



SJPN Trust's

Hirasugar Institute of Technology, Nidasoshi.

Inculcating Values, Promoting Prosperity

Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi

Recognized under 2(f) & 12B of UGC Act, 1956

Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA:CSE & ECE

Dept. of CSE

Academic

Course Plan

2022-23 (EVEN)

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.*

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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: Understand, 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.

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1.0 Student Help Desk

Sl. No.	Purpose	Contact Person	
		Faculty	Instructor
1	Research Center Coordinator ,Dept. NBA Coordinator Conference / FDP / Workshop, IIC/Internship Coordinator, NBA Criteria1 Coordinator Module Coordinator	Dr. K. B. Manwade	Mr. A. K. Talawar
2	Website Coordinator, Feedback Coordinator, Final year seminar Coordinator, NBA Criteria 4 Coordinator NACC Criteria 3 Co-Coordinator, Module Coordinator	Dr. Mahesh. G. Huddar	Mr. A. K. Badakar
3	Dept. ED Cell Coordinator ,NBA Criteria 6 Coordinator, NAAC Criteria 1 Co-coordinator Module Coordinator, Class Teacher for VII Sem Microprocessor Lab Incharge	Prof. N. K. Honnagoudar	Mr. V. V. Menasi
4	Head of Department, Innovation Club Coordinator AICTE activity point Coordinator, NBA Criteria 7 and 10 Coordinator, Module Coordinator, Project Lab Incharge	Prof. S. V. Manjaragi	Mr. A. R. Bhiste
5	GATE/Pre-placement Coaching Coordinator, Dept. T&P coordinator, NBA Criterion 9 Coordinator NACC Criterion-5 Co-Coordinator, Class Teacher for V Sem	Prof. N. M. Patel	Mr. A. K. Badakar
6	EMS/IA Coordinator, Alumni Coordinator, NBA Criteria 3 Coordinator, NACC Criterion-7 Co-Coordinator, Dept. Time table Coordinator / Meeting Coordinator, Module coordinator	Prof. A. A. Daptardar	Mr. V. V. Menasi
7	Department Association Coordinator (STAC), Technical magazine / Newsletter, Professional body Coordinator (IEEE/ISTE), NBA Criteria 5 Coordinator Web Programming Lab Incharge	Prof. P. G. Patil	Mr. A. K. Talawar
10	Project/KSCST Coordinator, NBA Criteria 2 Coordinator, Class Teacher for III Sem, Computer Center Lab Incharge	Prof. S. I. Mane	Mr. A. R. Bhiste
11	Dept. Library	Mr. A. R. Bhiste	
Institute Level			
12.	Dean Student Welfare Convener	Dr. Mahesh G. Huddar (7411043272)	
13.	Dean Placements	Prof. Pramod. Patil (9731104059)	
14.	Internal Complaint Committee Convener	Prof. S. S. Kamte (9008696825)	
15.	Grievance Redressal Convener	Prof. S. S. Tabhaj (9901398134)	
16.	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.

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2.1 Faculty Position

Sl.No.	Category	No. in Position	Average experience (in years)
1.	Teaching Faculty	08	14.5
2.	Technical Supporting Staff	05	12.6
3.	Helper Staff	03	21

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	Specialization	Professional Membership	Teaching Exp (in yrs)	Phone No.
1	Dr. K. B. Manwade	Assoc. Prof	M. Tech, Ph.D	CSE	LMISTE,CSI	18.00	8412968254
2	Dr. Mahesh G. Huddar	Assoc. Prof	M. Tech, Ph.D	CSE	LMISTE	13.06	7411043272
3	Prof. N. K. Honnagoudar	Asst. Prof.	M.E	ECE	LMISTE	20.00	9449495302
4	Prof. S. V. Manjaragi	Asst. Prof.	M.Tech.(Ph.D)	CSE	LMISTE	19.00	9986658309
5	Prof. A. A. Daptardar	Asst. Prof	M. Tech.	CSE	LMISTE	16.00	9620851002
6	Prof. P. G. Patil	Asst. Prof	M. Tech	CSE	LMISTE,CSI,IE	09.07	9743202717
7	Prof. Sujata Mane	Asst. Prof	M. Tech	CNE	--	08.05	9743202717



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2022-23 (EVEN)

4.0 Institute Academic Calendar


CALENDAR OF EVENTS OF VI SEM FOR THE ACADEMIC YEAR 2022-23 (Even)

Date	Events																																																			
20-03-2023	Commencement of VI Sem	March -2023																																																		
07-04-2023	World Health Day																																																			
14-04-2023	Fire Prevention Day	<table border="1"> <thead> <tr> <th>S</th><th>M</th><th>T</th><th>W</th><th>T</th><th>F</th><th>S</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr> <td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td></tr> <tr> <td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td></tr> <tr> <td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td></tr> <tr> <td>26</td><td>27</td><td>28</td><td>29</td><td>30</td><td>31</td><td></td></tr> </tbody> </table>	S	M	T	W	T	F	S				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									
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26	27	28	29	30	31																																															
20-04-2023 To 22-04-2023	First Internal Assessment for VI Semester & Feedback –I on Teaching-Learning																																																			
22-04-2023	World Earth Day																																																			
25-04-2023	Display & Submission of 1 st Internal Assessment Marks to Office	22- Yugadi																																																		
26-04-2023	World Intellectual Property Day	April -2023																																																		
01-05-23 To 07-05-23	Nutrition Week																																																			
22-05-2023	TECHNOVISION - 23		<table border="1"> <thead> <tr> <th>S</th><th>M</th><th>T</th><th>W</th><th>T</th><th>F</th><th>S</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td>1</td></tr> <tr> <td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr> <tr> <td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td></tr> <tr> <td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td></tr> <tr> <td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td></tr> <tr> <td>30</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	S	M	T	W	T	F	S							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						
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23-05-2023	HSIT QUEST- 23																																																			
24-05-2023	HSIT SAMBRAMA- 23																																																			
25-05-2023	Graduation Day for VIII Sem	04- Mahaveer Jayanti , 07- Good Friday , 14- Ambedkar Jayanti																																																		
01-06-2023 To 03-06-2023	Second Internal Assessment for VI Semester & Feedback –II on Teaching-Learning	May -2023																																																		
05-06-2023	World Environmental Day																																																			
06-06-2023	Display & Submission of 2 nd Internal Assessment Marks to Office																																																			
21-06-2023	International Yoga Day																																																			
03-07-2023 To 05-07-2023	Third Internal Assessment for VI Semester																																																			
01-07-2023 To 07-07-2023	Banamahostava Week	<table border="1"> <thead> <tr> <th>S</th><th>M</th><th>T</th><th>W</th><th>T</th><th>F</th><th>S</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td>1</td><td>2</td><td>3</td></tr> <tr> <td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr> <td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td></tr> <tr> <td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td></tr> <tr> <td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td><td></td></tr> </tbody> </table>	S	M	T	W	T	F	S					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									
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07-07-2023 To 08-07-2023	Lab Internal Assessment																																																			
10-07-2023	Display of Final Internal Assessment Marks	01- May Day (Karmika Dinacharane)																																																		
10-07-2023	Last working day for VI Semester	June -2023																																																		
11-07-2023 To 21-07-2023	Theory Practical Exams																																																			
24-07-2023 To 12-08-2023	Theory Exams																																																			
09-09-2023	Internship (Four Week)																																																			
11-09-2023	Commencement of VII Sem																																																			
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		29-Bakrid																																																		
		July -2023																																																		
		29-Moharam																																																		

Note: Mahaveer Jayanti is on 4.04.2023 instead of 3.04.2023 as per Revised VTU list of Holidays

R.R. Maggavi
21.03.23
IQAC Coordinator
Dr. R.R.Maggavi

S. C. Kamate
21/03/23
Principal
Dr. S. C. Kamate

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5.0 Scheme of Teaching & Examination

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI Scheme of Teaching and Examination 2018 – 19 Choice Based Credit System (CBCS) AND Outcome Based Education (OBE) (Effective from the academic year 2018 – 19)												
VI SEMESTER												
Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination			Credits	
					Theory Lecture	Tutorial	Practical / Drawing	Duration inHours	CIE Marks	SEE Marks		Total Marks
					L	T	P					
1	PCC	18CS61	System Software and Compilers	CS / IS	3	2	--	03	40	60	100	4
2	PCC	18CS62	Computer Graphics and Visualization	CS / IS	3	2	--	03	40	60	100	4
3	PCC	18CS63	Web Technology and Its Applications	CS / IS	3	2	--	03	40	60	100	4
4	PEC	18CS64X	Professional Elective -1	CS / IS	3	--	--	03	40	60	100	3
5	OEC	18CS65X	Open Elective –A	CS / IS	3	--	--	03	40	60	100	3
6	PCC	18CSL66	System Software Laboratory	CS / IS	--	2	2	03	40	60	100	2
7	PCC	18CSL67	Computer Graphics Laboratory with Mini project	CS / IS	--	2	2	03	40	60	100	2
8	MP	18CSMP68	Mobile Application Development	CS / IS	--	--	2	03	40	60	100	2
9	INT	-	Internship	(To be carried out during the intervening vacations of VI and VIIsemesters)			--	--	--	--	--	--
TOTAL					15	10	06	24	320	480	800	24

Note: PCC: Professional core, PEC: Professional Elective, OE: Open Elective, MP: Mini-project, INT: Internship.

