementsofTransportProtocols:Addressing,establishment,Connectionrelease.	
	L28	FlowcontrolandBuffering,MultiplexingCrashrecovery.	
	L29	AsimpleTransportprotocol:theexampleserviceprimitivities,Entity.	
	L30	TheexampleofFSM.InternetProtocols:UDP,RPC.	

	L31	Realtimetransportprotocol.InternetProtocols:TCP,servicemodel,protocol,segment header.	
	L32	TCPconnectionestablishment,connectionreleasemangments.	
	P5	ImplementanEthernetLANusingnnodesandsetmultipletrafficnodesandplot congestionwindowfordifferentsource/ destination.	
	P6	Writeaprogramforcongestioncontrolusingleakybucketalgorithm.	
5	L33	TheApplicationLayer:Principlesofnetworkapplications	20
	L34	Networkapplications	
	L35	ThewebandHTTP,Architectureoverview,static&dynamic web	
	L36	HTTPprotocol,establishments.	
	L37	ElectronicmailintheInternet,Architectureservicesagent	
	L38	Messageformats,transfer,finaldelivery.	
	L39	DNS:namespace,resourcerecords,	
	L40	DNSNameservers.Theinternet'sDirectoryServices.	

13.0 Assignments,PopQuiz,MiniProject,Seminars

Sl. No.	Title	Outcomeexpected	Allied study	Week No.	Individual / Groupactivity	Reference: book/website /Paper
1	Assignment1:University Questions Applicationlayer	Students studytheTopicsand writetheAnswers.Getpractice tosolveuniversityquestions.	Module-01 of the syllabus	3	Individual Activity.	Textbook-1
2	Assignment2:University Questions Transportlayer	StudentsstudytheTopicsand writetheAnswers.Getpractice to solve university questions.	Module-2of the syllabus	6	Individual Activity.	Textbook-1
3	Assignment3:University QuestionsNetworklayer	Students study the Topics and write the Answers. Get practice to solve university questions.	Module-03 of the syllabus	8	Individual Activity.	Textbook-1
4	Assignment4:University Questions Mobile and MultimediaNetworks	Students studytheTopicsand writetheAnswers.Getpractice tosolveuniversityquestions.	Module-04 of the syllabus	10	Individual Activity.	Textbook-1
5	Assignment5:University QuestionsonMultimedia NetworkingApplications	Students studytheTopicsand writetheAnswers.Getpractice tosolveuniversityquestions.	Module-05 of the syllabus	12	Individual Activity.	Textbook-1

14.0 QUESTIONBANK

MODULE 1

1. ExplainTransportServicesProvidedbytheInternet.
2. WritenoteonandHTTP andWebcaching
3. ExplainDNSfunctionalities.
4. WritenoteonSMTP.
5. HowtheDNSresolvesqueries.
6. WithneatdiagramexplainDNSmessageformat.
7. WriteaprogramforclientserverinteractionbyusingTCPsocket?
8. WriteaprogramforclientserverinteractionbyusingUDPsocket?
9. DifferentiatebetweenHTTPpersistentconnectionandnon-persistentconnection.
10. CompareClient-ServerandPeertoPeerarchitecture. (5MarksDec-2017/Jan2018)
11. DescribeHTTPwithpersistentandnon-persistentconnection. (8MarksDec-2017/Jan2018)
12. WhataretheservicesprovidedbyDNS? (3MarksDec-2017/Jan2018)
13. DemonstratesocketimplementationusingTCP. (8MarksDec-2017/Jan2018)
14. Writeanoteonweb caching. (4MarksDec-2017/Jan2018)
15. IllustratethebasicoperationofSMTPwithanexample. (4MarksDec-2017/Jan2018)
16. Whatarethedifferenttypesofservicesprovidedbytheinternet. (8MarksJune/July-2018)
17. Composelogicalnoteonproxy-serverwithsuitablediagram. (8MarksJune/July-2018)
18. Discusshowfilesaredistributedinpeer-to-peerapplication. (8MarksJune/July-2018)

19. DesignnetworkapplicationusingsocketprogrammingwithUDP. (8MarksJune/July-2018)
20. ExplainHTTPmessages. (8MarksDec2018-19)
21. Explainwebcachingwithdiagram. (8MarksDec2018-19)
22. ExplainFTPwithitscommandand replies. (8MarksDec2018-19)
23. ExplainSMTP. (4MarksDec2018-19)
24. ExplainDNSresourcerecord. (4MarksDec2018-19)

MODULE 2

1. ExplainUDPsegmentStructure.
2. WithneatdiagramexplainGoBackNprotocol.
3. Withneatdiagramexplainselectiverepeatprotocol.
4. Writenoteonmultiplexinganddemultiplexing.
5. Explainindetail UDP.
6. CompareStopandwaitprotocolwithpipelinedprotocol.
7. Withneatdiagramexplainthreewayhandshakeprotocol.
8. WithneatdiagramexplainTCPsegmentstructure.
9. WithneatdiagramexplainTCPconnectionmanagement.
10. ExplainTCPcongestioncontrolmechanismindetail.
11. ElaboratethethreewayhandshakinginTCP. (5MarksDec-2017/Jan2018)
12. DiscussGoBackNprotocol. (6MarksDec-2017/Jan2018)
13. Explaintheconnectionorientedmultiplexingand demultiplexing (5MarksDec-2017/Jan2018)
14. Statecongestionanddiscussthecauseofcongestion. (4MarksDec-2017/Jan2018)
15. WithneatdiagramexplaintheTCPsegmentstructure. (8MarksDec-2017/Jan2018)
16. DesignRDT2.0protocol. (8MarksJune/July-2018)
17. WithaneatsketchexplaintheTCPsegmentanditsservices. (8MarksJune/July-2018)
18. ExplainhowconnectionisestablishedandteardowninTCP. (8MarksJune/July-2018)
19. DrawTCPsegmentstructureandexplain. (8MarksDec2018-19)
20. Explain3wayhandshakeandclosingaTCPconnection. (8MarksDec2018-19)
21. Explainthecausesandcostsofcongestion. (8MarksDec2018-19)

MODULE 3

1. ExplainNetworklayerfunctionalitiesindetail.
2. Withneatdiagramexplainrouterarchitecture.
3. GivetheclassificationofIPV4 Addressing.
4. ExplainIPV4headerformat.
5. ExplainIPV6headerformat.
6. HowtheIPperformsfragmentationandreassemblyofpackets.
7. Explainclassfuladdressingscheme.
8. WriteanoteonDHCP.
9. WriteanoteonICMP.
10. ExplainthetransitionissuesfromIPV4to IPV6.
11. DifferentiatebetweenIPV4andIPV6.
12. ExplaintheservicesprovidedbyIPSEC.
13. GivethecomparisonofLSandDSroutingalgorithms.
14. ExplainDistanceVectorroutingalgorithm.
15. Whatisrouting?Explainthestructureofarouter. (8MarksDec-2017/Jan2018)
16. DiscusstheIPV6packetformat. (5MarksDec-2017/Jan2018)
17. ElaboratethepathattributesinBGPandstepstoselectBGProutes.(5MarksDec-2017/Jan2018)
18. Listthebroadcastroutingalgorithms.Explainanyoneofthem. (6MarksDec-2017/Jan2018)
19. DrawIPV6datagramformat,mentionthesignificanceofeachfields. (8MarksJune/July-2018)
20. IllustrateRoutingInformationProtocol(RIP)withsuitablediagram. (8MarksJune/July-2018)
21. Explainthespanningtreealgorithm. (8MarksJune/July-2018)
22. Withdiagramexplainrouterarchitecture. (8MarksDec2018-19)
23. ExplainIP fragmentation. (8MarksDec2018-19)
24. Explaindistancevectoralgorithm. (8MarksDec2018-19)
25. Explain4typesofhierarchicalOSPFrouters. (4MarksDec2018-19)
26. Comparelinkstatewithdistancevectoralgorithm. (4MarksDec2018-19)

Module4

1. ExplainDESalgorithm.

2. Explainpublickeyencryptionprotocols.
3. Classifyinternetinfrastructureattacks.
4. Explainthesecretkeycryptography.
5. Withanexample,explainpublickeycryptography.
6. ExplainDESstandard.
7. Explaintheroutingtablepoisoninganddenialofserviceattacks. Dec.2015/Jan20166M
8. DifferentiatebetweenDESandRSA. Dec.2015/Jan20164M

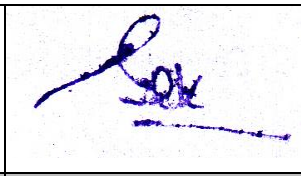
Module5

1. Classifymultimediaapplications.
2. WritenoteonHTTPStreaming.
3. ExplainCDNoperationindetail.
4. Howtheanalogaudiosignalisconvertedtodigitalsignal.
5. ExplainUDPStreaming.
6. ExplainHTTPstreaming.
7. ExplainAdaptivestreamingandDASH.
8. Explaintheapproachesthatareusedtoprovidenetwork-levelsupportformultimediaapplications.
9. Explaindifferentlinkschedulingmethods.ExplainDiffServ.
10. Elaboratethefeaturesofstreamingstoredvideo. (3MarksDec-2017/Jan2018)
11. WithneatdiagramexplaintheCDNoperation. (8MarksDec-2017/Jan2018)
12. SummarizethelimitationsofbesteffortIPservice. (5MarksDec-2017/Jan2018)
13. ExplaintheDiffServinternetarchitecture. (5MarksDec-2017/Jan2018)
14. Describetheleakybucketpolicingmechanism. (6MarksDec-2017/Jan2018)
15. DiscusstheRoundrobinandweightedfairqueuingschedulingmechanism. (5MarksDec-2017/Jan2018)
16. Briefoutthreebroadcategoriesofmultimedianetworkapplication.(8MarksJune/July-2018)
17. Discussthefollowings:1)Adaptivestreaming2)DASH (8MarksJune/July-2018)
18. Withgeneralformat,explainthevariousfieldsofRTP. (8MarksJune/July-2018)
19. Explaintheworkingprocedureofleakybucketalgorithm. (8MarksJune/July-2018)
20. Withdiagram,explainnaïvearchitectureforaudio/videostreaming. (8MarksDec2018-19)
21. Explain audio compression in internet. (8MarksDec2018-19)

With diagram explain interaction between client and server using RTSP (8 Marks Dec 2018-19)

15.0 UniversityResult

Examination	FCD	FC	SC	%Passing
Jan-Feb2022-23	19	20	20	100
Jan-Feb2021-22	09	24	15	94.11
Jan-Feb2020-21	12	21	9	97.67

Prepared by	Checked by		
			
Prof. M. G. Ganachari	**Prof. N.K.Honnagoudar**	**HOD**	**Principal**

SubjectTitle	DATABASEMANAGEMENT SYSTEMS		
SubjectCode	21CS53	**IAMarks**	50
NumberofLectureHrs/Week	3:0:0:0	**ExamMarks**	50
TotalNumberofLectureHrs	40	**TotalMarks**	100
Credits	03	**ExamHours**	03

FACULTYDETAILS:		
Name: Prof.ArunaA.Daptardar	**Designation:**AssistantProfessor	**Experience:**17.5Years
No.oftimescoursetaught: 05	**Specialization:**ComputerScienceandEngineering	

1.0 PrerequisiteSubjects:

Sl.No	Branch	Semester	Subject
01	ComputerScienceandEngineering	I/II	ProgramminginC
02	ComputerScienceandEngineering	III	DataStructures

2.0 CourseObjectives

Thiscoursewillenablestudentsto

CLO1.Provideastrongfoundationindatabaseconcepts,technology,andpractice. CLO 2. Practice SQL programming through a variety of database problems.
CLO3.Demonstratetheuseofconcurrencyandtransactionsindatabase CLO 4. Design and build database applications for real world problems.

3.0 CourseOutcomes

Afterstudyingthiscourse,studentswillbeableto

CO	CourseOutcome	Cognitive	POs
C303.1	Identify,analyzeanddefinedatabaseobjects,enforceintegrityconstraintson a database using RDBMS	L4	PO1-PO3,PO8, PO10, PO12
C303.2	Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation.	L3	PO1-PO3,PO8, PO10,PO12
C303.3	Designandbuildsimpledatabasesystemsandrelatetheconceptof transaction, concurrency control and recovery in database	L3	PO1-PO3,PO8, PO10,PO12
C303.4	Developapplicationtointeractwithdatabases,relationalalgebraexpression.	L3	PO1-PO3,PO8, PO10,PO12
C303.5	Developapplicationsusingtupleanddomainrelationexpressionfromqueries.	L3	PO1-PO3,PO8, PO10,PO12
	TotalHoursofinstruction	**40**	

4.0 Course Content

Module1 **8 Hours**

IntroductiontoDatabases: Introduction, Characteristics ofdatabaseapproach, AdvantagesofusingtheDBMSapproach, History of database applications.

Overview of Database Languages and Architectures: Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment.

Conceptual Data Modeling using Entities and Relationships: Entity types, Entity sets, attributes, roles, and structuralconstraints, Weak entity types, ER diagrams, examples

Textbook1: Ch1.1to1.8,2.1to2.6,3.1to3.7

Module2 **8 Hours**

Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations.
Relational Algebra: Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) examples of Queries in relational algebra.
MappingConceptualDesignintoaLogicalDesign:relationalDatabaseDesignusingER-to-Relationalmapping.