Professional Elective -1

Course code under 18XX64X	Course Title
18CS641	Data Mining and Data Warehousing
18CS642	Object Oriented Modeling and Design
18CS643	Cloud Computing and its Applications
18CS644	Advanced JAVA and J2EE
18CS645	System Modeling and Simulation
Open Elective –A (Not for CSE / ISE Programs)	
18CS651	Mobile Application Development
18CS652	Introduction to Data Structures and Algorithms
18CS653	Programming in JAVA
18CS654	Introduction to Operating System



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Students can select any one of the open electives offered by any Department (Please refer to the list of open electives under 18CS65X). Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Adviser/Mentor.

Mini-project work: Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary Mini- project can be assigned to an individual student or to a group having not more than 4 students.

CIE procedure for Mini-project:

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

(ii) **Interdisciplinary:** Continuous Internal Evaluation shall be group wise at the college level with the participation of all the guides of the college. The CIE marks awarded for the Mini-project, shall be based on the evaluation of project report, project presentation skill and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

SEE for Mini-project:

(i) **Single discipline:** Contribution to the Mini-project and the performance of each group member shall be assessed individually in the semester end examination (SEE) conducted at the department.

(ii) **Interdisciplinary:** Contribution to the Mini-project and the performance of each group member shall be assessed individually in semester end examination (SEE) conducted separately at the departments to which the student/s belongs to.

Internship: All the students admitted to III year of BE/B.Tech shall have to undergo mandatory internship of 4 weeks during the vacation of VI and VII semesters and /or VII and VIII semesters. A University examination shall be conducted during VIII semester and the prescribed credit shall be included in VIII semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the internship shall be declared fail and shall have to complete during subsequent University examination after satisfying the internship requirements

AICTE activity Points: In case students fail to earn the prescribed activity Points, Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.



Subject Title	SYSTEM SOFTWARE AND COMPILERS		
Subject Code	18CS61	CIE Marks	40
Number of Lecture Hrs / Week	3:2:0	SEE Marks	60
Total Number of Lecture Hrs	50	Exam Hours	03
CREDITS:04			

FACULTY DETAILS:

Name: Prof. S.V. Manjaragi	Designation: Associate Professor	Experience: 12Yrs
No. of times course taught: 05	Specialization: Computer Engineering	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
1	Computer Science and Engg.	IV	DAA: Graph Theory
2	Computer Science and Engg.	V	ATC: Regular Expressions, CFG
3	Computer Science and Engg.	III	DS: Trees

2.0 Course Objectives

- Define System Software such as Assemblers, Compilers and Loaders
- Familiarize with source file, object file and executable file structures and libraries.
- Describe the front-end and back-end phases of compiler and their importance to Students.

3.0 Course Outcomes

At the end of the course the students should be able to:

COs	Course Outcome	Cognitive Level	POs
CO310.1	Explain system software such as assemblers and Loader	L1-L3	1,2,3,8,10
CO310.2	Apply the fundamental concepts learnt for designing & implementing lexical analysis phase of compiler.	L1-L3	1,2,3,8,10
CO310.3	Apply the concepts studied for designing & Developing Syntax analysis phase.	L1-L3	1,2,3,8,10
CO310.4	Make use of translation techniques learnt for code generation phase.	L1-L3	1,2,3,8,10
CO310.5	Utilize LEX and YACC tools for implementing different concepts of system software.	L1-L3	1,2,3,8,10
Total Hours of instruction		50	

4.0 Course Content

Module-I **10Hrs**

Introduction to System Software, Machine Architecture of SIC and SIC/XE. **Assemblers:** Basic assembler functions, machine dependent assembler features, machine independent assembler features, assembler design options. Basic Loader Functions.

Text book -1: 1.1, 1.2, 1.3.1, 1.3.2, 2.1-2.4, 3.1

Module-II **10Hrs**

Introduction: Language Processors, The structure of a compiler, the evolution of Programming Languages, Applications of Compiler Technology.

Lexical Analysis: The role of Lexical Analyzer, Input buffering, Specifications of token Recognition of tokens.

Text book -2: 1.1 – 1.5,3.1 – 3.4

**Module-III****10Hrs**

Syntax Analysis: Introduction, Context Free Grammars, Writing a grammar, Top-Down Parsers, Bottom-Up Parsers.

Text book-2 : 4.1 - 4.5

Module-IV

LEX and YACC –The Simplest Lex Program, Grammars, Parser-Lexer Communication, A YACC Parser, The Rules Section, Running LEX and YACC, LEX and Hand- Written Lexers, Using LEX - Regular Expression, Examples of Regular Expressions, A Word Counting Program,

Using YACC – Grammars, Recursive Rules, Shift/Reduce Parsing, What YACC Cannot Parse, A YACC Parser The Definition Section, The Rules Section, The LEXER, Compiling and Running a Simple Parser, Arithmetic Expressions and Ambiguity.

Text Book- 3: Chapter 1,2 and 3.

Module-V**10Hrs**

Syntax Directed Translation, Intermediate code generation, Code generation

Text Book-2: 5.1, 5.2, 5.3 , 6.1 , 6.2 , 8.1, 8.2

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	VII	Web Technology	Regular Expressions, Grammars, Translators

6.0 Relevance to Real World

SL.No	Real World Mapping
01	Understanding the working of Assembler, Loader and Compilers etc.
02	Development of a Lexical analyzer, Parser, code generator etc
03	Design and implementing the Compiler for small class of Language of Interest.

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	NPTEL	Topic: Assemblers, Loader, Linker,
02	Slideshare	https://www.slideshare.net/ekeddi/examinable
03	Tutorial	Topic: Parsing, Syntax Directed Translations, Code Generation
04	NPTEL	Topic: Parsing, Code Optimization

8.0 Books Used and Recommended to Students

Text Books	
1.	System Software by Leland. L. Beck, D Manjula, 3rd edition, 2012
2.	Compilers-Principles, Techniques and Tools by Alfred V Aho, Monica S. Lam, RaviSethi, Jeffrey D. Ullman. Pearson, 2nd edition, 2007
3.	Doug Brown, John Levine, Tony Mason, lex & yacc, O'Reilly Media, October 2012.
Reference Books	
1.	Systems programming – Srimanta Pal , Oxford university press, 2016
2.	System programming and Compiler Design, K C Loudon, Cengage Learning
3.	System software and operating system by D. M. Dhamdhare TMG
4.	Compiler Design, K Muneeswaran, Oxford University Press 2013.
Additional Study material & e-Books	
Compiler Design by Dr. O.G. Kakade,	URL: http://turbo51.com/compiler-design



9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References	
1)	https://www.tutorialspoint.com/compiler_design
2)	www.diku.dk/~torbenm/Basics
3)	https://nptel.ac.in/courses/106108052/1
4)	www.sites.tufts.edu/comp181

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	ACM journals	https://www.acm.org/publications
2	IBM journal of Research and Development	http://ieeexplore.ieee.org/xpl/tocresult.jsp?isnumber=5390660

11.0 Examination Note

Internal Assessment: 30+10=40 Marks
 30 marks –from three internal assessment test
 10 marks- from the assignments

Scheme of Evaluation for Internal Assessment (30 Marks)

- a) Internal Assessment test is conducted for 50 marks in the same pattern as that of main exam. Average of all three test marks will be taken and finally scale down to 30 marks.
- b) Assignment marks for each module is 25. Average of 5 assignment marks will be taken and finally scale down to 10 marks.

Question Paper Pattern (IA):

1. Two main questions to be set from syllabus covered up to IA tests.
2. Student has to answer two full main questions and each question carries 25 marks, Total test marks are 50.
 - a. Q. No I or Q. No II = 25 Marks
 - b. Q. No III or Q. No IV = 25 Marks
 - c. Total = 50 Marks**
3. The average marks of three IA will be added with assignment marks and final evaluation will be done for 40 marks.

Question Paper Pattern and instructions (Main Exam):

1. The question paper will have TEN questions.
 2. There will be TWO questions from each module.
 3. Each question will have questions covering all the topics under a module.
 4. The students will have to answer FIVE full questions, selecting ONE full question from each module.
- Max. Marks: 100 and each question carries 20 marks.
 Exam Duration: 3 Hrs.

12.0 Course Delivery Plan

UNITs	Lecture No.	Content of Lecturer	% of Portion
Module-I	1	Introduction to System Software	20
	2	Machine Architecture of SIC and SIC/XE	
	3	Assemblers: Basic assembler functions	
	4	Machine dependent assembler features	
	5	Machine dependent assembler features contd...	
	6	Machine independent assembler features	
	7	Machine independent assembler features contd...	
	8	Assembler design options.	



	9	Assembler design options contd...	
	10	Introduction to Loader, Basic Loader Functions	
Module-II	11	Introduction. Language Processors.	20
	12	The structure of a compiler	
	13	The structure of a compiler Contd...	
	14	The evolution of Programming Languages, Applications of Compiler Technology.	
	15	Lexical Analyzer: The role of Lexical Analyzer	
	16	Alphabets and Tokens in Computer Languages	
	17	Input buffering	
	18	Input buffering Contd...	
	19	Token Specification and Token Recognition	
	20	Token Specification and Token Recognition Cont...	
Module-III	21	Syntax Analysis: Introduction and Therole of Parsers in Compiler,	20
	22	Context Free Grammars	
	23	Writing Grammars	
	24	Top-Down Parsers	
	25	Top-Down Parsers Contd...	
	26	Top-Down Parsers Contd...	
	27	Bottom-Up Parsers	
	28	Bottom-Up Parsers	
	29	Bottom-Up Parsers Contd.....	
	30	Bottom-Up Parsers Contd.....	
Module-IV	31	Introduction to LEX and YACC tools	20
	32	LEX and YACC –The Simplest Lex Program, Grammars, Parser-Lexer Communication.	
	33	A YACC Parser, The Rules Section, Running LEX and YACC	
	34	LEX and Hand- Written Lexers, Using LEX – Regular Expression	
	35	Examples of Regular Expressions, A Word Counting Program	
	36	Using YACC – Grammars, Recursive Rules, Shift/Reduce Parsing	
	37	Shift/Reduce Parsing Contd...	
	38	What YACC Cannot Parse, A YACC Parser The Definition Section	
	39	The Rules Section, The LEXER, Compiling and Running a Simple Parser	
	40	Arithmetic Expressions and Ambiguity	
Module-V	41	Syntax Directed Translation	20
	42	Syntax Directed Translation Contd...	
	43	Syntax Directed Translation Contd...	
	44	Syntax Directed Translation Contd...	
	45	Intermediate code generation.	
	46	Intermediate code generation Contd...	
	47	Intermediate code generation Contd...	
	48	Code generation	
	49	Code generationContd...	
	50	Code generation Contd...	



13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl.No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: Questions on Introduction to System S/W: Assemblers, Loaders	Students have to study the Topics and write the answers: open Test	Module-I of the syllabus	4	Individual Activity. Hand written solution expected.	Text books and class notes.
2	Assignment 2: Questions on Introduction to compiler, Lexical Analysis.	Students have to study the Topics and write the answers: open Test	Module-II of the syllabus	7	Individual Activity. Hand written solution expected.	Text books and class notes.
3	Assignment 3: Questions on Syntax Analysis (Parsers)	Students have to study the Topics and write the Answers(open Test)	Module-III of the syllabus.	10	Individual Activity. Hand written solution expected.	Text books and class notes.
4	Assignment 4: Questions on LEX and LACC tools and Code Generation topics	Students have to study the Topics and write the answers(open Test)	Module-IV and V of the syllabus.	13	Individual Activity. Hand written solution expected.	Text books and class notes.

14.0 QUESTION BANK

Module-I

1	Define system software. Distinguish between system software and application software with examples.(June-2018)
2	Explain in detail the architecture of SIC/XE (Jan-2019)
3	List out registers used in SIC/XE machine architecture along with their use(June-2018)
4	Briefly discuss the various instruction formats available in SIC/XE machine architecture.
5	What are assembles directives? Explain the different types of directives used in SIC machine
6	What are the functions of an assembler?
7	Explain the machine dependent features of an assembler
8	Write an algorithm for pass-1 of two-pass assembler (Jan-2019)
9	Write and explain the pass-2 of two-pass assembler
10	List the various assembler features that are machine-dependent and machine-independent
11	Explain the machine independent features of an assembler.
12	Explain the data structures & pass -1 algorithm of SIC assembler.(June-2018)
14	Explain the basic loader functions.

Module-II

1	Explain the phases of the compiler in detail. Write down the output of each phases for the expression $a = b + c * 50.0$
2	Briefly explain the applications of Compiler Technology.
3	Define and explain the following terms with examples:a) Token b) Pattern c) Lexeme
4	With neat sketch, explain two-buffer scheme for input buffering.
5	Write notes on: Regular expressions
6	Give the regular definition for 1.Unsigned numbers 2. Signed numbers 3.Identifiers
7	Construct a transition diagram for recognizing unsigned numbers. Sketch the program segment to implement it, showing the first two states and one final state
8	Construct a transition diagram for recognizing relational operators. Sketch the program segment to implement it, showing the first two states and one final state
9	What are the advantages of two-buffer scheme with sentinels? Write a program for look ahead code with sentinels.

Module-III

1	What is Parser? Explain the role of parser.
2	List and Explain the error recovery strategies for parser.
3	Consider the Grammar: $S \rightarrow (L) a \quad L \rightarrow L, S S$ Construct the left most derivation for the following sentences :1) (a, a) 2) (a, (a, a))



4	Eliminate left recursion from the grammar: $S \rightarrow aB \mid aC \mid Sd \mid Se$ $B \rightarrow bBc \mid f$ $C \rightarrow g$
5	Given the grammar: $S \rightarrow (L) \mid a$ $L \rightarrow L, S \mid S$ <ul style="list-style-type: none"> • Make necessary changes to make it suitable for LL(1) parsing. • Construct FIRST and FOLLOE sets for Non- terminals. • Construct the predictive parsing table. • Shows the moves made by the predictive parser on the input: (a, (a, a))
6	With neat sketch, Explain the model of a table driven Predictive parser.
7	What is handle pruning? For the grammar $S \rightarrow 0S1 \mid 01$, indicate the handle in each of the following right sentential forms: a) 000111 b) 00S11
8	Give the bottom – up parse for the input string: aaa^*a^{++} and grammar: $S \rightarrow SS+ \mid SS^* \mid a$
9	With suitable grammar examples, explain Shift-Reduce conflicts during Bottom-Up Parsing.
10	Given the grammar: $S \rightarrow L = R \mid R$ $L \rightarrow *R \mid id$ $R \rightarrow L$ a) Obtain the set of Canonical LR(0) items b) Is the grammar SLR(1)?
11	For the grammar: $S \rightarrow SA \mid A$ $A \rightarrow a$ i) Obtain the set of Canonical LR (0) items. ii) Is the grammar SLR(1)?
12	Show that the following grammar: $S \rightarrow AaAb \mid BbBa$ $A \rightarrow \epsilon$ $B \rightarrow \epsilon$ is not SLR (1).

Module-IV

1	With Examples, Explain the structure of LEX program.
2	With Examples, Explain the structure of YACC program
3	What is LEX? Discuss the usage of LEX in Lexical Analyzer generation.
4	Write a LEX program to recognize valid arithmetic expression. Identifiers in the expression could be only integers and operators could be + and *. Count the identifiers & operators present and print them separately.
5	Develop, Implement and Execute a program using YACC tool to recognize all strings ending with b preceded by n a's using the grammar an b (note: input n value)
6	Write YACC program to evaluate arithmetic expression involving operators: +, -, *, and /
7	Write a LEX program to eliminate comment lines in a C program and copy the resulting program into a separate file.
8	Write YACC program to recognize valid identifier, operators and keywords in the given text (C program) file

Module-V





1	What are Synthesized & Inherited Attributes?
2	Explain the concept of Syntax directed definition
3	Consider the CFG given below: $S \rightarrow EN$ $E \rightarrow E+T \mid E-T \mid T$ $T \rightarrow T*F \mid T/F \mid F$ $F \rightarrow (E) \mid digit$ $N \rightarrow ;$ Obtain the SDD for the above grammar. ii) Construct the Parse tree and annotated parse tree for the input string: $5*6+7$
4	Explain the role of Intermediate code generator
5	Obtain the DAG for the expression: $a+a*(b-c)+ (b-c)*d$. Also give the sequence of steps for constructing the same
6	Define a Quadruple. How it is different from Triples.
7	Convert the exp into three address code & Quadruple: $S=(a+b)/(c-d)*(e+f)$
8	Translate the exp: $-(a + b)*(c + d) + (a + b + c)$ into : a) Quadruple b) Triples c) Indirect triples.
9	Construct DAG and three address code for the following expression : $a + a * (b - c) + (b - c) * d$
10	Explain the Role of Code Generator.



11	Discuss the issue in the design of a code generator
12	Write three-address-code for the following program segment. Also construct the basic blocks: sum = 0; For(i = 0; i <=10; i++) sum = sum+a[i];
13	Construct the DAG for the basic block below: d= b*c e= a + b b = b *c a = e-d

15.0 University Result

Examination	S+,S,A	B	C,D,E	% Passing
AUG-2021	25	17	01	100

Course Coordinator	Module Coordinator		
			
Prof. S. V. Manjaragi	Prof. A. A. Daptardar	HOD	Principal



Subject Title	COMPUTER GRAPHICS AND VISUALIZATION		
Subject Code	18CS62	IA Marks	40
Number of Lecture Hrs. / Week	3:2:0	Exam Marks	60
Total Number of Lecture Hrs.	50	Exam Hours	03
CREDITS – 04			

FACULTY DETAILS:

Name: Dr. Mahesh Huddar	Designation: Associate Professor	Experience: 10
No. of times course taught: 06	Specialization: Computer Science and Engineering	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Mathematics (Knowledge of Matrices)	I/II/III/IV	Mathematics-I/II/III/IV
02	C programming	I/II	Programming in C and Data Structures

2.0 Course Objectives

1. Explain hardware, software and OpenGL Graphics Primitives.
2. Illustrate interactive computer graphic using the OpenGL.
3. Design and implementation of algorithms for 2D graphics Primitives and attributes.
4. Demonstrate Geometric transformations, viewing on both 2D and 3D objects.
5. Infer the representation of curves, surfaces, Color and Illumination models

3.0 Course Outcomes

Having successfully completed this course, the student will be able to :

CO	Course Outcome	Cognitive Level	POs
C311.1	Explain hardware, software and OpenGL Graphics Primitives.	L2	PO1, 2,3,5,8,10
C311.2	Illustrate Geometric transformations on both 2D and 3D objects.	L2	PO1,2,3,8,10
C311.3	Apply concepts of clipping, color and Illumination Models in 2D and 3D objects.	L3	PO1, 2,3,5,8,10
C311.4	Apply the concepts of viewing and visible surface detection of 3D objects	L3	PO1, 2,3,5,8,10
C311.5	Explain curve generating concepts and interactive computer graphics using the OpenGL.	L2	PO1,2,3,5,8,10
Total Hours of instruction			50