Textbook1:5.1to5.3,8.1to8.5,9.1;

Module3 **8 Hours**

SQL:SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE,and UPDATE statements in SQL, Additional features of SQL.
SQL: Advances Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers,Views in SQL, Schema change statements in SQL.
DatabaseApplicationDevelopment: Accessingdatabases fromapplications,AnintroductiontoJDBC,JDBCclasses and interfaces, SQLJ, Stored procedures, Case study: The internet Bookshop.

Textbook1:Ch6.1to6.5,7.1to7.4;Textbook2:6.1to6.6;

Module4 **8 Hours**

Normalization:DatabaseDesignTheory–IntroductiontoNormalizationusingFunctionalandMultivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Examples on normal forms.
NormalizationAlgorithms: Inference Rules, Equivalence, and Minimal Cover, PropertiesofRelational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs, Further discussion ofMultivalued dependencies and 4NF, Other dependencies and Normal Forms

Textbook1:Ch14.1to14.7,15.1to15.6

Module5 **8 Hours**

Transaction Processing: Introduction to Transaction Processing, Transaction and System concepts, Desirable propertiesof Transactions, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL.
Concurrency Control in Databases: Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking.

Textbook1:20.1to20.6,21.1to21.7;

5.0 Relevancetofuturesubjects

Sl No	Semester	Subject	Topics
01	VII	Projectwork	AcademicsProject
01	VIII	Seminar	AcademicSeminars

6.0 RelevancetoRealWorld

SL.No.	RealWorldMapping
01	Developmentofdatabaserelatedapplications
02	Developmentofweb-basedapplications

7.0 GapAnalysisandMitigation

Sl.No	DeliveryType	Details
01	Tutorial	SQLqueryprocessingapplications
02	NPTEL	DBMSApplications

8.0 BooksUsedandRecommendedtoStudents

TextBooks
1. FundamentalsofDatabaseSystems,RamezElmasriandShamkantB.Navathe,7thEdition,2017,Pearson. 2. Databasemanagementsystems,Ramakrishnan,andGehrke,3rdEdition,2014,McGrawHill
ReferenceBooks
1. AbrahamSilberschatz,HenryF.KorthandS.Sudarshan'sDatabaseSystemConcepts6thEditionTataMcgrawHill EducationPrivateLimited
AdditionalStudymaterial&e-Books
http://www.pearsoned.co.in/ramezelmasri/

9.0 RelevantWebsites(ReputedUniversitiesandOthers)for Notes/Animation/Videos Recommended

WebsiteandInternetContentsReferences
1. https://www.youtube.com/watch?v=3EJlovevfcA 2. https://www.youtube.com/watch?v=9TwMRs3qTcU 3. https://www.youtube.com/watch?v=ZWl0Xow304I 4. https://www.youtube.com/watch?v=4YilEjkNPrQ 5. https://www.youtube.com/watch?v=CZTkgMoqVss 6. https://www.youtube.com/watch?v=Hl4NZB1XR9c 7. https://www.youtube.com/watch?v=EGEwkad_llA 8. https://www.youtube.com/watch?v=t5hsV9lC1rU

10.0 Magazines/JournalsUsedandRecommendedtoStudents

Sl.No	Magazines/Journals	Website
1	CSIcommunications	www.csi-india.org

11.0 ExaminationNote

AssessmentDetails(bothCIEandSEE)

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 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures notless than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) takentogether.

ContinuousInternalEvaluation:

ThreeUnitTestseachof**20Marks(duration01hour**)

1. Firsttestattheendof5thweekofthesemester
2. Secondtestattheendofthe10thweekofthesemester

3. Thirdtestattheendofthe15thweekofthesemester

Twoassignmentseachof**10Marks**

4. Firstassignmentattheend of4thweekofthe semester
5. Secondassignmentattheendof9th weekofthesemester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for**20 Marks** (**duration 01hours**) .

6. Attheendofthe13th weekofthesemester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks** (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIEmethods/questionpaperhastobedesignedtoattainthedifferentlevelsofBloom'staxonomyasperthe outcome defined for the course.

SemesterEndExamination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. Thequestionpaperwillhavetenquestions.Eachquestionissetfor20marks.Marksscoredshallbe proportionally reduced to 50 marks.
2. 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.
3. Thestudentshavetoanswer5fullquestions,selectingonefullquestionfromeachmodule.

12.0 CourseDelivery Plan

Module	Lecture No.	ContentofLecturer	% of Portion
1	1	**IntroductiontoDatabases:**Introduction,Characteristicsofdatabaseapproach	20
	2	AdvantagesofusingtheDBMSapproach,Historyofdatabaseapplications	
	3	**OverviewofDatabaseLanguagesandArchitectures:**DataModels,Schemas,andInstances	
	4	Threeschemaarchitectureanddataindependence,databaselanguages,andinterfaces	
	5	TheDatabaseSystemenvironment.	
	6	**ConceptualDataModelingusingEntitiesandRelationships:**Entitytypes,Entitysets	
	7	Attributes,roles,andstructuralconstraints,Weakentitytypes	
	8	ERdiagrams,Examples	
2	9	**RelationalModel**:RelationalModelConcepts	20
	10	RelationalModelConstraintsandrelationaldatabaseschemas,	
	11	Updateoperations,	
	12	Transactions,anddealingwithconstraintviolations	
	13	**RelationalAlgebra:**UnaryandBinaryrelationaloperations	
	14	Additionalrelationaloperations(aggregate,grouping,etc.)	
	15	ExamplesofQueriesinrelationalalgebra	
	16	**MappingConceptualDesignintoaLogicalDesign:**relationalDatabaseDesignusingER-to-Relationalmapping	
3	17	**SQL:**SQLdatadefinitionanddatatypes,specifyingconstraintsinSQL,Retrievalqueriesin SQL,	20
	18	INSERT,DELETE,andUPDATEstatementsinSQL,AdditionalfeaturesofSQL	
	19	**SQL:AdvancesQueries:**MorecomplexSQLretrievalqueries	
	20	Specifyingconstraintsasassertionsandactiontriggers	
	21	ViewsinSQL,SchemachangestatementsinSQL	
	22	**DatabaseApplicationDevelopment:**Accessingdatabasesfromapplications	
	23	AnintroductiontoJDBC,JDBCclassesandinterfaces,SQLJ	
	24	Storedprocedures,Casestudy:TheinternetBookshop	
4	25	**Normalization:DatabaseDesignTheory**–IntroductiontoNormalizationusingFunctional andMultivaluedDependencies,Informaldesignguidelinesforrelationschema	20
	26	FunctionalDependencies,NormalFormsbasedonPrimaryKeys	
	27	SecondandThirdNormalForms,Boyce-CoddNormalForm	
	28	MultivaluedDependencyandFourthNormalForm,JoinDependenciesandFifthNormal Form	
	29	**NormalizationAlgorithms:**InferenceRules,Equivalence,andMinimalCover	
	30	PropertiesofRelationalDecompositions,AlgorithmsforRelationalDatabaseSchemaDesign	
	31	Nulls,Danglingtuples,andalternateRelationalDesigns,	
	32	FurtherdiscussionofMultivalueddependenciesand4NF,OtherdependenciesandNormal Forms	
5	33	**TransactionProcessing:**IntroductiontoTransactionProcessing	20
	34	TransactionandSystemconcepts,DesirablepropertiesofTransactions	
	35	Characterizingschedulesbasedonrecoverability	
	36	CharacterizingschedulesbasedonSerializability,TransactionsupportinSQL	
	37	**ConcurrencyControlinDatabases:**Two-phaselockingtechniquesforConcurrencycontrol	
	38	ConcurrencycontrolbasedonTimestampordering, MultiversionConcurrencycontrol techniques	
	39	ValidationConcurrencycontroltechniques,	
	40	GranularityofDataitemsandMultipleGranularityLocking.	

13.0 QUESTIONBANK

MODULE-1

1. Withaneatdiagramexplainabouthighlevelconceptualdatamodelsfor Databasedesign.
2. DefinethefollowingEntity,entitytypesentitysets. (Jun-11)
3. Discussthefollowingterms:CandidateKey,Superkey,ForeignKey,PrimaryKey,keyconstraints.(July-07)
4. Whatis meant byrecursiverelationship? Bringout theimportanceofrole manesinrecursiverelationship, withan example. (Dec-11)
5. Definerelationshipdegree,rolenamesandrecursiverelationship. (MQP)
6. Explainaboutstructuralconstraintsonrelationshiptypes. (MQP,Dec-2014)
7. Whatisweakentitytypeanddifferentiatebetweenprimarykeyandweakentitytype.(June-06,Dec-2014)
8. DefineER-Diagramandexplainaboutconventionsusedin ER-diagram. (MQP,Dec-13)
9. Definethefollowingterms:i)Recursiverelationshipii)Weakentitytypeiii). Atomicattributesiv).Participation role (Dec-13)
10. DrawanERdiagramforMusicianswhoperformforalbum.Assumeany4entities.Indicateallkeyand cardinality constraints and any assumptions that are made. (Dec-13)
11. Explainthemaincharacteristicsofthedatabaseapproachversusthefileprocessingapproach. (Jan2018)
12. Explainthethree-schemaarchitecture withneatdiagram. Whydo weneed mappingsamongschemalevels? How do different schema definition languages support this architecture? (Jan 2018)
13. Discusswithexamples,differenttypesofattributes. (Jan2018)
14. Draw an ER diagram for a BANK database schema with atleast five entity types. Also specify primary key andstructural constraints. (Jan 2018)
15. Explainthetypesofendusers withsuitableexamples.(Feb-2021)
16. ListandexplaintheadvantagesofusingDBMSapproach.(Feb-2022)
17. DescribetheThree-Schemaarchitecture.Whydoweneedmappingsbetweenschemalevels?(Feb-2021)
18. Explainthedifferenttypesofattributesin ERmodelwithsuitableexamplesforeach.(Feb-2022)

MODULE-2

1. Explainaboutthefollowing:SELECTPROJECT,DIVISIONandSETDIFFERENCEwithexample.(Jan-08)
2. ExplainaboutthesequenceofoperationsandtheRENAMEoperations.(Jan-09)
3. ExplainthefollowingUNION,INTERSECTION,SETDIFFERENCE.
4. ExplainaboutjoinandCartesianproductoperationwithexample.(MQP,Dec-2014)
5. DiscussvarioustypesofJOINoperation.Whythethetajoinisrequired?(July-12,Dec-2014)
6. Explainaboutnaturalandequijoinoperationwithexample. (MQP)
7. Explain theJoin Selectivity and Cross Join. Based on what condition Join degenerate into Cartesian Product orcross join.(MQP)
8. ExplainthecompletesetofRelationalalgebraoperations.(MQP,Dec-13)
9. DefinetheAggregateFunctionsandexplainatleastthreeaggregatefunctionswithexample.
10. Explainwithexamplethe OUTERJOINoperation. (MQP)
11. Considerthefollowingrelationaldatabaseschema (Jun-06,Dec-13)
    Sailors(sid,sname,rating,age)Reserve(sid,bid,date)Boat(bid,bname,color)

    Writethequeryforthefollowingquestionsinrelationalalgebra
    i) Findthenamesofsailorswhohavereservedredboat.
    ii) Findthenamesofsailorswhohavereservedboat103.
    iii) Findthecolorsoftheboatreservedby Harish
    iv) Findthesidofsailorswithagemorethan20whohasnotreservedredboat.
    v) Findthenameofsailorswhoseratingismorethan 7.
    vi) Findthenameofsailorswhohavenotreservedanyboat
    vii) Findthenameofsailorswhohavereservedallboats.
12. Considerthefollowingrelationaldatabaseschema (July-06)
    EMPLOYEE (Ssn,Ename,Bdate,Address,Sex,Salary,SuperssnDno)
    DEPARTMENT(Dname, Dnumber, Mgrssn, Mgrstdate)
    PROJECT (Pnumber,Pname,Plocation,Dnum)
    WORKS_ON (ESSN, Pno, Hrs)
    DEPENDENT (Essn,Dep_name,Sex,Bdate,Relationship)

Write the query for the following questionsin relational algebra.

i) Findthenameoftheemployeeswhoworkforresearchdepartment.
ii) FindthenamesofemployeeswhohaveatleasttwoDependents.
iii) Findthenameandaddressoffemaleemployeeswhohavenodependents.
iv) Retrievenameofemployeesandtheirsupervisorname.
v) Findthenamesofemployeewhoworkonallprojectscontrolledbydepartment5
vi) Increasethesalaryofemployeeswhoareworkingindepartment5to10%

13. Describethecharacteristicsofrelationswithsuitableexampleforeach. (Jan2018)
14. Whatarethebasicoperationsthatcanchangethestatesofrelationsinthedatabase?Explainhowthebasic operations deal with constraint violations. (Jan 2018)
15. InSQLwhichcommandisusedfortablecreation?Explainhowconstraintsarespecifiedin SQLduringtable creation with suitable example. (Jan 2018)
16. Explaintheentityintegrityandreferentialintegrityconstraints.Whyiseachconsideredimportant?Giveexamples.(Feb-2021)
17. Discussequijoinandnaturaljoinwithsuitableexamplesusingrelationalalgebranotations.(Feb-2022)
18. ExplaintheERtorelationalmappingalgorithmwithsuitableexampleforeachstep.(Feb-2022)

MODULE-3

1. WhatisAssertion?ExplainhowtocreateAssertioninSQL.Explainitssignificance.(Dec-11)
2. Whatismeanbyimpedancemismatchproblem?Explainit. (Dec-11)
3. WriteanoteonEmbeddedSQL.Withanexample,illustratehowwouldyouconnecttoadatabase,fetchthe records and display. Also explain the concept of stored procedure, in brief.(Jul-12,Dec-2014)
4. WriteanoteonDynamicSQL.(Dec-08)
5. Consider the following relational database schema. (Jun-12)
   Sailors(sid, sname, rating)
   Reserve(sid, bid, date) Boat
   (bid,bname,color)
   Writethequeryforthefollowingquestionsin SQL
   i. Findthenamesofsailorswhohavereservedredboat.
   ii. Findthenamesofsailorswhohavereservedboat103.
   iii. Findthecolorsoftheboatreservedby Harish
   iv. Findthesidofsailorswithagemorethan20whohasnotreservedredboat.
   v. Findthenameofsailorswhoseratingismorethan 7.
   vi. Findthenameofsailorswhohavenotreservedanyboat

6. Considerthefollowingrelationaldatabaseschema. (Dec-11)
   EMPLOYEE (Ssn,Ename,Bdate,Address,Sex,Salary,SuperssnDno)
   DEPARTMENT(Dname, Dnumber, Mgrssn, Mgrstdate)
   PROJECT (Pnumber,Pname,Plocation,Dnum)
   WORKS_ON (ESSN, Pno, Hrs)
   DEPENDENT (Essn,Dep_name,Sex,Bdate,Relationship)
   Write the SQL query for the following questions.
   i. Findthenameoftheemployeeswhoworkforresearchdepartment.
   ii. FindthenamesofemployeeswhohaveatleasttwoDependents.
   iii. Findthenameandaddressoffemaleemployeeswhohavenodependents.
   iv.Retrieve name of employees and their supervisor name.
   v. Findthenamesofemployeewhoworkonallprojectscontrolledbydepartment5
   vi.Increase the salary of employees who are working in department 5 to 10%
7. Howisviewcreatedanddropped?Whatproblemsareassociatedwithupdatingviews(Dec-14)
8. ConsiderCOMPANYDATABASE (Jan 2018)
   EMPLOYEE (Fname,Minit,Lname,Ssn,Bdate,Address,Sex,Salary,Super-ssn,Dno)
   DEPARTMENT(Dname, Dnumber, Mgr_ssn, Mgr_st_date)
   DEPARTMENT_LOCATIONS(Dnumber, Dlocation)
   PROJECT (Pname,PnumberPlocation,Dnum)
   WORKS_ON (ESSN, Pno, Hours)
   DEPENDENT (Essn, Dependent_name, Sex, Bdate, Relationship)
   SpecifythefollowingqueriesinSQLonthedatabaseschemagivenabove:
   a. For every project located in Stafford , list the project number the controlling department number and the department manager's last name, address and birth date.

b. Listthenamesofallemployees whohaveadependentwiththesamefirstnameasthemselves.
c. Foreachproject,listtheprojectnameandthetotalhoursperweek(byallemployees)spentonthat project.
d. Retrievethenameofeachemployeewhoworksonalltheprojectscontrolledby'Research'department.

9. DefineStoredProcedure.Explainthecreatingandcallingofstoredprocedurewithsuitableexample.(Jan2018)
10. Explaincursorsanditspropertiesinembedded SQLwithsuitableexample.(Feb-2021)
11. HowaretriggersdefinedinSQL?Explainwithexample.(Feb-2022)
12. Illustrateinsert,delete,update,alteranddropstatementsinSQL.(Feb-2021)

MODULE-4

1. DefineClosureofF?WritethealgorithmtofindtheAttributeClosure X^+ FindtheclosureofBiff=(B->CD,D-E,B-E,B->A,E->C,AD->B)
2. Consider the universal relational schema R(A,B,C,D,E,F,G,H,I,J) with FD = (AB→C, A→DE, B→F, F→GH,D→IJ) What is the key for R? Decompose R into 2NF, then3NF relations.
   1)List-allKeys-for-R2)Isin3NF?IsinBCNF? (July-05)
3. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples. (Dec-13)
4. Givenbelowaretwo setsof FDs forarelationR (A,B,C, D,E).Aretheyequivalent? I)A→B, AB→C,D→AC, D→EII) A→ BC,D→AE (Dec-13,Dec-14)
5. ConsidertherelationalschemaR(A,B,C,D,E,F) withFD=(A→B,C→DF,AC→E,D→F) whichisthekey and highest normal form of R? If it is not in 3NF find a decomposition that is lossless and dependency preserving?(Dec-11)
6. ConsiderthefollowingUniversalrelationR={A,B,C,D,E,F,G,H,I,J}withFDsetF={{A,B}→C,A→{D,E},B →F,F→{G,H},D→{I,J}}.WhatisthekeyofR?DecomposeRinto2NF,then3NFrelations. (Dec-13)
7. Whatisthedependencypreservationpropertyfordecomposition?Whyisitimportant?(Dec-13)
8. Definefourthnormalform.Whenisitviolated?Whyisituseful? (Dec-13)
9. Explain the informal design guidelines used as measures to determine the quality of relations schema design. (Jan 2018)
10. DefineNormalform.Explain1NF,2NFand3NFwithsuitableexampleforeach. (Jan2018,Feb-2022)
11. DefineMinimalcover.WriteanalgorithmforfindingaminimalcoverFforasetoffunctionaldependenciesE. Find the minimal cover for the given set of FDs be E:{B→A, D→A, AB→D}. (Jan 2018)
12. ConsiderthefollowingUniversalrelationR={A,B,C,D,E,F,G,H,I,J}withFDsetF ={{A,B}→{C}, {A}→{D,E}, {B}→ {F}, {F}→{G,H}, {D}→{I,J}}. Determine whether each decomposition has the lossless join property with respect to F.D1 = {R_1, R_2,R_3**};** R_1**=** { A,B,C,D, E }; R_2= { B,F,G,H }; R_3= {D,I,J }.(Jan 2018,Feb- 2022)
13. ExplainArmstronginferencerules.(Feb-2021)
14. Explaintypesofupdatesanomalieswithexamples.(Feb-2022)

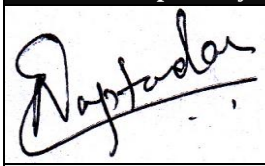
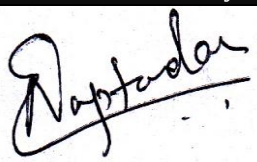
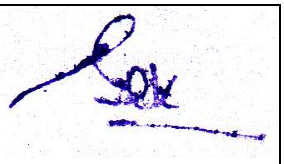
MODULE–5

1. DiscusstheACIDproperties.(Dec-06,dec-2014)
2. Explainthefollowing:lostupdateproblemanddirtyreadproblem.(jun-11)
3. Whataretheconflictsthatmayoccurbecauseofinterleavedtransactionprocessing?Explain.
4. Write a neat diagram of a transaction processing and explain the various states a transaction goes through before termination. (Jan-07)
5. Discuss2PLandstrict2PLalgorithms.Advantagesanddisadvantages.(Dec-11,Dec-2014)
6. Discussbinaryandsharedlocks mechanisms.(MQP)
7. Whatisintentionmodelocking?Describethevariousintentionmodelockswiththehelpofanexample.(July-05)
8. Writeanoteonmultiversionschemesandmultiplegranularitylocking.(MQP)
9. ConsiderthethreetransactionsT1, T2andT3andschedulesS1andS2givenbelow.Determinewhethereach schedule is serializable or not. If a schedule is serializable. Write down the equivalent serial schedule(S).
   T1:R1(X);R1(Z);W1(X);
   T2:R2(Z);R2(Y);W2(Z);W2(Y);
   T3: R3(X);R3(Y);W3(Y);
   S1:R1(X);R2(Z);R1(Z);R3(X);R3(Y);W1(X);W3(Y);R2(Y);W2(Z);W2(Y);
   S2:R1(X);R2(Z);R3(X);R1(Z);R2(Y);R3(Y);W1(X);W2(Z);W3(Y);W2(Y);
10. Whyconcurrencycontrolisneeded&demonstratewithexample? (Jan2018,Feb-2021)
11. Discussthedesirablepropertiesoftransactions. (Jan2018,Feb-2022)
12. Whendeadlockandstarvationproblemsoccurs?Explainhowtheseproblemscanberesolved. (Jan2018)

13. Explainhowshadowpaginghelpstorecoverfromtransactionfailure. (Jan2018,Feb-2022)

15.0 UniversityResult

Examination	FCD	FC	SC	%Passing
Mar-2021	06	17	12	81.39
Feb-2022	01	17	28	90.19
Feb-2023	06	11	39	94.91

Preparedby	Checkedby		
			
Prof.ArunaA.Daptardar	Prof.ArunaA.Daptardar	HOD	Principal

ARTIFICIALINTELLIGENCEANDMACHINELEARNING			
SubjectCode	21CS54	**CIEMarks**:IA-Tests(20)+Assignments(10)+ Quiz/GD/Seminar (20)	**50**
TeachingHours/Week(L:T:P:S)	**3:0:0:0**	**SEEMarks**	**50**
TotalHoursofPedagogy	**40**	Totalmarks(CIE+ SEE)	**100**
Credits	**03**	SEEHours	**03**

FACULTYDETAILS:		
Name: Prof.PVPATIL	**Designation:**AssistantProfessor	**Experience:**12Years
No.oftimescoursetaught:1	**Specialization:**VLSIDesign&EmbeddedSystems	

1.0 PrerequisiteSubjects:

Sl. No	Branch	Semester	Subject
01	CSE	I	MathematicalConcepts
02	CSE	IV	DesignandAnalysisofAlgorithms

2.0 CourseObjectives

CLO1.GainahistoricalperspectiveofAIanditsfoundations.
CLO2.BecomefamiliarwithbasicprinciplesofAItowardproblemsolving.
CLO3.FamiliarizewiththebasicsofMachineLearning&MachineLearningprocess,basicsof Decision Tree, and probability learning
CLO4.UnderstandtheworkingofArtificialNeuralNetworksandbasicconceptsofclusteringalgorithms

3.0 CourseOutcomes[C304]

Attheend of thecourse thestudentwillbeableto:

CO	CourseOutcome	Cognitive Level	POs
C304.1	Apply theknowledge ofsearching andreasoning techniques fordifferent applications.	L1,L2	1,2,3,8,10
C304.2	Haveagoodunderstandingofmachineleaninginrelationtootherfieldsand fundamental issues and challenges of machine learning.	L1-L4	1,2,3,8,10
C304.3	Applytheknowledgeofclassification algorithmsonvariousdatasetand compareresults	L1,L2	1,2, 3,8,10

C304.4	ModeltheneuronandNeuralNetwork,andtoanalyzeANNlearningandits applications	L1-L4	1,2,3,8,10
C304.5	Identifyingthesuitableclusteringalgorithmfordifferentpattern	L2,L3	1,2,3,8,10

4.0 CourseContent

Module-1

Introduction: WhatisAI?FoundationsandHistoryofAI

Problem- solving: Problem- solvingagents,Exampleproblems,SearchingforSolutions,Uninformed Search Strategies: Breadth First search, Depth First Search,

Module-2

InformedSearchStrategies:Greedybest-firstsearch,A*search,Heuristicfunctions.IntroductiontoMachine Learning , Understanding Data

Module-3

BasicsofLearningtheorySimilarityBasedLearningRegressionAnalysis

Module-4

Decision Tree learning ,Bayesian Learning

Module-5

ArtificialneuralNetwork,ClusteringAlgorithms

5.0 Relevancetofuturesubjects

S.No	Semester	Subject	Topics
01	VIII	Deep Learning	ArtificialNeuralNetwork

6.0 RelevancetoRealWorld

S.No	RealWorldMapping
01	Developmentofmodernlanguagedevelopment,compilerdesign,digitalcircuitdesignetc.