4.0 Course Content

MODULE-1: Overview: Computer Graphics and OpenGL: Computer Graphics: Basics of computer graphics, Application of Computer Graphics, Video Display Devices: Random Scan and Raster Scan displays, color CRT monitors, Flat panel displays. Raster-scan systems: video controller, raster scan Display processor, graphics workstations and viewing systems, Input devices, graphics networks, graphics on the internet, graphics software. OpenGL: Introduction to OpenGL ,coordinate reference frames, specifying two-dimensional world coordinate reference frames in OpenGL, OpenGL point functions, OpenGL line functions, point attributes, line attributes, curve attributes, OpenGL point attribute functions, OpenGL line attribute functions, Line drawing algorithms(DDA, Bresenham's), circle generation algorithms (Bresenham's).
Text-1:Chapter -1: 1-1 to 1-9,2-1 to 2-9 (Excluding 2-5),3-1 to 3-5,3-9,3-20 **10 Hours**



MODULE-2: Fill area Primitives, 2D Geometric Transformations and 2D viewing: Fill area Primitives: Polygon fill-areas, OpenGL polygon fill area functions, fill area attributes, general scan line polygon fill algorithm, OpenGL fill-area attribute functions. 2D Geometric Transformations: Basic 2D Geometric Transformations, matrix representations and homogeneous coordinates. Inverse transformations, 2D Composite transformations, other 2D transformations, raster methods for geometric transformations, OpenGL raster transformations, OpenGL geometric transformations function, 2D viewing: 2D viewing pipeline, OpenGL 2D viewing functions.

Text-1: Chapter 3-14 to 3-16, 4-9, 4-10, 4-14, 5-1 to 5-7, 5-17, 6-1, 6-4

10 Hours

MODULE-3: Clipping, 3D Geometric Transformations, Color and Illumination Models: Clipping: clipping window, normalization and viewport transformations, clipping algorithms, 2D point clipping, 2D line clipping algorithms: Cohen-Sutherland line clipping only - polygon fill area clipping: Sutherland-Hodgeman polygon clipping algorithm only. 3D Geometric Transformations: 3D translation, rotation, scaling, composite 3D transformations, other 3D transformations, affine transformations, OpenGL geometric transformations functions. Color Models: Properties of light, color models, RGB and CMY color models. Illumination Models: Light sources, basic illumination models - Ambient light, diffuse reflection, specular and Phong model, Corresponding OpenGL functions.

Text-1: Chapter : 6-2 to 6-08 (Excluding 6-4), 5-9 to 5-17 (Excluding 5-15), 12-1, 12-2, 12-4, 12-6, 10-1, 10-3

10 Hours

MODULE-4: 3D Viewing and Visible Surface Detection: 3D Viewing: 3D viewing concepts, 3D viewing pipeline, 3D viewing coordinate parameters, Transformation from world to viewing coordinates, Projection transformation, orthogonal projections, perspective projections, The viewport transformation and 3D screen coordinates. OpenGL 3D viewing functions. Visible Surface Detection Methods: Classification of visible surface Detection algorithms, back face detection, depth buffer method and OpenGL visibility detection functions.

Text-1: Chapter: 7-1 to 7-10 (Excluding 7-7), 9-1 to 9-3, 9-14

10 Hours

MODULE-5: Input & interaction, Curves and Computer Animation: Input and Interaction: Input devices, clients and servers, Display Lists, Display Lists and Modelling, Programming Event Driven Input, Menu Picking, Building Interactive Models, Animating Interactive programs, Design of Interactive programs, Logic operations. Curved surfaces, quadric surfaces, OpenGL Quadric-Surface and Cubic-Surface Functions, Bezier Spline Curves, Bezier surfaces, OpenGL curve functions. Corresponding OpenGL functions.

Text-1: Chapter : 8-3 to 8-6 (Excluding 8-5), 8-9, 8-10, 8-11, 3-8, 8-18, 13-1, 3-2, 13-3, 13-4, 13-10

Text-2: Chapter 3: 3-1 to 3.11: Input & interaction

10 Hours

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	VIII	Project work	Drawings, Part Modeling
02	VII	Game theory	Extensive games: extensions and discussions: iterated games:

6.0 Relevance to Real World

SL.No	Real World Mapping
01	Animated Movies
02	Simulations
03	Development of a software applications

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Animation Videos	Topic: working of Displays, Pinhole Camera, 3D Transformations.



8.0 Books Used and Recommended to Students

Text Books
2. Donald Hearn & Pauline Baker: Computer Graphics with OpenGL Version, 3rd / 4 th Edition, Pearson Education, 2011. 3. Edward Angel: Interactive Computer Graphics- A Top Down approach with OpenGL, 5th edition. Pearson Education, 2008.
Reference Books
1. James D Foley, Andries Van Dam, Steven K Feiner, John F Huges Computer graphics with OpenGL: pearson education 2. Xiang, Plastock : Computer Graphics , sham's outline series, 2nd edition, TMG. 3. Kelvin Sung, Peter Shirley, steven Baer : Interactive Computer Graphics, concepts and applications, Cengage Learning 4. M M Raiker, Computer Graphics using OpenGL, Filip learning/Elsevier
Additional Study material & e-Books
1. Notes Prepared by Staff 2. VTU E-learning notes

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References
1) https://www.youtube.com/watch?v=fwzYuhduME4 2) http://nptel.ac.in/courses/106106090/ 3) http://freevideolectures.com/Course/2664/Introduction-to-Computer-Graphics

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	Website
1	An International Journal of Systems & Applications in Computer Graphics	https://www.journals.elsevier.com/computers-and-graphics/
2	International Journal of Computer Graphics and Animation(IJCGA)	http://aircse.org/journal/ijcga/index.html
3	Journal of Computer Aided Design & Computer Graphics	http://english.ict.cas.cn/sp/200908/t20090819_33259.html

11.0 Examination Note

Internal Assessment: 30+10=40 Marks
 30 marks –from three internal assessment test
 10 marks- from the assignments

Scheme of Evaluation for Internal Assessment (30 Marks)

- a) Internal Assessment test is conducted for 50 marks in the same pattern as that of main exam. Average of all three test marks will be taken and finally scale down to 30 marks.
- b) Assignment marks for each module is 25. Average of 5 assignment marks will be taken and finally scale down to 10 marks.

Question Paper Pattern (IA):

- 1) Two main questions to be set from syllabus covered up to IA tests.
- 2) Student has to answer two full main questions and each question carries 25 marks, Total test marks are 50.
 - a. Q. No I or Q. No II = 25 Marks
 - b. Q. No III or Q. No IV = 25 Marks
 - c. **Total = 50 Marks**
- 3) The average marks of three IA will be added with assignment marks and final evaluation will be done for 40 marks.



Question Paper Pattern and instructions (Main Exam):

1. The question paper will have TEN questions.
 2. There will be TWO questions from each module.
 3. Each question will have questions covering all the topics under a module.
 4. The students will have to answer FIVE full questions, selecting ONE full question from each module.
- Max. Marks: 100 and each question carries 20 marks.
 Exam Duration: 3 Hrs.

INSTRUCTION FOR COMPUTER GRAPHICS AND VISUALIZATION (18CS62) EXAMINATION

Student has to answer 5 full questions choosing at least one question from each module.

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	% of Portion
MODULE 1:	1	Overview: Computer Graphics and OpenGL: Computer Graphics: Basics of computer graphics, Application of Computer Graphics	.2
	2	Video Display Devices: Random Scan and Raster Scan displays	
	3	Color CRT monitors, Flat panel displays. Raster-scan systems:	
	4	Video controller, raster scan Display processor, graphics workstations and viewing systems,	
	5	Input devices, graphics networks, graphics on the internet, graphics software.	
	6	OpenGL: Introduction to OpenGL ,coordinate reference frames,	
	7	Specifying two-dimensional world coordinate reference frames in OpenGL, OpenGL point functions,	
	8	OpenGL line functions, point attributes, line attributes, curve attributes, OpenGL point attribute functions,	
	9	OpenGL line attribute functions, Line drawing algorithms(DDA, Bresenham's),	
	10	Circle generation algorithms (Bresenham's).	
MODULE 2:	11	Fill area Primitives, 2D Geometric Transformations and 2D viewing: Fill area Primitives: Polygon fill-areas,	.2
	12	OpenGL polygon fill area functions,	
	13	Fill area attributes, general scan line polygon fill algorithm,	
	14	OpenGL fill-area attribute functions.	
	15	2D Geometric Transformations: Basic 2D Geometric Transformations, matrix representations and homogeneous coordinates.	
	16	Inverse transformations, 2D Composite transformations,	
	17	Other 2D transformations, raster methods for geometric transformations, OpenGL raster transformations,	
	18	OpenGL geometric transformations function,	
	19	2D viewing: 2D viewing pipeline	
	20	OpenGL 2D viewing functions.	
MODULE 3:	21	Clipping, 3D Geometric Transformations, Color and Illumination Models: Clipping: clipping window, normalization and viewport transformations,	.2
	22	Clipping algorithms, 2D point clipping,	
	23	2D line clipping algorithms: cohen-sutherland line clipping only -polygon fill area clipping:	
	24	Sutherland-Hodgeman polygon clipping algorithm only	
	25	3D Geometric Transformations: 3D translation, rotation,	
	26	Scaling, composite 3D transformations, other 3D transformations,	
	27	Affine transformations, OpenGL geometric transformations functions.	
	28	Color Models: Properties of light, color models, RGB and CMY color models.	
	29	Illumination Models: Light sources, basic illumination models-Ambient light, diffuse reflection,	
	30	Specular and phong model, Corresponding OpenGL functions.	