7.0 GapAnalysisandMitigation

S.No	DeliveryType	Details
01	E-content	https://www.kdnuggets.com/2019/11/10-free-must-read-books-ai.html
02	NPTEL	https://nptel.ac.in/courses/106/105/106105077/

8.0 BooksUsedandRecommendedtoStudents

TextBooks

1. StuartJ.RussellandPeterNorvig,ArtificialIntelligence,3rdEdition,Pearson,2015
2. S.Sridhar,MVijayalakshmi"MachineLearning".Oxford,2021

ReferenceBooks
1. ElaineRich,KevinKnight,ArtificialIntelligence,3rdedition,TataMcGrawHill,2013 2. GeorgeFLugar,ArtificialIntelligenceStructureandstrategiesforcomplex,PearsonEducation, 5th Edition, 2011 3. TomMichel,MachineLearning,McGrawHillPublication.
AdditionalStudymaterial&e-Books
1. E-Book:. **https://www.javatpoint.com/history-of-artificial-intelligence** 2. https://www.tutorialandexample.com/problem-solving-in-artificial-intelligence

9.0 RelevantWebsites(ReputedUniversitiesandOthers)forNotes /Animation/VideosRecommended

WebsiteandInternetContentsReferences
https://www.analyticsvidhya.com/machine-learning/

10.0 Magazines/JournalsUsedandRecommendedtoStudents

S.No	Magazines/Journals	website
1	Journals	**https://www.udacity.com/course/knowledge-based-ai-cognitive-systems--ud409**

11.0 ExaminationNote

AssessmentDetails (bothCIE andSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

ContinuousInternalEvaluation(CIE)

ThreeUnitTestseachof **20Marks(Duration01 hour**):

1) First Test at the end of **5**th week of the semester, 2) Second Test at the end of the **10**th week of the semester, 3) Third test at the end of the **15**thweek of the semester

TwoAssignmentseachof**10Marks:**

4. Firstassignmentattheendof**4**thweekofthe semester
5. Secondassignment attheendof**9**thweekofthesemester

Groupdiscussion/Seminar/quizanyoneofthreesuitablyplannedtoattaintheCOsandPOsfor**20 Marks** (**Duration:01hours**)attheendofthe **13**thweekofthe semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks.**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

SemesterEndExamination(SEE)

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**Duration: 03 hours)**

1. Thequestionpaperwillhave**Ten**questions.Eachquestionissetfor20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **will have a mix of topics** under that module. **The students have to answer 5 full questions, selecting one full question from each module.**

12.0 CourseDelivery Plan

Module	Lecture No.	ContentofLecture		% of Portion
		PART-A	**Teaching-Learning Process**	
1	1.	WhatisAI.	Chalk and board, Active Learning,Problembased learning	20
	2.	FoundationsandHistoryofAI		
	3.	**Problem- solving**		
	4.	Problem- solvingagents		
	5.	Exampleproblems		
	6.	SearchingforSolutions		
	7.	UninformedSearchStrategies		
	8.	BreadthFirstsearch		
	9.	DepthFirstSearch,		
2	10.	**InformedSearchStrategies**	Chalkandboard,Active Learning,Demonstration	20
	11.	Greedybest-firstsearch		
	12.	A*search		
	13.	Heuristicfunctions		
	14.	IntroductiontoMachineLearning		
	15.	UnderstandingData		
3	16.	BasicsofLearningtheory	Chalkandboard,Problem based learning, Demonstration	20
	17.	Similarity BasedLearning		
	18.	RegressionAnalysis		
4	19.	DecisionTreelearning	Chalk&board,Problem based learning	20
	20.	ExamplesonDTLearning		
	21.	ExamplesonDTLearning		
	22.	ExamplesonDTLearning		
	23.	BayesianLearning		
	24.	ExamplesonBayesianLearning		
	25.	ExamplesonBayesianLearning		
	26.	ExamplesonBayesianLearning		

5	27.	ArtificialneuralNetwork	Chalkandboard,MOOC	20
	28.	ExamplesonArtificialneuralNetwork		
	29.	ExamplesonArtificialneuralNetwork		
	30.	ExamplesonArtificialneuralNetwork		
	31.	ClusteringAlgorithms		
	32.	ExamplesonClusteringAlgorithms		
	33.	ExamplesonClusteringAlgorithms		
	34.	ExamplesonClusteringAlgorithms		

13.0 Assignments,Quiz,GD,MiniProject,Seminars

S. No.	Title	Outcome expected	Related Study	Week No.	Individual / Groupactivity	Reference: book/website /Paper
1	**Assignment-1:** IntroductiontoMachine Learning, Understanding Data.(**10Marks**)	Studentsstudythe Topic and write the Answers.	Chapter-1of Module-2	4	IndividualActivity.	Book1,2ofthe reference list.
2	**Assignment-2:** RegressionAnalysis. (**10Marks**)	Studentsstudythe Topics and write theAnswers.	Chapter-2of Module-3	9	IndividualActivity.	Book1,2ofthe reference list.
3	Quiz/Seminar/GD (**20Marks**)	Studentsstudythe Topicsandanswer theQuiz/present seminar.	Will be Notifiedlater.	13	Individual/Group activity.	Book1,2ofthe reference list.

14.0 QUESTIONBANK

Module-1

1. WhatisAI?ExplainthevariousdimensionsofAI
2. ExplainthefoundationofAIwithrespecttophilosophy&Mathematics
3. ExplainthefoundationofAIwithrespecttoEconomics&Nueroscience
4. ExplainthefoundationofAIwithrespecttoPsychology&Computerscience&Engineering
5. ExplainthefoundationofAIwithrespecttoControlTheory&Linguistics
6. ExplainWelldefinedProblemsandsolutionswithexample.
7. ExplainProblemsolvingagentswithexample.
8. Explainbrieflypropertiesofsearchstreatergies.

9. ExplainbrieflyBreadthFirstSearchAlgorithm.
10. ExplainbrieflyDepthFirstSearchAlgorithm.

Module-2

1. ExplainGreedybestFirstseachalgorithmindetailwithExample.
2. ExplainA*seachalgorithmforAIindetailwithExample.
3. WhatisMachineLearning? ExplaintheMajorfieldsofMachineLearning.
4. ExplainbreiflyTypesofMachine Learning.
5. ExplainChallanagesofMachineLearning.
6. ExpalinApplicationsofMachineLearning.
7. Explainhowtoovercomemissingdata.
8. ExaplinthetypesofData.
9. SolvethefollowingsetofequationsusingGaussianEliminationmethod.
   2x1+4x2=6
   4x1+3x2=7
10. ExplainPCAAlgorithmindetailwithexample.
11. ExplainSVDAlgorithmindetailwithexample.

Module-3

1. ExplainConceptLearningwithan Example.
2. ExplainHypothesisspacesearchbyFindSAlgorithmin detail.
3. ExplainCandidateEliminationAlgorithmindetail.
4. DifferentiatebetweenBiasVsVariance.
5. DifferentiatebetweenInstanceandModelBasedLearning.
6. ExplainWeightedK-NearestneighborAlgorithmindetail.
7. ExplainLocallyWeightedRegression.
8. ExplaintypesofRegressionMethodes.
9. ExplainLinearRegressionin detail.
10. ExplainLogisticRegressionindetail.

11. ExplainRIDGE,LASSO,&Elasticnetregression.

Module-4

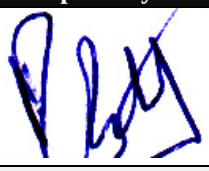
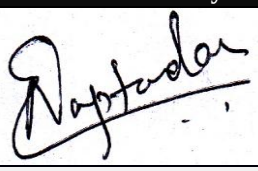
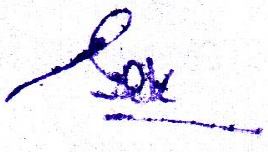
1. ExplainDecisionTreeAlgorithm.
2. ExplainID3Algorithm.
3. ExplainAdvantages&DisadvantagesdecisionTrees.
4. ExplainEntropy&InformationGain.
5. ExplainBayestheorem.
6. ExplainMAPHypothesis.
7. ExplainMLHypothesis.
8. ExplainBruteforceMAPlearningAlgorithm.

Module-5

1. ExplainANNwithexample.
2. ExplainBackpropagationwithexample.
3. ExplaintheArchitecturesofANNwithexample.
4. ImplementtheANDgatewithANN.
5. ExplainthePerceptronruleusinganexample.
6. ExplaintheDeltaruleusinganexample.
7. ExplaintheGradientDecentAlgorithmusinganexample.
8. ExplaintheClusteringAlgorithmusinganexample

15.0 UniversityResult

Examination	S+	S	A	B	C	D	E	F	%Passing
-	-	-	-	-	-	-	-	-	-

Preparedby	Checkedby		
			
Prof.P.V.PATIL	**Prof.A.A.Daptardar**	HOD	Principal

SubjectTitle	RESEARCHMETHODOLOGY&INTELLECTUALPROPERTY		
SubjectCode	21RMI56	IAMarks	50
NumberofLectureHrs/Week	1:2:0:0	ExamMarks	50
TotalNumberofLectureHrs	25	ExamHours	03
CREDITS–02			

FACULTYDETAILS:		
Name:Dr.MaheshG.Huddar	Designation:AssociateProfessor	Experience:14Years
No.oftimescoursetaught: 01	Specialization:ComputerScienceandEngineering	

1.0 PrerequisiteSubjects:

Sl.No	Branch	Semester	Subject
01	ComputerScienceandEngineering	I/II	ProgramminginCandDataStructures

2.0 CourseObjectives

Studentsshouldable to:

1. CO1:Understandtheknowledgeonbasicsofresearchanditstypes.
2. CO2.LearntheconceptofLiteratureReview,TechnicalReading,AttributionsandCitations.
3. CO3.LearnEthicsinEngineeringResearch.
4. CO4.DiscusstheconceptsofIntellectualPropertyRightsinengineering.

3.0 CourseOutcomes

Afterstudyingthiscourse,studentswillbeableto

	CourseOutcome	Cognitive Level	POs
C306.1	Toknowthemeaningofengineeringresearch	L2	1,2,3,8,10,12
C306.2	ToknowtheprocedureofLiteratureReviewandTechnicalReading.	L2	1,2,3,8,10,12
C306.3	Toknowthefundamentalsofpatentlawsanddraftingprocedure.	L2	1,2,3,8,10,12
C306.4	Understandingthecopyrightlawsandsubjectmattersofcopyrightsand designs	L2	1,2,3,8,10,12
C306.5	Understandingthebasicprinciplesofdesign rights.	L2	1,2,3,8,10,12
	TotalHoursof Instruction	25	

4.0 CourseContent

Module–1 **5 Hours**

Introduction: Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem. Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship.

Module–2 **5 Hours**

LiteratureReviewandTechnicalReading,NewandExistingKnowledge,AnalysisandSynthesisofPriorArt

Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet. Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments.

Module–3 **05 Hours**

Introduction To Intellectual Property: Role of IP in the Economic and Cultural Development of the Society, IP Governance, IP as a Global Indicator of Innovation, Origin of IP History of IP in India. Major Amendments in IP Laws and Acts in India.

Patents: Conditions for Obtaining Patent Protection, To Patent or Not to Patent an Invention. Rights Associated with Patents. Enforcement of Patent Rights. Inventions Eligible for Patenting. Non-Patentable Matters. Patent Infringements. Avoid Public Disclosure of an Invention before Patenting. Process of Patenting. Prior ArtSearch. Choice of Application to be Filed. Patent Application Forms. Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection.

Post-grant Opposition. Commercialization of a Patent. Need for a Patent Attorney/Agent. Can a Worldwide Patent be Obtained. Do I Need First to File a Patent in India. Patent Related Forms. Fee Structure. Types of Patent Applications. Commonly Used Terms in Patenting. National Bodies Dealing with Patent Affairs. Utility Models.

Process of Patenting. Prior Art Search. Choice of Application to be Filed. Patent Application Forms.Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection. Post-grant Opposition. Commercialization of a Patent. Need for a Patent Attorney/Agent. Can a Worldwide Patent be Obtained. Do I Need First to File a Patent in India. Patent Related Forms. Fee Structure. Types of Patent Applications. Commonly Used Terms in Patenting. National Bodies Dealing with Patent Affairs. Utility Models.

Module–4 **5 Hours**

Copyrights and Related Rights: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement is a Criminal Offence. Copyright Infringement is a Cognizable Offence. Fair Use Doctrine. Copyrights and Internet. Non-Copyright Work. Copyright Registration. Judicial Powers of the Registrar of Copyrights. Fee Structure. Copyright Symbol. ValidityofCopyright.CopyrightProfileofIndia.Copyrightandtheword„Publish".TransferofCopyrightstoa Publisher. Copyrights and the Word „Adaptation". Copyrights and the Word „Indian Work". Joint Authorship. Copyright Society. Copyright Board. Copyright Enforcement Advisory Council (CEAC). International Copyright Agreements, Conventions and Treaties. Interesting Copyrights Cases. Trademarks: Eligibility Criteria. Who Can Apply for a Trademark. Acts and Laws. Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India. Trademark Registry. Process for Trademarks Registration. Prior Art Search. Famous Case Law: Coca-Cola Company vs. Bisleri International Pvt. Ltd.

Module–5 **12 Hours**

IndustrialDesigns:EligibilityCriteria.ActsandLawstoGovernIndustrialDesigns.DesignRights. Enforcement of Design Rights. Non-Protectable Industrial Designs India. Protection Term. Procedure for RegistrationofIndustrialDesigns.PriorArtSearch.ApplicationforRegistration.DurationoftheRegistration of a Design. Importance of Design Registration. Cancellation of the Registered Design. Application Forms. Classification of Industrial Designs. Designs Registration Trendin India. International Treaties. Famous Case Law: Apple Inc. vs. Samsung Electronics Co.

Geographical Indications: Acts, Laws and Rules Pertaining to GI. Ownership of GI. Rights Granted to the Holders.RegisteredGIinIndia.IdentificationofRegisteredGI.ClassesofGI.Non-RegisterableGI.Protection of GI. Collective or Certification Marks. Enforcement of GI Rights. Procedure for GI Registration Documents Required for GI Registration. GI Ecosystem in India.