MODULE 4:	31	3D Viewing and Visible Surface Detection: 3D Viewing: 3D viewing concepts, 3D viewing pipeline.	.2
	32	3D viewing coordinate parameters, Transformation from world to viewing coordinates	
	33	Projection transformation, orthogonal projections, perspective projections	
	34	The viewport transformation and 3D screen coordinates.	
	35	OpenGL 3D viewing functions.	
	36	Visible Surface Detection Methods: Classification of visible surface Detection algorithms,	
	37	Classification of visible surface Detection algorithms,	
	38	Back face detection,	
	39	Depth buffer method	
	40	OpenGL visibility detection functions.	

MODULE 5:	41	Input & interaction, Curves and Computer Animation: Input and Interaction: Input devices	.2
	42	clients and servers, Display Lists, Display Lists and Modelling,	
	43	Programming Event Driven Input, Menus Picking,	
	44	Building Interactive Models,	
	45	Animating Interactive programs, Design of Interactive programs,	
	46	Logic operations. Curved surfaces, quadric surfaces,	
	47	OpenGL Quadric-Surface and Cubic-Surface Functions,	
	48	Bezier Spline Curves,	
	49	Bezier surfaces	
	50	OpenGL curve functions. Corresponding openGL functions.	

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl.No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: Some important expected University Questions on module one and module two	Students study the Topics and write the Answers. Get practice to solve questions.	Module 1,2 of the syllabus	4	Individual Activity. Printed solution expected	Text book
2	Pop Quiz 1: On module three.	Students study the Topics and write the Answers MCQs.	Module 3 of the syllabus	6	Individual Activity. Printed Answers expected	Text book
3	Assignment 2: Some important University Questions on module four and five	Students study the Topics and write the Answers. Get practice to solve questions	Module 4,5 of the syllabus	8	Individual Activity. Printed solution expected	Text book

14.0 QUESTION BANK

MODULE-1

1. Define Computer Graphics. Explain applications of Computer graphics.
2. Describe Computer graphics system with neat diagram.
3. Explain Different graphics architecture.
4. Explain Bresenham's line drawing algorithm with example
5. Explain Bresenham's circle generation algorithm with example.
6. Explain Random Scan and Raster Scan displays.
7. List and explain basic primitives supported by OpenGL.

**MODULE-2**

1. Explain the concept of Vector method for Splitting Concave Polygon.
2. Explain the Scan line polygon fill algorithm with example.
3. Explain rotation, transformation & scaling with respect to 2-dimensions.
4. List all OpenGL Fill area attribute functions and explain any three.
5. Derive the general matrix for 2D pivot point rotation.
6. List all OpenGL geometric transformation functions and explain any three.
7. Explain 2D viewing pipeline.
8. List all OpenGL 2D viewing functions and explain any five.

MODULE-3

1. Derive the matrix for clipping window into normalized viewport.
2. Explain Cohen-Sutherland line clipping algorithm with example.
3. Explain Liang-Barsky line clipping algorithm with example.
4. Explain Sutherland-Hodgman polygon clipping algorithm with example.
5. Explain Weiler-Atherton polygon clipping with example.
6. List the basic transformations in 3D and explain with example.
7. List all OpenGL 3D geometric transformation functions and explain any five.

MODULE-4





1. Explain 3D viewing concept.
2. Explain 3D viewing pipeline with suitable sketch.
3. Derive the transformation matrix for world to viewing coordinates.
4. Explain orthogonal projection.
5. Explain perspective projection.
6. List all OpenGL 3D viewing functions and explain any four.
7. Explain depth buffer algorithm with example.
8. List all OpenGL visibility detection functions and explain any three.

MODULE-5

1. List and explain OpenGL quadric surface and cubic surface functions.
2. Explain cubic spline interpolation methods.
3. Write OpenGL program for Bezier curve generation.
4. Explain raster methods for computer animation.
5. List all Logical input devices and explain.
6. Explain different input modes.
7. Explain Picking concept.
8. Explain double buffering in OpenGL.

15.0 University Result

Examination	FCD	FC	SC	FAIL	Pass %
2022 July	17	19	14	01	98.03

Prepared by	Checked by		
			
Dr. Mahesh Huddar	Dr. Mahesh Huddar	HOD	Principal



Subject Title	WEB TECHNOLOGY AND ITS APPLICATIONS		
Subject Code	18CS63	IA Marks	40
Number of Lecture Hrs / Week	3:2:0	Exam Marks	60
Total Number of Lecture Hrs	50	Exam Hours	03
CREDITS – 04			

FACULTY DETAILS:

Name: Prof. A. A. Daptardar	Designation: Assistant Professor	Experience: 16 Years
No. of times course taught: 02	Specialization: Computer Science and Engineering	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Computer Science and Engineering	I/II/III	Programming in C & Data Structure
02	Computer Science and Engineering	IV	Java Programming
03	Computer Science and Engineering	V	Data Base Management System

2.0 Course Objectives

This course will enable students to

1. Illustrate the Semantic Structure of HTML and CSS
2. Compose forms and tables using HTML and CSS
3. Design Client-Side programs using JavaScript and Server-Side programs using PHP
4. Infer Object Oriented Programming capabilities of PHP
5. Examine JavaScript frameworks such as jQuery and Backbone

3.0 Course Outcomes

After studying this course, students will be able to

CO	Course Outcome	RBT Level	POs
C312.1	Adapt HTML and CSS syntax and semantics to build web pages.	L1, L2, L3	P1-P3, P5, P8, P10, P12
C312.2	Construct and visually format tables and forms using HTML and CSS	L1, L2, L3	P1-P3, P5, P8, P10, P12
C312.3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically	L1, L2, L3	P1-P3, P5, P8, P10, P12
C312.4	Appraise the principles of object oriented development using PHP	L1, L2, L3	P1-P3, P5, P8, P10, P12
C312.5	Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.	L1, L2, L3	P1-P3, P5, P8, P10, P12

4.0 Course Content

Module 1

10 Hours

Introduction to HTML, What is HTML and where did it come from? HTML Syntax, Semantic Markup, Structure of HTML Documents, Quick Tour of HTML Elements, HTML5 Semantic Structure Elements, Introduction to CSS, What is CSS, CSS Syntax, Location of Styles, Selectors, The Cascade: How Styles Interact, The Box Model, CSS Text Styling.

**Module 2****10 Hours**

HTML Tables and Forms, Introducing Tables, Styling Tables, Introducing Forms, Form Control Elements, Table and Form Accessibility, Micro formats, Advanced CSS: Layout, Normal Flow, Positioning Elements, Floating Elements, Constructing Multicolumn Layouts Approaches to CSS Layout, Responsive Design, CSS Frameworks.

Module 3**10 Hours**

JavaScript: Client-Side Scripting, What is JavaScript and What can it do?, JavaScript Design Principles, Where does JavaScript Go?, Syntax, JavaScript Objects, The Document Object Model (DOM), JavaScript Events, Forms, Introduction to Server-Side Development with PHP, What is Server-Side Development, A Web Server's Responsibilities, Quick Tour of PHP, Program Control, Functions

Module 4**10 Hours**

PHP Arrays and Superglobals, Arrays, \$_GET and \$_POST Superglobal Arrays, \$_SERVER Array, \$_FILES Array, Reading/Writing Files, PHP Classes and Objects, Object-Oriented Overview, Classes and Objects in PHP, Object Oriented Design, Error Handling and Validation, What are Errors and Exceptions?, PHP Error Reporting, PHP Error and Exception Handling

Module 5**10 Hours**

Managing State, The Problem of State in Web Applications, Passing Information via Query Strings, Passing Information via the URL Path, Cookies, Serialization, Session State, HTML5 Web Storage, Caching, Advanced JavaScript and jQuery, JavaScript Pseudo-Classes, jQuery Foundations, AJAX, Asynchronous File Transmission, Animation, Backbone MVC Frameworks, XML Processing and Web Services, XML Processing, JSON, Overview of Web Services.

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	VII	Project work	Academics Mini Projects
02	VIII	Project work	Academics Project

6.0 Relevance to Real World

SL. No.	Real World Mapping
01	Development of Web-Based applications
02	Development of Database applications

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Tutorial	Web Technologies
02	NPTEL	Web Applications

8.0 Books Used and Recommended to Students

Text Books	
1.	Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 1 st Edition, Pearson Education India. (ISBN:978-9332575271)
Reference Books	
1.	Robin Nixon, "Learning PHP, MySQL & JavaScript with jQuery, CSS and HTML5", 4 th Edition, O'Reilly Publications, 2015. (ISBN:978-9352130153)
2.	Luke Welling, Laura Thomson, "PHP and MySQL Web Development", 5 th Edition, Pearson Education, 2016. (ISBN:978-9332582736)
3.	Nicholas C Zakas, "Professional JavaScript for Web Developers", 3 rd Edition, Wrox/Wiley India, 2012. (ISBN:978-8126535088)
4.	David Sawyer Mcfarland, "JavaScript & jQuery: The Missing Manual", 1 st Edition, O'Reilly/Shroff Publishers & Distributors Pvt Ltd, 2014



Additional Study material & e-Books	
1.	http://www.pearsonglobaleditions.com/connolly
2.	https://www.w3schools.com/html/html5_intro.asp
3.	https://www.w3schools.com/css/
4.	https://www.w3schools.com/jS/default.asp
5.	https://www.w3schools.com/pHP/default.asp
6.	https://getbootstrap.com/
7.	https://www.apachefriends.org/index.html
8.	https://www.w3schools.com/xml/
9.	https://www.w3schools.com/xml/ajax_intro.asp
10.	https://jquery.com/

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References	
1.	http://www.pearsonglobaleditions.com/connolly
2.	https://www.coursera.org/
3.	https://swayam.gov.in/
4.	https://nptel.ac.in/
5.	https://www.udemy.com/
6.	https://www.mooc.org/
7.	https://www.coursera.org/

10.0 Magazines/Journals Used and Recommended to Students

Sl. No	Magazines/Journals	website
1	CSI communications	www.csi-india.org

11.0 Examination Note

Mandatory Note:

Distribution of CIE Marks is as follows (Total 40Marks):

- 20MarksthroughIA Tests
- 20Marksthroughpracticalassessment

Maintain a copy of their port for verification during LIC visit.

Internal Assessment: 20+20=40 Marks

20 Marks - from Three Internal Assessment Test

20 Marks - from the Practical Assessment

Scheme of Evaluation for Internal Assessment (20 Marks)

a) Internal Assessment test in the same pattern as that of the main examination (Average of the three Tests): 20 Marks

Internal Assessment Question Paper Pattern (IA):

1. Two main questions to be set from syllabus covered up to IA tests.
2. Student has to answer two full main questions and each question carries 25 marks, Total test marks are 50.
 - a. Q.No I or Q.No II = 25 Marks
 - b. Q.No III or Q.No IV = 25Marks
 - c. **Total = 50 Marks**

Question Paper Pattern and instructions for Main Exam

1. The question paper will have ten questions
2. Each full Question consisting of 20 marks
3. There will be 2 full questions (with a maximum of four sub questions) from each module
4. Each full question will have sub questions covering all the topics under a module
5. The students will have to answer 5 full questions, selecting one full question from each module



12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	% of Portion
1	1	Introduction to HTML, What is HTML and where did it come from?	20
	2	HTML Syntax, Semantic Markup, Structure of HTML Documents,	
	3	Quick Tour of HTML Elements,	
	4	HTML5 Semantic Structure Elements,	
	5	Introduction to CSS, What is CSS,	
	6	CSS Syntax,	
	7	Location of Styles,	
	8	Selectors	
	9	The Cascade: How Styles Interact,	
	10	The Box Model, CSS Text Styling	
2	11	HTML Tables and Forms,	20
	12	Introducing Tables, Styling Tables,	
	13	Introducing Forms, Form Control Elements,	
	14	Table and Form Accessibility,	
	15	Micro formats,	
	16	Advanced CSS: Layout, Normal Flow,	
	17	Positioning Elements, Floating Elements,	
	18	Constructing Multicolumn Layouts Approaches to CSS Layout,	
	19	Responsive Design,	
	20	CSS Frameworks.	
3	21	JavaScript: Client-Side Scripting,	20
	22	What is JavaScript and What can it do?	
	23	JavaScript Design Principles,	
	24	Where does JavaScript Go?, Syntax, JavaScript Objects,	
	25	The Document Object Model (DOM),	
	26	JavaScript Events, Forms,	
	27	Introduction to Server-Side Development with PHP,	
	28	What is Server-Side Development,	
	29	A Web Server's Responsibilities,	
	30	Quick Tour of PHP, Program Control, Functions	
4	31	PHP Arrays and Superglobals, Arrays,	20
	32	\$_GET and \$_POST Superglobal Arrays,	
	33	\$_SERVER Array, \$_FILES Array,	
	34	Reading/Writing Files,	
	35	PHP Classes and Objects,	
	36	Object-Oriented Overview,	
	37	Classes and Objects in PHP,	
	38	Object Oriented Design,	
	39	Error Handling and Validation, What are Errors and Exceptions?,	
	40	PHP Error Reporting, PHP Error and Exception Handling	
5	41	Managing State, The Problem of State in Web Applications,	20
	42	Passing Information via Query Strings,	
	43	Passing Information via the URL Path,	
	44	Cookies, Serialization, Session State,	
	45	HTML5 Web Storage, Caching,	
	46	Advanced JavaScript and jQuery,	
	47	JavaScript Pseudo-Classes, jQuery Foundations,	
	48	AJAX, Asynchronous File Transmission,	
	49	Animation, Backbone MVC Frameworks,	
	50	XML Processing and Web Services, XML Processing, JSON, Overview of Web Services.	



13.0 POSSIBLE LIST OF PRACTICAL'S

1. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.
2. Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.
3. Write a JavaScript code that displays text "TEXT-GROWING" with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays "TEXT-SHRINKING" in BLUE color. Then the font size decreases to 5pt.
4. Develop and demonstrate a HTML5 file that includes JavaScript script that uses functions for the following problems:
 - a. Parameter: A string
 - b. Output: The position in the string of the left-most vowel
 - c. Parameter: A number
 - d. Output: The number with its digits in the reverse order
5. Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, and Name of the College, Branch, Year of Joining, and email id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
6. Write a PHP program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.
7. Write a PHP program to display a digital clock which displays the current time of the server.
8. Write the PHP programs to do the following:
 - a. Implement simple calculator operations.
 - b. Find the transpose of a matrix.
 - c. Multiplication of two matrices.
 - d. Addition of two matrices.
9. Write a PHP program named states.py that declares variable states with value "Mississippi Alabama Texas Massachusetts Kansas". write a PHP program that does the following:
 - a. Search for a word in variable states that ends in xas. Store this word in element 0 of a list named statesList.
 - b. Search for a word in states that begins with k and ends in s. Perform a case insensitive comparison. [Note: Passing re.I as a second parameter to method compile performs a case-insensitive comparison.] Store this word in element1 of statesList.
 - c. Search for a word in states that begins with M and ends in s. Store this word in element 2 of the list.
 - d. Search for a word in states that ends in a. Store this word in element 3 of the list.
10. Write a PHP program to sort the student records which are stored in the database using selection sort.

14.0 QUESTION BANK

MODULE - 1 INTRODUCTION TO HTML, INTRODUCTION TO CSS

1. What is the difference between unordered lists and ordered lists?
2. Why is semantic structure so important for HTML?
3. What role does W3C play in the implementation of XHTML?
4. What are the three main aims of HTML5?
5. What are nested HTML elements?
6. What is semantic markup? Why is it important?
7. What is the difference between <p> and the <div> element? In what context should one use the one over other?
8. Describe the difference between a relative and an absolute reference. When should each be used?
9. What are the advantages of using the new HTML5 semantic elements? Disadvantages?
10. What is a CSS selector?
11. Compare the approach the W3C has used with CSS3 in comparison to CSS2.1.
12. What are inline styles?
13. What is the difference between a relative and an absolute measure unit in CSS? Why are relative units preferred over absolute units in CSS?
14. What is an element selector and a grouped element selector? Provide an example of each.
15. What are class selectors? What are id selectors? Briefly discuss why you would use one over the other.
16. What are contextual selectors? Identify the four different contextual selectors.
17. Explain the concept of the Document Object Model. What are they commonly used for?



18. What does the location of styles refer to?
19. What are the three cascade principles used by browsers when style rules conflict? Briefly describe each.
20. Illustrate the CSS box model. Be sure to label each of the components of the box.
21. What is specificity? Why are they necessary?
22. Briefly explain the history of markup languages. [DEC-2018]
23. Write a note on XHTML and HTML5. [DEC-2018]
24. Explain- i) <a> ii) iii) <p> iv) <div> elements with examples. [DEC-2018]
25. With an example explain different levels of style sheets. [DEC-2018]
26. List the different selectors available in CSS and explain in detail. [DEC-2018]

MODULE – 2 HTML TABLES & FORMS, ADVANCED CSS

1. What are the elements used to define the structure of an HTML table?
2. Describe the purpose of a table caption and the table heading elements.
3. What are <tr> and <td> tags?
4. Create a table that correctly uses the caption, thead, tfoot, and tbody elements. Briefly discuss the role of each of these elements.
5. What is the disadvantage of using tables for markup?
6. What is the difference between datetime and datetime-local?
7. What is a form?
8. What is a text input control?
9. What are the two different ways of passing information via the URL?
10. What is the purpose of the action attribute?
11. In what situation would you use a radio button? A checkbox?
12. What are some of the main additions to form construction in HTML5?
13. What is an hCard?
14. What are microformats? What is their purpose?
15. What is the difference between replaced inline elements and nonreplaced inline elements?
16. What is normal flow in the context of CSS?
17. Describe how block-level elements are different from inline elements. Be sure to describe the two different types of inline elements.
18. In CSS, what does floating an element do? How do you float an element?
19. In CSS positioning, the concept of positioning context is important. What is it and how does it affect positioning? Provide an example of how positioning context might affect the positioning of an element.
20. Briefly describe the two ways to construct multicolumn layouts in CSS.
21. Write the CSS and HTML to create a two-column layout using positioning and floating.
22. Briefly describe the role of CSS media queries.
23. What is viewport? Why is it important?
24. What are the advantages and disadvantages of using a CSS framework?
25. Explain the role of grid systems in the creation of multicolumn layouts.
27. Explain different form widgets created with the <input> tag. [DEC-2018]
28. Write HTML code for VTU college academic time table. [DEC-2018]
29. Discuss the difference between relative and absolute positioning. [DEC-2018]
30. What does floating an element do in CSS? How do you float an element? [DEC-2018]

MODULE-3 JAVASCRIPT: CLIENT SIDE SCRIPTING, Introduction to Server-Side Development with PHP

1. What is an applet?
2. Discuss the advantages and disadvantages of client-side scripting.
3. How is a browser plug-in different from a browser extension?
4. How do AJAX requests differ from normal requests in the HTTP request-response loop?
5. What are software layers, and what benefit do they provide?
6. What are some reasons a user might have JavaScript disabled?
7. What kind of variable typing is used in JavaScript? What benefits and dangers arise from this?
8. Why is embedded JavaScript used? What is the disadvantage of using embedded JavaScript?
9. Compare graceful degradation with progressive enhancement.
10. What are the different ways in which JavaScript can be linked to an HTML page?
11. How does one access a particular HTML tag through JavaScript?
12. What is the use of functions in JavaScript?
13. When should one use a try-catch block?
14. Name some common software design layers.