CaseStudiesonPatents.CasestudyofCurcuma(Turmeric)Patent,CasestudyofNeemPatent,Case study of Basmati patent. IP Organizations In India. Schemes and Programmes

5.0 Relevancetofuturesubjects

Sl.No	Semester	Subject	Topics
01	VIII	ProjectWork	FinalYearAcademicProject

6.0 RelevancetoRealWorld

Sl.No	RealWorldMapping
01	FinalYearAcademicProject

7.0 GapAnalysisandMitigation

Sl.No	DeliveryType	Details
01	NPTEL	https://onlinecourses.nptel.ac.in/noc22_hs59/preview
02	NPTEL	https://onlinecourses.nptel.ac.in/noc23_ge36/preview

8.0 BooksUsedandRecommendedtoStudents

TextBooks

1. Dipankar Deb • Rajeeb Dey, Valentina E. Balas "Engineering Research Methodology", ISSN 1868-4394 ISSN 1868-4408 (electronic), Intelligent Systems Reference Library, ISBN 978-981-13-2946-3 ISBN 978-981-13-2947-0 (eBook), https://doi.org/10.1007/978-981-13-2947-0
2. IntellectualPropertyAPrimerforAcademiabyProf.RupinderTewariMs.Mamta Bhardwa

ReferenceBooks

1. DavidV.Thiel"ResearchMethodsforEngineers"CambridgeUniversityPress,978-1-107-03488-4
2. IntellectualPropertyRightsbyN.K.AcharyaAsiaLawHouse6thEdition.ISBN:978-93-81849-30-9

AdditionalStudymaterial&e-Books

1. **--**

9.0 RelevantWebsites(ReputedUniversitiesandOthers)for Notes/Animation/VideosRecommended

WebsiteandInternetContentsReferences

1. --

10.0 Magazines/JournalsUsedandRecommendedtoStudents

Sl.No	Magazines/Journals	website
1	ResearchMethodology	https://www.tandfonline.com/journals/tsrm20
2	IndianJournalofIntellectualPropertyLaw	https://ijipl.nalsar.ac.in/

11.0 ExaminationNote

AssessmentDetails(bothCIEandSEE)

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 40% of the maximum marks (20 marks out of 50). A studentshallbedeemedtohavesatisfiedtheacademicrequirementsandearnedthecreditsallottedtoeachsubject/

course ifthe student secures not less than 35%(18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

ContinuousInternalEvaluation:

ThreeUnitTestseachof20Marks(duration01hour)

1. Firsttest at theendof5thweekofthesemester
2. Secondtest at theendofthe10thweekofthesemester
3. Thirdtestattheendofthe15thweekofthesemesterTwoassignmentseachof10 Marks.
4. Firstassignment attheendof4thweekofthesemester
5. Second assignment at the end of 9 th weekof the semester Group discussion/Seminar/quizanyone of three suitably planned to attain the Cos and Pos for 20 Marks (duration 01 hours)
6. At the end of the 13th week of the semester The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /question paper is designed to attain the different levels of Bloom‟s taxonomy as per the Outcome defined for the course.

SemesterEnd Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. Thequestionpaperwillbesetfor100marks.Marksscoredshallbeproportionallyreducedto50 marks
2. Thequestionpaperwillhavetenquestions.Eachquestionissetfor20 marks.
3. Therewillbe2questionsfromeachmodule.Eachofthetwoquestionsisunderamodule(witha maximum of 2 sub-questions).
4. The studentshave to answer5 fullquestions,selectingone fullquestion from each module. Marks scored by the students will be proportionally scaled down to 50 marks

12.0 CourseDelivery Plan

Module	Lecture No.	ContentofLecturer	%of Portion
1	1	Introduction:MeaningofResearch,	20
	2	ObjectivesofEngineeringResearch,andMotivationinEngineeringResearch	
	3	TypesofEngineeringResearch,FindingandSolvingaWorthwhileProblem	
	4	EthicsinEngineeringResearch,EthicsinEngineeringResearchPractice	
	5	TypesofResearchMisconduct,EthicalIssuesRelatedtoAuthorship	
2	6	LiteratureReviewandTechnicalReading,NewandExistingKnowledge,	20
	7	AnalysisandSynthesisofPriorArtBibliographicDatabases,WebofScience, GoogleandGoogleScholar	
	8	,EffectiveSearch:TheWayForwardIntroductiontoTechnicalReading ConceptualizingResearch,CriticalandCreativeReading, TakingNotesWhile Reading, Reading Mathematics and Algorithms, Reading a Datasheet	
	9	AttributionsandCitations:GivingCreditWhereverDue,Citations:Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow throughCitation,CitingDatasets,StylesforCitations,Acknowledgmentsand Attributions	
	10	WhatShouldBeAcknowledged,Acknowledgmentsin,BooksDissertations, DedicationorAcknowledgments	

3	11	Introduction To Intellectual Property: Role of IP in the Economic and Cultural Development of the Society, IP Governance, IP as a Global Indicator of Innovation,OriginofIPHistoryofIPinIndia.MajorAmendmentsinIPLaws andActs inIndia.	20
	12	Patents: Conditions for Obtaining Patent Protection, To Patent or Not to Patent an Invention. Rights Associated with Patents. Enforcement of Patent Rights. Inventions Eligible for Patenting. Non-Patentable Matters. PatentInfringements. Avoid Public Disclosure of an Invention before Patenting. Process of Patenting. Prior Art Search. Choice of Application to be Filed.Patent Application Forms. Jurisdiction of Filing Patent Application.Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of PatentProtection.	
	13	Post-grant Opposition. Commercialization of a Patent. Need for a Patent Attorney/Agent. Cana Worldwide Patent be Obtained.Do INeed First to Filea Patent in India. Patent Related Forms. Fee Structure. Types of Patent Applications.CommonlyUsedTermsinPatenting.NationalBodiesDealing withPatentAffairs.UtilityModels.	
	14	ProcessofPatenting.PriorArtSearch.ChoiceofApplicationtobeFiled. PatentApplicationForms.JurisdictionofFilingPatentApplication.	
	15	Publication.Pre-grant Opposition.Examination. Grant of a Patent. Validityof PatentProtection.Post-grantOpposition.CommercializationofaPatent.Need for a Patent Attorney/Agent. Can a Worldwide Patent be Obtained. Do INeed First to File a Patent in India. Patent Related Forms. Fee Structure. Types of Patent Applications. Commonly Used Terms in Patenting. National Bodies DealingwithPatentAffairs.UtilityModels.	
4	16	Copyrights and Related Rights: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement is a Criminal Offence.	20
	17	Copyright InfringementisaCognizableOffence.FairUse Doctrine.Copyrights and Internet. Non-Copyright Work. Copyright Registration. Judicial Powers of theRegistrarofCopyrights.FeeStructure.CopyrightSymbol.Validityof Copyright.	
	18	Copyright Profile of India. Copyright and the word „Publish". Transfer of CopyrightstoaPublisher.CopyrightsandtheWord„Adaptation".Copyrights andtheWord„IndianWork".JointAuthorship.	
	19	CopyrightSociety.CopyrightBoard.CopyrightEnforcementAdvisoryCouncil (CEAC). International Copyright Agreements, Conventions and Treaties. InterestingCopyrightsCases.Trademarks:EligibilityCriteria.WhoCanApply foraTrademark.ActsandLaws.DesignationofTrademark Symbols.	
	20	ClassificationofTrademarks.RegistrationofaTrademarkisNotCompulsory. Validity of Trademark. Types of Trademark Registered in India. Trademark Registry.ProcessforTrademarks Registration.PriorArtSearch.FamousCase Law:Coca-ColaCompanyvs.BisleriInternationalPvt. Ltd.	
5	21	IndustrialDesigns:EligibilityCriteria.ActsandLawstoGovernIndustrial Designs.DesignRights.EnforcementofDesignRights.Non-Protectable IndustrialDesignsIndia.ProtectionTerm.Procedurefor	20
	22	RegistrationofIndustrialDesigns.PriorArtSearch.Applicationfor Registration.DurationoftheRegistrationofaDesign.	

	23	ImportanceofDesignRegistration.CancellationoftheRegisteredDesign. Application Forms. ClassificationofIndustrialDesigns.DesignsRegistrationTrendinIndia. InternationalTreaties.FamousCaseLaw:AppleInc.vs.SamsungElectronics Co.	
	24	Geographical Indications: Acts, Laws and Rules Pertaining to GI. Ownership of GI. Rights Granted to the Holders. Registered GI in India. Identification of Registered GI. Classes of GI. Non-Registerable GI. Protection of GI. Collective or Certification Marks. Enforcement of GI Rights. Procedure forGIRegistrationDocumentsRequiredforGIRegistration.GIEcosystemin India.	
	25	CaseStudiesonPatents.CasestudyofCurcuma(Turmeric)Patent,Casestudy of Neem Patent, Case study of Basmati patent. IP Organizations In India. Schemesand Programmes	

13.0 Assignments,Quiz,MiniProject,Seminars

Sl. No.	Title	Outcomeexpected	Allied study	Week No.	Individual/Group activity	Reference: book/website /Paper
1	Assignment 1: UniversityQuestions on Module 1	Students study the Topics and write the Answers. Get practice tosolveuniversity questions.	Module1 of the syllabus	2	Individual Activity. Printed solution expected.	Book1
2	Assignment 2: UniversityQuestions on Module 2	Students study the Topics and write the Answers. Get practice tosolveuniversity questions.	Module2 of the syllabus	4	Individual Activity. Printed solution expected.	Book1and2
3	Assignment 3: UniversityQuestions on Module 3	Students study the Topics and write the Answers. Get practice tosolveuniversity questions.	Module3 of the syllabus	6	Individual Activity. Printed solution expected.	Book2
4	Assignment 4: UniversityQuestions on Module 4	Students study the Topics and write the Answers. Get practice tosolveuniversity questions.	Module4 of the syllabus	8	Individual Activity. Printed solution expected.	Book2
5	Assignment 5: UniversityQuestions on Module 5	Students study the Topics and write the Answers. Get practice tosolveuniversity questions.	Module5 of the syllabus	10	Individual Activity. Printed solution expected.	Book1

14.0 QUESTIONBANK

MODULE–1

1. Defineresearch.Drawandexplainflowdiagramof research.
2. Whatareresearchobjectives?Explaindifferenttypesofresearchobjectives.
3. Listandexplainthemotivationsforengineeringresearch.
4. Howtofindandsolveworthwhileproblem.

5. Explaindifferenttypesofresearchwithexamples.
6. Typesofmisconductinengineeringresearch.
7. Ethicalissuesinco-authorship.

MODULE–2

1. Whatisliteraturereview?Explain.
2. ExplainAnalysisandSynthesisofPriorknowledge.
3. WriteashortnoteonBibliographic Databases.
4. Explainwhatcitationis.Discussdifferentwaystocite.
5. WhatisAcknowledgement?WhatShouldBe Acknowledged?

MODULE–3

1. ExplainRoleofIPintheEconomicandCulturalDevelopmentofthe Society.
2. WhatarethedifferentconditionsforObtainingaPatentProtection?
3. Explainprocessofpatenting.
4. HowtodecideToPatentorNottoPatentanInvention.
5. Explaintypeofpatentapplications.

MODULE-4

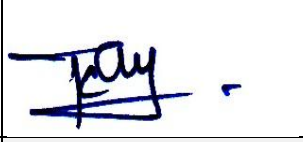
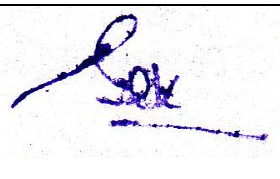
1. ListandexplainClassesofCopyrights.CriteriaforCopyright.
2. ExplainCopyrightInfringements.
3. HowtogetCopyrightsin India.
4. Whataretrademarks?Explaineligibilitycriteriafortrademarks.
5. ExplainprocessofTrademarksRegistrationinIndia.

MODULE-5

1. ExplainEligibilityCriteria.ActsandLawstoGovernIndustrial Designs.
2. ImportanceofDesignRegistration.
3. ClassificationofIndustrialDesigns.“
4. ExplainActs,LawsandRulesPertainingtoGI.
5. ExplainProcedureforGIRegistrationDocumentsRequiredforGIRegistration.

15.0 UniversityResult

Examination	FCD	FC	SC	Fail	%Passing
NA	NA	NA	NA	NA	NA

Preparedby	Checkedby		
			
Dr.MaheshG.Huddar	Dr. K B Manwade	**HOD**	**Principal**

SubjectTitle	**ENVIRONMENTALSTUDIES**		
SubjectCode	21CIV57	**IA Marks**	50
NumberofLectureHrs/	01(L)+2(T)	**ExamMarks**	50
TotalNumberof LectureHrs	15	**ExamHours**	01
CREDITS–01			

FACULTYDETAILS:		
Name:Dr.M.S.Hanagadakar Dr.S.J.Walaki	Designation:i)Assoc.Professor ii)Asst.Professor	Experience:i)18.0 ii)6.0
No.of timescoursetaught:i)08 ii)03	**Specialization:**i)PhysicalChemistry ii)OrganicChemistry	

1.0 PrerequisiteSubjects:

Fundamentals of Chemistry, Physics, Mathematics, Biology, Engineering, Anthropology, Sociology, (Social problems), Economics (production, consumption, and transfer of wealth), management, Ecology Knowledgeare required.