15. In the LAMP stack, what software is responsible for responding to HTTP requests?
16. Describe the ASP.NET framework.
17. Identify and briefly describe at least four different server-side development technologies.
18. Describe the difference between the multi-threaded and multi-process setup of PHP in Apache.
19. Describe the steps taken by the Zend Engine when it receives a PHP request.
20. What does it mean that JSP is a cross-platform technology?
21. What are server-side include files? Why are they important in PHP?
22. Can Apache support the multi-threaded mode? Why is a thread advantageous?
23. How does PHP allow variable names to be specified at run-time? Explain with an example.
24. How are parameters passed by reference different than those passed by value?
25. Discuss the advantages and disadvantages of client side scripting. **[DEC-2018]**
26. Write a JavaScript code that displays text "VTU BELAGAVI" with increasing font size in the interval of 100ms in blue color, when the font reaches 50pt it should stop. **[DEC-2018]**
27. With a neat diagram, explain client and server script execution. **[DEC-2018]**
28. Write a PHP program to greet the user based on time. **[DEC-2018]**

MODULE - 4 PHP ARRAYS & SUPERGLOBALS, PHP CLASSES & OBJECTS, ERROR HANDLING & VALIDATION

1. Explain how an array acts as an ordered map in PHP.
2. What are superglobal variables?
3. Explain the process of sanitizing user inputs.
4. Describe the relationship between keys and indexes in arrays.
5. What are the different types of in-memory file functions?
6. Are arrays sorted by key or by value, or not at all?
7. How would you get a random element from an array?
8. What does urlencode() do? How is it "undone"?
9. What information is uploaded along with a file?
10. How do you read or write a file on the server from PHP?
11. List and briefly describe the ways you can limit the types and size of file uploaded?
12. What classes of information are available via the \$_SERVER superglobal array?
13. Describe why hidden form fields can easily be forged / changed by an end user.
14. What is a static variable and how does it differ from a regular one?
15. What are the three access modifiers?
16. What is a class?
17. Explain the role of an interface in object oriented programming.
18. Describe the concept of dynamic dispatching.
19. What are the advantages of inheritance?
20. When is the determination made as to which version of a method to call? Compile time or run time.
21. What are the three error reporting flags? How are expected errors different from warnings?
22. What is the role of error reporting in PHP? How should it differ for development sites compared to production sites?
23. Discuss the trade-offs between procedural and object-oriented exception handling.
24. Describe the different error_reporting constants.
25. Explain \$_GET and \$_POST superglobal arrays. **[DEC-2018]**
26. How do you read or write a file on the server from PHP? Give example. **[DEC-2018]**
27. Write a PHP program to create a class STUDENT with the following specifications-
Data members- Name, Roll Number, Average Marks
Member functions- Read(getters) and Write(setters)
Use the above specifications to read and print the information of 2 students. **[DEC-2018]**
28. How do you achieve data encapsulation in PHP? Give example. **[DEC-2018]**

MODULE – 5 MANAGING STATE, ADVANCED JAVASCRIPT & JQUERY, XML PROCESSING & WEB SERVICES

1. How can we pass information in HTTP?
2. What are the different types of global web storage objects? What is their purpose?
3. Describe the use of URL rewriting.
4. What is the difference between session cookies and persistent cookies? How does the browser know which type of cookie to create?
5. Describe the best practices for using persistent cookies.
6. What is web storage in HTML5? How does it differ from HTTP cookies?



7. What is the httpOnly cookie?
8. Describe the two models for page caching.
9. In PHP, how are sessions stored between requests?
10. How does object serialization relate to stored sessions in PHP?
11. What is web farm? What issues do they create for session state management?
12. What is caching in the context of web applications? What benefit does it provide?
13. What is the difference between page output caching and application data caching?
14. Why are prototypes more efficient than other techniques for creating classes in JavaScript?
15. How can an object be instantiated using the concept of object literals?
16. What does \$() shorthand stand for in jQuery?
17. Write a jQuery selector to get all the <p> that contain the word "hello"?
18. jQuery extends the CSS syntax for selectors. Explain what that mean.
19. How can we ensure jQuery loads, even if the CDN is down?
20. How would you change the text color of all the <a> tags in jQuery (one line)?
21. What is the difference between the append () and appendTo() methods?
22. What are the advantages of using asynchronous requests over traditional synchronous once?
23. What are the two techniques for AJAX file upload?
24. What are the commonly used animations in jQuery?
25. What is Cross-Origin-Resource-Sharing (CORS)?
26. How collections and views are useful?
27. What is well-formedness and validity in the context of XML? How do they differ?
28. What is XPath? How can it be used in web development?
29. What are the in-memory and the event approaches to XML processing? How do they differ? What are some examples of each approach in PHP?
30. Discuss the merits and drawbacks of SOAP and REST based web services and for XML versus JSON as a REST data format.
31. What are HTTP cookies? How do you handle them in PHP? [DEC-2018]
32. Why state is a problem for web applications? Explain. [DEC-2018]
33. What does \$() short and stand for in JQuery? Explain any 3 JQuery form selectors. [DEC-2018]

15.0 University Result

Examination	FCD	FC	SC	% Passing
Jul-2021	36	07	00	100
Aug-2022	13	15	20	94.11

Prepared by	Checked by		
Prof. A. A. Daptardar	Prof. S. V. Manjaragi	HOD	Principal



Subject Title	DATA MINING AND DATA WAREHOUSING		
Subject Code	18CS641	IA Marks	40
Number of Lecture Hrs / Week	03	Exam Marks	60
Total Number of Lecture Hrs	40	Exam Hours	03
Credits-03			

FACULTY DETAILS:

Name: Dr. K. B. Manwade	Designation: Associate Professor	Experience: 18 years
No. of times course taught: 03	Specialization: Computer Science and Engineering	

1.0 Prerequisite Subjects

Sl. No	Branch	Semester	Subject
01	Students must have the basic knowledge of mathematics.	III & IV	Engineering Mathematics
02	Students must have the basic knowledge of algorithms.	IV	Design and analysis of Algorithms
03	Students must have the basic knowledge of DBMS	V	Database Management System

2.0 Course Objectives

Course objectives: This course will enable students to

1. Define data warehouse, its operations and multi-dimensional data models.
2. Study data warehouse operations and data mining tasks.
3. Study association rule, its terminologies and algorithms.
4. Study classification concept, algorithms and its applications.
5. Study clustering concept, algorithms and its applications.

3.0 Course Outcomes

After studying this course, students will be able to

CO	Course Outcome	Cognitive Level	POs
C313.1	Explain data warehouse and multi-dimensional data models.	L2	PO1,PO2,PO3,PO8,PO10,PO12
C313.2	Explain various operations on data warehouse and data models.	L2	PO1,PO2,PO3,PO8,PO10,PO12
C313.3	Apply concept, algorithms and applications of association rules for solving data mining problems.	L3	PO1,PO2,PO3,PO8,PO10,PO12
C313.4	Apply concept, algorithms and applications of classifications for solving data mining problems.	L3	PO1,PO2,PO3,PO8,PO10,PO12
C313.5	Apply concept, algorithms and applications clustering for solving data mining problems.	L3	PO1,PO2,PO3,PO8,PO10,PO12
Total Hours of instruction		40	

4.0 Course Content

MODULE – 1

08Hours

Data Warehousing & Modeling: Basic Concepts: Data Warehousing: A multitier Architecture, Data warehouse models: Enterprise warehouse, Data mart and virtual warehouse, Extraction, Transformation and loading. Data Cube: A multidimensional data model, Stars, Snowflakes and Fact constellations: Schemas for multidimensional Data models,



Dimensions: The role of concept Hierarchies, Measures: Their Categorization and computation, Typical OLAP Operations.
MODULE -2 **08Hours**

Data warehouse implementation & Data mining: Efficient Data Cube computation: An overview, Indexing OLAP Data: Bitmap index and join index, Efficient processing of OLAP Queries, OLAP server Architecture ROLAP versus MOLAP Versus HOLAP.: Introduction: What is data mining, Challenges, Data Mining Tasks, Data: Types of Data, Data Quality, Data Preprocessing, Measures of Similarity and Dissimilarity.

MODULE- 3 **08Hours**

Association Analysis: Association Analysis: Problem Definition, Frequent Item set Generation, Rule generation. Alternative Methods for Generating Frequent Item sets, FP-Growth Algorithm, Evaluation of Association Patterns.

MODULE- 4 **08Hours**

Classification: Decision Trees Induction, Method for Comparing Classifiers, Rule Based Classifiers, Nearest Neighbor Classifiers, Bayesian Classifiers.