2.0 CourseLearningObjectives

1. Recognizemajorconceptsinenvironmentalsciencesanddemonstratein-depthunderstandingofthe environment.
2. Developanalyticalskills,criticalthinking,anddemonstrateproblem-solvingskillsusingscientific techniques.
3. Demonstratetheknowledgeandtrainingforenteringgraduateorprofessionalschools,orthejob market.

3.0 CourseOutcomes

Havingsuccessfullycompletedthis course,the studentwill beable to

Course Code	**CourseOutcome**	**RBT level**	**POs**
C309.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.	L1,L2	1,2,3,6,7,9,10,12
C309.2	Developcritical thinking and/or observationskills, andapply them tothe analysis of a problem or question related to the environment.	L1, L2	1,2,3,6,7,9,10,12
C309.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.	L1, L2	1,2,3,6,7,9,10,12
C309.4	Applytheirecologicalknowledgetoillustrateandgraphaproblemand describe the realities that managers face when dealing with complex issues.	L1, L2	1,2,3,6,7,9,10,12
C309.5	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.	L1,L2	1,2,3,6,7,9,10,12
TotalHoursof instruction		**25**	

4.0 Course Content

Module-1

Ecosystems (Structure and Function): Forest, Desert, Wetlands, Riverine, Oceanic and Lake.
Biodiversity: Types,Value;Hot-spots;ThreatsandConservationofbiodiversity,ForestWealth,and Deforestation.

Module-2

AdvancesinEnergySystems(Merits,Demerits,GlobalStatusandApplications)**:**Hydrogen,Solar,OTEC, Tidal and Wind.

NaturalResourceManagement(Conceptandcase-studies):DisasterManagement,SustainableMining, Cloud Seeding, and Carbon Trading.

Module-3

Environmental Pollution (Sources, Impacts, Corrective and Preventive measures, Relevant Environmental Acts, Case-studies)**:** Surface and Ground Water Pollution; Noise pollution; Soil Pollution and Air Pollution.

WasteManagement&PublicHealthAspects: Bio-medicalWastes;Solidwaste;Hazardouswastes;E- wastes; Industrial and Municipal Sludge.

Module-4

Global Environmental Concerns: (Concept, policies and case-studies):Ground water depletion/recharging, ClimateChange;AcidRain;OzoneDepletion;RadonandFluorideproblemindrinkingwater;Resettlement and rehabilitation of people, Environmental Toxicology.

Module-5

Latest Developments in Environmental Pollution Mitigation Tools (Concept and Applications): G.I.S. & RemoteSensing,EnvironmentImpactAssessment,EnvironmentalManagementSystems,ISO14001;Environmental Stewardship- NGOs.

Fieldwork: VisittoanEnvironmentalEngineeringLaboratoryorGreenBuildingorWaterTreatmentPlantor Waste water treatment Plant; ought to be followed by understanding of process and its brief documentation.

5.0 Relevancetofuturesubjects

Sl. No.	Semester	Subject	Topics
01	Commontoall	Commontoallengineering Subjects	Sustainabledevelopment,wastemanagement, Pollution control, Energy systems, Environmentalissues.

6.0 RelevancetoRealWorld

Sl. No	RealWorldMapping
01	Allengineeringapplications/projectsleadingtothesustainabledevelopment,wastemanagement, pollutioncontrol,toresolveglobalrelatedissues.

7.0 GapAnalysisandMitigation

Sl. No	Delivery Type	Details
01	NPTEL	http://nptel.ac.in/courses

8.0 BooksUsedandRecommendedtoStudents

Text Books
1. BennyJoseph(2005),"EnvironmentalStudies",TataMcGraw–HillPublishingCompanyLimited.
2. R.J.Ranjit Daniels and Jagadish Krishnaswamy, (2009), "Environmental Studies", Wiley India Private Ltd., New Delhi.

3. RRajagopalan,"EnvironmentalStudies–FromCrisistoCure",OxfordUniversityPress,2005,

4. AlokaDebi,"EnvironmentalScienceandEngineering",UniversitiesPress(India)Pvt.Ltd.2012.

ReferenceBooks

1. RamanSivakumar,"PrincipalsofEnvironmentalScienceandEngineering",SecondEdition,Cengage learning Singapore, 2005

2. P.Meenakshi,"ElementsofEnvironmentalScienceandEngineering",PrenticeHallofIndiaPrivateLimited, New Delhi, 2006

3. S.M.Prakash,"EnvironmentalStudies",ElitePublishersMangalore,2007

4. ErachBharucha,"TextBookofEnvironmentalStudies",forUGC,Universitypress,2005

5. G.TylerMillerJr.,"EnvironmentalScience–workingwiththeEarth",TenthEdition,ThomsonBrooks /Cole,2004

6. G.TylerMillerJr.,"EnvironmentalScience–workingwiththeEarth",EleventhEdition,Thomson Brooks /Cole, 2006

7. Dr.PratibaSing,Dr.AnoopSinghandDr.PiyushMalaviya,"TextBookofEnvironmentalandEcology", AcmeLearningPvt.Ltd.New Delhi.

9.0 RelevantWebsites(ReputedUniversitiesandOthers)for Notes/Animation/Videos Recommended

WebsiteandInternetContentsReferences

Web links and Video Lectures:

https://nptel.ac.in/courses/120/108/120108005/https://nptel.ac.in/courses/120/108/120108002/https://nptel.ac.in/courses/120/108/120108004/https://nptel.ac.in/courses/105/102/105102089/https://www.my-mooc.com/en/categorie/environmental-science
https://academicearth.org/environmental-studies/

10.0 Magazines/JournalsUsedandRecommendedtoStudents

Sl.No	Magazines/Journals	website
1	Environmental-science	http://nlspub.ac.in/category/journals/journal-of-environmental-law-policy-and-development/
2	Environmental-research	https://www.journals.elsevier.com/environmental-research

11.0 ExaminationNote

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 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than35%(18 Marksoutof50)in the semester-end examination(SEE),and a minimum of40%(40 marks outof100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

ContinuousInternalEvaluation:
ThreeUnitTestseachof20Marks(duration01hour)
1. Firsttestattheendof5thweekofthe semester
2. Secondtestattheendofthe10thweekofthesemester
3. Thirdtestattheendofthe15thweekofthesemester Two
assignments each of 10 Marks
4. Firstassignmentattheend of4thweekofthesemester
5. Secondassignmentattheendof9thweekofthesemester
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)
6. Attheendofthe13thweekofthesemester
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks
(tohave lessstressedCIE,the portionofthe syllabus should notbecommon/repeatedforanyofthe methodsoftheCIE. Each method of CIE should have a different syllabus portion of the course).
CIE methods /question paper is designed to attain the different levels of Bloom‟s taxonomy as per the outcome defined for the course.
SemesterEndExamination:
TheorySEEwillbeconductedbyUniversityasperthescheduledtimetable,withcommonquestionpapersforthe subject (duration 01 hours)
Questionpaperpattern:
1. TheQuestionpaperwillhave50objectivequestions.
2. Eachquestionwillbefor01marks
3. StudentswillhavetoanswerallthequestionsonanOMRSheet.
4. TheDurationoftheExamwillbe01hour

12.0 CourseDelivery Plan

Module No.	Lecture No.	ContentofLecturer	%of Portion
1	1	**Ecosystems**(StructureandFunction):,Wetlands, Riverine	20
	2	ForestandDesert	
	3	Oceanicand Lake	
	4	**Biodiversity:** Types, Value; Hot-spots; Threats and Conservation of biodiversity.	
	5	ForestWealth,and Deforestation	
2	6	**AdvancesinEnergySystems**(Merits,Demerits,GlobalStatusand Applications)**:**Hydrogen,	20
	7	Solarand OTEC	
	8	Tidaland Wind.	
	9	**Natural Resource Management** (Concept andcase-studies): Disaster Management.	
	10	SustainableMining,CloudSeeding,andCarbonTrading.	
3	11	**EnvironmentalPollution**(Sources,Impacts,CorrectiveandPreventive measures,RelevantEnvironmentalActs,Case-studies)**:**SurfaceandGround	20
	12	WaterPollutionandNoisepollution	
	13	SoilPollutionandAir Pollution.	
	14	**WasteManagement&PublicHealthAspects:**Bio-medicalWastes;Solid waste	
	15	Hazardouswastes;E-wastes;IndustrialandMunicipalSludge	
4	16	**GlobalEnvironmentalConcerns:**(Concept,policiesandcase-studies):Ground water depletion/recharging.	20
	17	ClimateChange;AcidRainand Ozone Depletion	
	18	RadonandFluorideproblemindrinkingwater	

	19	Resettlementandrehabilitationofpeople	
	20	EnvironmentalToxicology.	
5	21	**LatestDevelopmentsinEnvironmentalPollutionMitigationTools (Concept and Applications):** G.I.S. & Remote Sensing.	**20**
	22	EnvironmentImpactAssessment,	
	23	Environmental Management Systems, ISO14001,Environmental Stewardship-NGOs.	
	24	**Fieldwork:**VisittoanEnvironmentalEngineeringLaboratoryorGreen Building or Water Treatment Plant or Waste water treatment Plant.	
	25	Oughttobefollowedbyunderstandingofprocessanditsbriefdocumentation.	

13.0 Assignments

Sl.No.	Title	Outcome expected	Allied study	Week No.	Individual / Groupactivity	Reference: book/website /Paper
1	Assignment 1: University Questions/Writeup	Students study the Topics and write the Answers.Getpractice tosolveuniversity questions.	Module1 of the syllabus	2	IndividualActivity.	Book 1, of the reference list. Website of the Reference list
2	Assignment 2: University Questions/Writeup	Students study the Topics and write the Answers.Getpractice tosolveuniversity questions.	Module2 of the syllabus	4	IndividualActivity.	Book1,2 ofthe reference list. Website of the Reference list
3	Assignment 3: University Questions/Writeup	Students study the Topics and write the Answers.Getpractice to solve university questions.	Module3 of the syllabus	6	IndividualActivity.	Book1,2 ofthe reference list. Website of the Reference list
4	Assignment 4: University Questions/Writeup	Students study the Topics and write the Answers.Getpractice tosolveuniversity questions.	Module4 of the syllabus	8	IndividualActivity.	Book1,2 ofthe reference list. Website of the Reference list
5	Assignment 5: University Questions/Writeup	Students study the Topics and write the Answers.Getpractice tosolveuniversity questions.	Module5 of the syllabus	10	IndividualActivity.	Book1,2 ofthe reference list. Website of the Reference list

14.0 QUESTIONBANK

Module-1

1. Theterm„Environment"hasbeenderivedfromtheFrenchwordwhichmeanstoencircleorsurround
a) Environ b)Oikos c)geo d)Aqua
2. Theobjectiveofenvironmentaleducationis
a) Raise consciousness about environmental conditions b)Toteachenvironmentallyappropriate behavior c) Create an environmental ethic d) All of the above
3. Whichofthefollowingconceptualspheresoftheenvironmentishavingtheleaststoragecapacityfor matter?

a) Atmosphere b)Lithosphere c)Hydrosphere d)Biosphere
4. Whichofthefollowingcomponentsoftheenvironmentareeffectivetransportersofmatter?
a) AtmosphereandHydrosphere b)AtmosphereandLithosphere
c)HydrosphereandLithosphere d)BiosphereandLithosphere
5. Biosphereis
a) Thesolidshellofinorganicmaterialsonthesurfaceofthe earth
b) Thethinshelloforganicmatteronthesurfaceofearthcomprisingofallthelivingthings
c) Thespherewhichoccupiesthemaximumvolumeofallofthespheres d)allofthese.
6. Atmosphereconsistsof79percentNitrogenand21percentOxygen by
a) Volume b)weight c)Density d)Allthethree
7. Whichofthefollowingisabioticcomponentofanecosystem?
a) Fungi b)solarlight c)temperature d)humidity
8. Inanecosystem,theflowofenergyis
a) Bi-directional b)Cyclic c)Unidirectional d)Multidirectional
9. WhichPyramidisalwaysupright?
a) Energy b)biomass c)numbers d)foodchain
10. Incomplexecosystemsthedegreeofspeciesdiversityis
a) Poor b) high c)medium d)none

Module-2

1. Whichofthefollowingisconsideredasanalternate fuel?
a) CNG b)Kerosene c)Coal d)Petrol
2. Solarradiationconsistsof
a) UV b)Visiblelight c)Infrared d)Allofthese
3. Reductioninusageoffuelscannotbebroughtabout by
a) Usingalternatefuels b)Changinglifestyles c)Reducingcartaxes d)Botha)&b)
4. Whichofthefollowingisahazardofanuclearpowerplant?
a) Accidentriskwhentankerscontainingfuelcausespill
b) Radioactivewasteofthepowerplantremainshighlytoxicforcenturies
c) Releaseoftoxicgasesduringprocessing d)Allofthese
5. Themostimportantfuelusedbynuclearpowerplantis
a) U– 235 b) U- 238 c)U– 245 d)U– 248
6. Biogasisproducedby
a) Microbialactivity b)Harvestingcrop c)Botha) &b) d)Noneofthese
7. OilandGasarepreferredbecause of
a) Easytransportation b)Cheap c)Strongsmell d)Allofthese
8. Biomasspowergenerationuses
a) Crops b)Animaldung c) Wood d)Allofthese
9. Chernobylnucleardisasteroccurredintheyear
a) 1984 b) 1952 c) 1986 d)1987
10. Whichofthefollowingisnotarenewablesourceofenergy?
a) Fossilfuels b)Solarenergy c)Tidalwaveenergyd)Windenergy

Module-3

1. Environmentalpollutionisdueto
a) RapidUrbanization b)deforestation c)Afforestation d)a&b
2. Whichofthefollowingarenaturalsourcesofairpollution?
a) Volcaniceruption b)solarflair c)earthquake d)all
3. Whichofthefollowingarebiodegradablepollutants?
a) Plastics b)Domesticsewage c)detergent d)all
4. Theliquidwastefrombathsandkitchensiscalled
a) Sullage b)Domesticsewage c)Stormwaste d)Runoff
5. Noisepollutioncanbeminimized by
a) Urbanization b)Maintaining silence c)Reducingnoiseatsource d)none
6. BODMeans
a) Biochemicaloxygendemand b)chemicaloxygendemand c)biophysicaloxygendemand d)all
7. Whichofthefollowingindustrygeneratescoloredwaste?
a) Softwareindustry b)Textileindustry c)Biomedicalindustry d) none
8. Physicalpollutionofwaterisdue to
a) Dissolvedoxygen b)Turbidity c)pH d)noneofthese

9. Whichofthefollowingsourceissurfacewater?
a) Springs b)streams c)deepwells d)all
10. Deforestationcan
a) Increasetherainfall b)Increasesoilfertility c)Introducesiltintherivers d)Noneofthese
11. Whichofthefollowingisnonpointsourceofwaterpollution?
a) Factories b)Sewagetreatmentplant c)UrbanandSub-urbanland d)allofthe above

Module-4

1. Acidraincanbecontrolledby
a) ReducingSO_2andNO_2emissions. b)Reducingoxygenemission.
c)Increasingnumberoflakes. c)Increasingtheforestcover.
2. AtmosphericoxidationofSO_2toSO_3isinfluencedby
a) Sunlight. b)Humidity c)presenceofhydrocarbons d)allofthese
3. ReductioninbrightnessofthefamousTajMahalisdueto
a) Globalwarming. b)Airpollution c)Ozonedepletion d)Afforestation.
27.TheEffectofAcid rain
a)Reducessoilfertility. b)increasesatmospherictemperature.
c)Causingrespiratoryproblems d)skincancer
4. Theprocessofmovementofnutrientsfromthesoilbytheacidrainiscalled
a) Transpiration. b)Evapotranspiration c)Leaching d)Infiltration.
5. Ozonelayerispresentin
a) Troposphere b)Stratosphere c)Mesosphere d)Thermosphere
6. Whichofthefollowingstatementsaboutozoneistrue?
a) Ozoneisamajorconstituentofphotochemicalsmog
b) Ozoneprotectsusfromtheharmfuluvradiationofsun
c) Ozoneishighlyreactive d)Alloftheabove
7. Majorcompoundresponsibleforthedestructionofstratosphericozonelayer is
a) Oxygen b)CFC c)Carbondioxide d)Methane
8. Ozonelayerthicknessismeasuredin
a) PPM b)PPB c)Decibels d)Dobsonunits
9. Normalaveragethicknessofstratosphericozonelayeracrosstheglobeisaround
a) 200DU b)300 DU c)400DU d)500DU
10. ChloroFluroCarbon‟s(CFC)are
a) Nontoxic b)Nonflammable c)Non carcinogenic d)Allthese
11. Ozonelayersabsorbs
a) UVrays b)infraredrays c)Cosmicrays d)CO
12. Whichofthefollowingisnotanilleffectofacidrain?
a) Resultsinkillingfish b)causesstoneleprosy.c)Leachesnutrientsfromthesoil.d)Causescataract.

13. Formationofozonelayerisexplainedby
a) Rosenmundreaction b)Henderson‟sreactionc)Chapman‟sreaction. d)Perkin‟sreaction
14. EachChlorinefreeRadicalcandestroythefollowingnumberofozonemolecules.
a) 1000 b)10,000 c)1,00,000 d)100
15. Whichofthefollowingstatementsaboutozoneistrue?
a) Ozoneisamajorconstituentofphotochemicalsmog b)Ozoneishighlyreactive
c)Ozoneprotectsusfromtheharmful UVradiationofsun. d)Allofthese

Module-5

1. Sustainabledevelopmentmeans
a) Meetingpresentneedswithoutcompromisingonthefutureneeds b)Progressinhumanwellbeings
c)Balancebetweenhumanneedsandtheabilityofearthtoprovidetheresources d)Alltheabove
2. Themostimportantremedytoavoidnegativeimpactduetoindustrializationis
a) Industryshouldbeclosed b)Don‟tallownewindustrialunits
c) Industryshouldtreatallthewastesgeneratedbyitbeforedisposal
d) Industriesshouldbeshiftedfarawayfromhumanhabittats.
3. Miningmeans
a) Toconserve&preserveminerals b)Tocheckpollutionduetomineralresources
c)Toextractmineralsandores d)None

4. E.I.A.canbeexpandedas
a) Environment&IndustrialAct b)Environment&ImpactActivities
c)EnvironmentalImpactAssessment d)EnvironmentallyImportantActivity
5. E.I.A.isrelatedto
a) Resourceconservation b)Efficientequipment/process
c)Wasteminimization d)Allof the above
6. Inordertoprotectthehealthofpeoplelivingalongtheadjoiningareasofroads,oneshould.
a) Planttreesalongsideoftheroads b)Notallowdieseldriven vehicles
c)Shiftthem(people)tootherplaces d)Noneoftheabove
7. Thepollutioncausedbytransportation/vehicularactivitiesdependson
a) Typeofthevehicle‟sengine b)Ageofthevehicle
c)Trafficcongestion d)Alloftheabove
8. Sustainabledevelopmentwillnotaimat
a) Socialeconomicdevelopmentwhichoptimizestheeconomicandsocietalbenefitsavailableinthe present, without spoiling the likely potential for similar benefits in the future
b) Reasonableandequitablydistributedlevelofeconomicwellbeingthatcanbeperpetuatedcontinually
c) Developmentthatmeetstheneedsofthepresentwithoutcompromisingtheabilityoffuturegenerations
d) Maximizingthepresentdaybenefitsthroughincreasedresourcemeettheirownneedsconsumption
10.WhichofthefollowingisakeyelementofEIA?
a) Scoping b)Screening c)Identifyingandevaluatingalternatives d)allofthese

Preparedby	Checkedby		
Dr.M.S.Hanagadakar Dr. S. J. Walaki	Dr.M.S. Hanagadakar	HOD	Principal

SubjectTitle	DATABASEMANAGEMENTSYSTEMSLABORATORYWITH MINI PROJECT		
SubjectCode	21CSL55	CIEMarks	50
NoofLectureHrs+PracticalHrs/Week	0:0:2:0	SEEMarks	50
TotalNo.ofLectureHrs	21	TotalMarks	100
Credits	01	ExamHours	03

FACULTYDETAILS:		
Name:Prof.ArunaA.Daptardar	Designation:AssistantProfessor	Experience:17.5Years
No.oftimescoursetaught:05	Specialization:ComputerScienceandEngineering	

1.0 PrerequisiteSubjects:

Sl.No	Branch	Semester	Subject
01	ComputerScience&Engineering	I/II	ProgramminginC
02	ComputerScience&Engineering	III	DataStructures

2.0 CourseObjectives

1. Foundationknowledgeindatabaseconcepts,technologyandpracticetogroomstudentsintowell-informed database application developers.
2. StrongpracticeinSQLprogrammingthroughavarietyofdatabaseproblems.
3. Developdatabaseapplicationsusingfront-endtoolsandback-endDBMS.

3.0 CourseOutcomes

Thestudent,aftersuccessfulcompletionofthecourse,willbeable to

CO	CourseOutcome	Cognitive Level	POs
C305.1	DemonstratetheworkingofCreate,Updateandqueryonthedatabase.	L2	PO1-PO3, PO8-PO12
C305.2	Demonstratetheworkingofdifferentconceptsof DBMS	L2	PO1-PO3, PO8-PO12
C305.3	Implement,analyzeandevaluatetheprojectdevelopedforanapplication.	L6	PO1-PO3, PO8-PO12
TotalHoursofinstruction		40	

4.0 CourseContent

PartA:SQLProgramming

1. Aim:Demonstratingcreationoftables,applyingtheviewconceptsonthetables.

   Consider the following schema for a Library Database:
   BOOK(Book_id, Title, Publisher_Name, Pub_Year)
   BOOK_AUTHORS(Book_id, Author_Name)
   PUBLISHER(Name, Address, Phone)
   BOOK_COPIES(Book_id,Programme_id,No-of_Copies)
   BOOK_LENDING(Book_id,Programme_id,Card_No,Date_Out,Due_Date)
   LIBRARY_PROGRAMME(Programme_id, Programme_Name, Address)
   Write SQL queries to

1. Retrievedetailsofallbooksinthelibrary –id,title, nameofpublisher,authors,numberofcopiesin each branch, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun2017.
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. PartitiontheBOOKtablebasedonyearofpublication.Demonstrateitsworkingwithasimple query.
5. CreateaviewofallbooksanditsnumberofcopiesthatarecurrentlyavailableintheLibrary.

2. Aim:Discussthevariousconceptsonconstraintsandupdateoperations.

ConsiderthefollowingschemaforOrderDatabase:
SALESMAN(Salesman_id, Name, City, Commission)
CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id)
ORDERS(Ord_No,Purchase_Amt,Ord_Date,Customer_id,Salesman_id) Write
SQL queries to

1. CountthecustomerswithgradesaboveBangalore‟saverage.
2. Findthenameandnumbersofallsalesmanwhohadmorethanonecustomer.
3. Listallthesalesmanandindicatethosewhohaveanddon‟thavecustomersintheircities(UseUNION operation.)
4. Createaviewthatfindsthesalesmanwhohasthecustomerwiththehighestorderofa day.
5. DemonstratetheDELETEoperationbyremovingsalesmanwithid1000.Allhisordersmustalsobedeleted.

3. Aim:DemonstratetheconceptsofJOINoperations.

ConsidertheschemaforMovieDatabase:
ACTOR(Act_id, Act_Name, Act_Gender)DIRECTOR(Dir_id,
Dir_Name, Dir_Phone)
MOVIES(Mov_id,Mov_Title,Mov_Year,Mov_Lang,Dir_id)
MOVIE_CAST(Act_id, Mov_id, Role)
RATING(Mov_id,Rev_Stars)
Write SQL queries to

1. Listthetitlesofallmoviesdirectedby,,Hitchcock‟.
2. Findthemovienameswhereoneormoreactorsactedintwoormoremovies.
3. Listallactorswhoactedinamoviebefore2000andalsoinamovieafter2015(useJOINoperation).
4. Find the title of movies and number of stars for each movie that has at least one rating and find the highestnumber of stars that movie received. Sort the result by movie title.
5. Updateratingofallmoviesdirectedby,,StevenSpielberg‟to5.

4. Aim:IntroduceconceptsofPLSQLandusageonthetable.

ConsidertheschemaforCollegeDatabase:
STUDENT(USN,SName,Address,Phone,Gender)
SEMSEC(SSID, Sem, Sec)
CLASS(USN,SSID)
SUBJECT(Subcode,Title,Sem,Credits)
IAMARKS(USN,Subcode,SSID,Test1,Test2,Test3,FinalIA)
Write SQL queries to

1. Listallthestudentdetailsstudyinginfourthsemester,,C‟section.
2. Computethetotalnumberofmaleandfemalestudentsineachsemesterandineachsection.
3. CreateaviewofTest1marksofstudentUSN,,1BI15CS101‟inallsubjects.
4. CalculatetheFinalIA(averageofbesttwotestmarks)andupdatethecorrespondingtableforallstudents.
5. Categorizestudentsbasedonthefollowingcriterion:
   IfFinalIA=17 to 20 thenCAT =,,Outstanding‟ If
   FinalIA = 12 to 16 then CAT = ,,Average‟
   IfFinalIA<12thenCAT=,,Weak‟

Givethesedetailsonlyfor8thsemesterA,B,andCsectionstudents.

5. Aim:Demonstratethecoreconceptsontablelikenestedandcorrelatednestingqueriesandalso EXISTSand NOT EXISTS keywords.

   ConsidertheschemaforCompanyDatabase:
   EMPLOYEE(SSN,Name,Address,Sex,Salary,SuperSSN,DNo)
   DEPARTMENT(DNo, DName, MgrSSN, MgrStartDate)
   DLOCATION(DNo,DLoc)
   PROJECT(PNo,PName,PLocation,DNo) WORKS_ON
   (SSN, PNo, Hours)
   WriteSQLqueriesto
   1. Makealistofallprojectnumbersforprojectsthatinvolveanemployeewhoselastnameis„Scott‟,eitherasa worker or as a manager of the department that controls the project.
   2. Showtheresultingsalariesifeveryemployeeworkingonthe„IoT‟projectisgivena10percentraise.
   3. Find the sum of the salaries of all employees of the „Accounts‟ department, as well as the maximum salary, the minimum salary, and the average salary in this department.
   4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
   5. Foreachdepartmentthathasmorethanfiveemployees,retrievethedepartmentnumberandthe numberofits employees who are making more than Rs. 6,00,000.

PartB:Miniproject

Mini project: For any problem selected, make sure that the application should have five or more tables. Indicative areas include: Organization, health care, Ecommerce etc.

5.0 Relevancetofuturesubjects

SL.No	Semester	Subject	Topics/Relevance
01	VIII	Projectwork	Academicprojects

6.0 RelevancetoRealWorld

SL.No	RealWorldMapping
01	Developmentofdatabaserelatedapplications
02	Developmentofweb-basedapplications

7.0 BooksUsedandRecommendedtoStudents

TextBooks
1. DatabasesystemsModels,Languages,DesignandApplicationProgramming,RamezElmasriandShamkantB. Navathe, 7th Edition, 2017, Pearson. 2. Databasemanagementsystems,Ramakrishnan,andGehrke,3rdEdition,2014,McGrawHill
ReferenceBooks
1. SilberschatzKorthandSudharshan,DatabaseSystemConcepts,6thEdition,Mc-GrawHill,2013. 2. Coronel,Morris,andRob,DatabasePrinciplesFundamentalsofDesign,ImplementationandManagement, Cengage Learning 2012.
AdditionalStudymaterial&e-Books
http://www.pearsoned.co.in/ramezelmasri/

8.0 RelevantWebsites(ReputedUniversitiesandOthers)for Notes/Animation/Videos Recommended

WebsiteandInternetContentsReferences	
1.	http://www.nptel.ac.in

9.0 Magazines/JournalsUsedandRecommendedtoStudents

Sl.No	Magazines/Journals	Website
1	CSIcommunications	www.csi-india.org

10.0 ExaminationNote

AssessmentDetails(bothCIEandSEE)

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 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE). The student has to secure a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

ContinuousInternalEvaluation(CIE):

CIEmarksforthepracticalcourseis**50Marks**.

Thesplit-upofCIEmarksforrecord/journalandtestareintheratio**60:40**.

- Each experiment to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should containallthe specified experimentsinthe syllabusand eachexperiment write-up willbeevaluated for 10 marks.
- Totalmarksscoredbythestudentsarescaleddownedto30marks(60%ofmaximummarks).
- Weightagetobegivenforneatnessandsubmissionofrecord/write-upontime.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semesterand the second test shall be conducted after the 14th week of the semester.
- Ineachtest,testwrite-up,conductionofexperiment,acceptableresult,andproceduralknowledgewillcarrya weightage of 60% and the rest 40% for viva-voce.
- Thesuitablerubricscanbedesigned toevaluate eachstudent"sperformanceandlearning ability.Rubricssuggestedin Annexure-II of Regulation book
- Theaverageof02testsisscaleddownto20marks(40%ofthemaximummarks).
- The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIEmarks scored by the student.

SemesterEndEvaluation(SEE):

- SEEmarksforthepracticalcourseis50Marks.
- SEEshallbeconductedjointlybythetwoexaminersofthesameinstitute,examinersareappointedbytheUniversity
- Alllaboratoryexperimentsaretobeincludedforpracticalexamination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Studentscanpickonequestion(experiment)fromthequestionslotpreparedbytheinternal/externalexaminers jointly.
- Evaluationoftestwrite-up/conductionprocedureandresult/vivawillbeconductedjointlybyexaminers.
- GeneralrubricssuggestedforSEEarementionedhere,writeup-20%,Conductionprocedureandresultin -60%,Viva- voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- Students can pick one experiment from the questions lot of PART A with an equal choice to all the students in a batch. For PART B, the project group (Maximum of 4 students per batch) should demonstrate the mini-project.
- WeightageofmarksforPART Ais60%and forPART Bis40%.GeneralrubricssuggestedtobefollowedforpartA and part B.
- Change of experiment is allowed onlyonce and Marks allotted to the procedure part to be made zero (Not allowed for Part B).
- ThedurationofSEEis03 hours

11.0 CourseDelivery Plan

Expt. No	Lecture/Practical No	NameoftheExperiment	% Of Portion
		PART-A	
1	1 2	Consider the following schema for a Library Database: BOOK(Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS(Book_id, Author_Name) PUBLISHER(Name, Address, Phone) BOOK_COPIES(Book_id,Programme_id,No-of_Copies) BOOK_LENDING(Book_id,Programme_id,Card_No,Date_Out,Due_Date) LIBRARY_PROGRAMME(Programme_id, Programme_Name, Address) Write SQL queries to:- 1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc. 2. Gettheparticularsofborrowerswhohaveborrowedmorethan3books, but from Jan 2017 to Jun 2017. 3. Deleteabook in BOOKtable.Updatethecontents of othertablesto reflect this data manipulation operation. 4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query. 5. Create a view of all books and its number of copies that are currentlyavailable in the Library.	15
2	3 4	Consider the following schema for Order Database: SALESMAN(Salesman_id, Name, City, Commission) CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id) ORDERS(Ord_No,Purchase_Amt,Ord_Date,Customer_id,Salesman_id) Write SQL queries to 1. CountthecustomerswithgradesaboveBangalore‟saverage. 2. Findthenameandnumbersofallsalesmanwhohadmorethanone customer. 3. Listallthesalesmanandindicatethosewhohaveanddon‟thave customers in their cities (Use UNION operation.) 4. Create a view thatfinds thesalesmanwhohas the customerwith the highest order of a day. 5. DemonstratetheDELETEoperationbyremovingsalesmanwithid 1000. All his orders must also be deleted.	15
3	5 6	ConsidertheschemaforMovieDatabase: ACTOR(Act_id, Act_Name, Act_Gender)DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id,Mov_Title,Mov_Year,Mov_Lang,Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id,Rev_Stars) Write SQL queries to 1. Listthetitlesofallmoviesdirectedby„Hitchcock‟. 2. Find the movie names where one or more actors acted in two or more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. 5. Updateratingofallmoviesdirectedby„StevenSpielberg‟to5.	15
4	7	ConsidertheschemaforCollegeDatabase:	15

	8	STUDENT(USN,SName,Address,Phone,Gender) SEMSEC(SSID, Sem, Sec) CLASS(USN,SSID) SUBJECT(Subcode,Title,Sem,Credits) IAMARKS(USN,Subcode,SSID,Test1,Test2,Test3,FinalIA) Write SQL queries to 1. Listallthestudentdetailsstudyinginfourthsemester,,C"section. 2. Computethetotalnumberofmaleandfemale studentsineachsemester and in each section. 3. CreateaviewofTest1marksofstudentUSN,,1BI15CS101"inall subjects. 4. Calculate the FinalIA (average of best two test marks) and update thecorresponding table for all students. 5. Categorizestudentsbasedonthefollowingcriterion: IfFinalIA=17to20thenCAT=,,Outstanding" If FinalIA = 12 to 16 then CAT = ,,Average" IfFinalIA<12thenCAT=,,Weak" GivethesedetailsonlyfOr8thsemesterA,B,andCsectionstudents.	
5	9 10	ConsidertheschemaforCompanyDatabase: EMPLOYEE(SSN,Name,Address,Sex,Salary,SuperSSN,DNo) DEPARTMENT(DNo, DName, MgrSSN, MgrStartDate) DLOCATION(DNo,DLoc) PROJECT(PNo,PName,PLocation,DNo) WORKS_ON (SSN, PNo, Hours) WriteSQLqueriesto 1. Make a listofallprojectnumbersfor projectsthat involve anemployee whose last name is ,,Scott", either as a worker or as a manager of the department that controls the project. 2. Show the resulting salaries if every employee working on the ,,IoT" project is given a 10 percent raise. 3. Find the sum of the salaries of all employees of the ,,Accounts" department, as well as the maximum salary, the minimum salary, and the average salary in this department. 4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator). 5. For each department that has more than five employees, retrieve the departmentnumber and thenumber of its employeeswhoaremaking morethanRs.6,00,000.	15
PART-B			
6	11 12 13 14	**Mini project:** For any problem selected, make sure that the application should have five or more tables. Indicative areas include: Organization, health care, Ecommerce etc.	25

12.0 QuestionBank

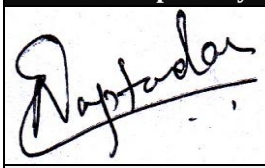
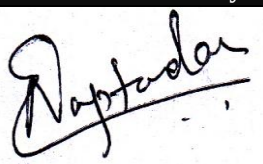
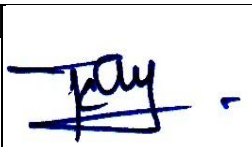
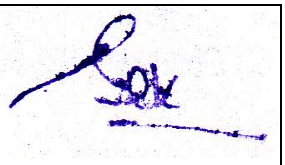
SL. NO.	VivaQuestions
1	Whatisdatabase?WhatisDBMS?
2	WhatisaDatabasesystem?
3	WhyDBMSisnecessary?
4	WhatistheuseofNormalization?
5	WhichS/Wusedforfrontenddesignandbackhanddesign?
6	DisadvantageinFileProcessingSystem?AdvantagesofDBMS.
7	Describethethreelevelsofdataabstractionandhence Data Independence.
8	Definethe"integrityrules".Whatisdataindependence?
9	Whatisaview? Howitisrelatedtodata independence?

10	Whatisdatamodel?Whatisanentity?WhatisE-R model?
11	Whatisanentitytype? Whatisanentity set?
12	Whatisanweakentityset?Whatisarelationschema&arelation?
13	Whatisanattribute?Whatisrelationship?
14	Whatisrelationshipset?Whatisdegreeofrelation?
15	Whatisrelationshiptype?Whatisdegreeofrelationship type?
16	WhatisVDL?WhatisSDL?
17	WhyDBMSisnecessary?
18	WhatistheuseofNormalization?
19	WhatisDMLcompiler?WhatisDDLinterpreter?
20	Whatisqueryevaluationengine?
21	WhatisRecalled-at-a-time?WhatisSet-at-a-timeorset-oriented?
22	Whatisrelationalalgebra?Whatisrelationalcalculus?
23	Howdoestuple-orientedrelationalcalculusdifferfromdomainorientedrelationalcalculus?
24	Whatisnormalization?Whatisfunctionaldependency?
25	Whatis1NF(normalForm),2NF,3NF?
26	WhatisBCNF(Boyce-CoddNormalForm)?Whatis4NF?Whatis5NF?
27	Whatislosslessjoinproperty?Whatisdomain-keynormalform?
28	Whatarepartial,alternate,artificial,compound&naturalkey?
29	Whatissystemcatalogorcatalogrelation?Howisbetterknownas?
30	Whatismeantbyqueryoptimization?Whatdoyoumeanbyflatfiledatabase?
31	WhatisdurabilityinDBMS?Whatis“transparentDBMS”?
32	Whatisacheckpoint&whendoesitoccur?
33	Whatisaquery?Namethesubsystemofa RDBMS?
34	HowdoyoucommunicatewithanRDBMS?
35	DefineSQL&statethedifferencebetweenSQL&otherconventionalprogramminglanguages?
36	Namethethree majorsetoffilesondiskthatcomposeadatabaseinOracle.
37	WhichisthesubsetofSQLcommandsusedtomanipulateOracleDBstructure,includingtables?
38	Whatoperatorperformspatternmatching?Whatoperatortestscolumnfortheabsenceofdata?
39	Whichcommandexecutesthecontentofaspecifiedfile?
40	WhatisparametersubstitutionsymbolusedwithINSERTINTOcommand?
41	WhichcommanddisplaystheSQLcommandintheSQLbuffer,&thenexecutes it?
42	Whatarethewildcardsusedforpatternmatching?
43	Statetrueorfalse.EXISTS,SOME,ANY,areoperatorinSQL.
44	Statetrueorfalse.!=,<>,^=alldenotethesameoperation.
45	Whatareteprivilegesthatcanbegrantedonatablebyauserto others?
46	WhatcommandisusedtogetbacktheprivilegesofferedbytheGRANT command?
47	Whichsystemtablescontaininformationonprivilegesgranted&privilegesobtained?
48	WhatisDMLcompiler?WhatisDDLinterpreter?
49	Whatisqueryevaluationengine?
50	WhatisRecalled-at-a-time?WhatisSet-at-a-timeorset-oriented?
51	Whatisrelationalalgebra?Whatisrelationalcalculus?
52	Howdoestuple-orientedrelationalcalculusdifferfromdomainorientedrelationalcalculus?
53	Whatisnormalization?Whatisfunctionaldependency?
54	Whatis1NF(normalForm),2NF,3NF?
55	WhatisBCNF(Boyce-CoddNormalForm)?Whatis4NF?Whatis5NF?

13.0 UniversityResult

Examination	FCD	FC	SC	%Passing
Mar-2021	36	03	04	100
Feb-2022	46	04	01	100
Feb–2023	52	06	01	100

	SJPNTrust's **HirasugarInstituteofTechnology,Nidasoshi** *InculcatingValues,PromotingProsperity* ApprovedbyAICTE,RecognizedbyGovt.ofKarnatakaandAffiliatedtoVTUBelagavi. **Accreditedat'A'GradebyNAAC** **ProgrammesAccreditedbyNBA:CSE&ECE**	**CSED** **Academics** **CoursePlan** **2023-24(Odd)**

Preparedby	Checkedby		
			
Prof.Aruna.A.Daptardar	**Prof.Aruna.A.Daptardar**	**HOD**	**Principal**