MODULE -5 **08Hours**

Clustering Analysis: Overview, K-Means, Agglomerative Hierarchical Clustering, DBSCAN, Cluster Evaluation, Density-Based Clustering, Graph-Based Clustering, Scalable Clustering Algorithms.

5.0 Relevance to future subjects

Sl. No	Semester	Subject	Topics
01	VII	Machine Learning	Association rules, Classification & Clustering
02	VIII	Project work	One can use Classification & Clustering Analysis for data mining Projects

6.0 Relevance to Real World

Sl. No	Real World Mapping
01	Different projects on data mining, AI and Machine Learning.

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	NPTEL	DATA MINING AND DATA WAREHOUSING videos

8.0 Books Used and Recommended to Students

Text Books	
1.	Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining , Pearson, First impression, 2014.
2.	Jiawei Han, Micheline Kamber, Jian Pei: Data Mining -Concepts and Techniques , 3 rd Edition, Morgan Kaufmann Publisher, 2012.
Reference Books	
1.	Sam Anahory, Dennis Murray: Data Warehousing in the Real World , Pearson, Tenth Impression, 2012.
2.	Michael.J.Berry, Gordon.S.Linoff: Mastering Data Mining , Wiley Edition, second edition, 2012.
Additional Study material & e-Books	
1.	Data warehouse and data mining- Rai Technology university - e-books
2.	Data Warehousing and Mining - Department of Higher Education Open University. Mysore
3.	Data warehousing and data mining - CSE, IIT Bombay
4.	Data Mining - The Textbook Charu C. Aggarwal Springer



9.0

Relevant Websites (Reputed Universities and Others) for Notes /Animation / Videos Recommended

Website and Internet Contents References

- <https://www.cse.iitb.ac.in/infolab/Data/Talks/krihi-talk-impact.ppt>
- <http://www.oddbms.org/2015/06/free-data-mining-ebooks/>
- <https://www.dei.unipd.it/~capri/SI/MATERIALE/DWDM0405.pdf>
- https://www.MSIT_116C_Data_Warehousing_and_Data_Mining.pdf

10.0

Magazines/Journals Used and Recommended to Students

Sl. No	Magazines/Journals	Website
1	IEEE and Springer Transactions on Knowledge and Data Engineering	http://ieeexplore.ieee.org/ http://www.springer.com/computer/database+management
2.	ACM Transactions on Intelligent Systems and Technology (TIST)	https://tist.acm.org/

11.0

Examination Note

Mandatory Note:

Distribution of CIE Marks is as follows (Total 40Marks):

- 20MarksthroughIA Tests
- 20Marksthroughpracticalassessment

Maintain a copy of their port for verification during LIC visit.

Internal Assessment: 20+20=40 Marks

20 Marks - from Three Internal Assessment Test

20 Marks - from the Practical Assessment

Scheme of Evaluation for Internal Assessment (20 Marks)

b) Internal Assessment test in the same pattern as that of the main examination (Average of the three Tests): 20 Marks

Internal Assessment Question Paper Pattern (IA):

- Two main questions to be set from syllabus covered up to IA tests.
- Student has to answer two full main questions and each question carries 25 marks, Total test marks are 50.
 - Q.No I or Q.No II = 25 Marks
 - Q.No III or Q.No IV = 25Marks
 - Total = 50 Marks**

Question Paper Pattern and instructions for Main Exam

- The question paper will have ten questions
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module
- Each full question will have sub questions covering all the topics under a module
- The students will have to answer 5 full questions, selecting one full question from each module

12.0

Course Delivery Plan

Module	Lecture No.	Content of Lecturer	% of Portion
1	1	Basic Concepts: Difference between Operational Database systems and Data warehouse.	20
	2	Data Warehousing: A multitier Architecture.	
	3	Data warehouse models: Enterprise warehouse, Data mart and virtual warehouse, Extraction, Transformation and loading.	
	4	Data Cube: A multidimensional data model Stars.	
	5	Snowflakes and Fact constellations: Schemas for multidimensional Data models.	
	6	Dimensions: The role of concept Hierarchies.	



	7	Measures: Their Categorization and computation.	
	8	Typical OLAP Operations.	
2	1	Efficient Data Cube computation: An overview.	20
	2	Indexing OLAP Data: Bitmap index and join index.	
	3	Efficient processing of OLAP Queries.	
	4	OLAP server Architecture.	
	5	ROLAP versus MOLAP versus HOLAP.	
	6	Introduction: What is data mining, Challenges, Data Mining Tasks.	
	7	Data: Types of Data, Data Quality, Data Preprocessing.	
	8	Measures of Similarity and Dissimilarity.	
3	1	Association Analysis: Problem Definition.	20
	2	Frequent Item set Generation.	
	3	Rule generation.	
	4	Alternative Methods for Generating Frequent Item sets.	
	5	Continued...	
	6	FP-Growth Algorithm.	
	7	Evaluation of Association Patterns.	
	8	Continued...	
4	1	Decision Trees Induction.	20
	2	Decision Trees Induction.	
	3	Method for Comparing Classifiers.	
	4	Method for Comparing Classifiers.	
	5	Rule Based Classifiers.	
	6	Nearest Neighbor Classifiers.	
	7	Bayesian Classifiers.	
	8	Continued...	
5	1	Clustering Analysis: Overview	20
	2	K-Means.	
	3	Agglomerative Hierarchical Clustering.	
	4	DBSCAN.	
	5	Cluster Evaluation.	
	6	Density-Based Clustering.	
	7	Graph-Based Clustering.	
	8	Scalable Clustering Algorithms.	

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl. No	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions on Module-I	Students study the Topics and write the Answers. Get practice to solve university questions.	Module I of the syllabus	2	Individual Activity.	Text Book of the reference list. Website of the Reference list
2	Assignment 2: University Questions on Module -II	Students study the Topics and write the Answers. Get practice to solve university questions.	Module II of the syllabus	4	Individual Activity.	Text Book of the reference list. Website of the Reference list
3	Assignment 3: University Questions on Module -III	Students study the Topics and write the Answers. Get practice to solve university questions.	Module III of the syllabus	6	Individual Activity.	Text Book of the reference list. Website of the Reference list
4	Assignment 4: University Questions on Module -IV	Students study the Topics and write the Answers. Get practice to solve university questions.	Module IV of the syllabus	8	Individual Activity.	Text Book of the reference list. Website of the Reference list



5	Assignment 5: University Questions on Module -V	Students study the Topics and write the Answers. Get practice to solve university questions.	Module V of the syllabus	10	Individual Activity.	Text Book of the reference list. Website of the Reference list
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14.0 QUESTION BANK

MODULE: 1

1. What is data warehouse? Elaborate data warehouse using multi-tier architecture with a neat diagram. (10 Marks, June2018)
2. Explain star schema and snow flake schema with examples. (06 Marks, June2018)
3. What is data cube measure? How it is categorized? Explain. (05 Marks, June2018)
4. Explain data warehouse model with neat diagram. (07 Marks, June2018)
5. Briefly elaborate on typical OLAP operations on multidimensional data. (04 Marks, June2018)
6. What is ODS? How does it differ from data warehouse? Explain.
7. Explain guidelines for data warehouse implementation?
8. What is ETL? List steps of ETL process.
9. What is the KDD Process?
10. An operational data store (ODS) is a type of database that's often used as an interim logical area for a data warehouse.
11. What are the tasks of data mining?
12. What are the characteristics of data warehouse?
13. Define data model.
14. What are the various forms of the data processing?
15. What is ODS? Explain the issues need to resolve during successful implementation of ETL system.
16. Explain the data ware housing implementation steps.
17. Explain data warehouse meta data.
18. What is data warehouse? Difference between ODS and data warehouse. (06 Marks, Jan 2019)
19. Explain with diagram, three tier data warehouse architecture. (10 Marks, Jan 2019)
20. Explain OLAP operations with example. (10 Marks, Jan 2019)
21. Define: i) Dimensions ii) Measures iii) Fact tables. (03 Marks, Jan 2019)
22. What is meta data in data warehouse? What it contains? (03 Marks, Jan 2019)

MODULE -2

31. With respect to indexing, explain Bitmap index and Join Index. (04 Marks, June2018)
32. Describe the servers involved in implementation of a warehouse server. (08 Marks, June2018)
33. How data mining tasks are categorized? Explain. (04 Marks, June2018)
34. Describe the challenges that motivated the development of data mining. (10 Marks, June2018)
35. What are the properties necessary to describe attributes? Explain different types of attributes. (06 Marks, June2018)
36. Why multidimensional views of data and data cubes are used? With a neat diagram explain data cube implementations.
37. What are data cube operations? Explain.
38. Explain Types of attributes.
39. Data Preprocessing
40. How to Handle Missing Data?
44. How to Handle Noisy Data?
23. What is data mining? Explain various data mining tasks.
24. Why data preprocessing required in data mining? Explain various steps involved in data preprocessing.
25. Write a short note on data mining applications.
26. Explain Codd's OLAP characteristics.
27. What are data cube operations? Explain Slice and Dice operations.
28. Write a short note on 1) ROLAP 2) MOLAP
29. What is data mining? Explain the KDD with neat diagram.
30. Explain the core data mining tasks.



31. What is sampling? Explain different types of sampling approaches.
32. Explain indexing OLAP data: Bitmap index and join index with example. (10 Marks, Jan 2019)
33. Explain ROLAP versus MOLAP. (06 Marks, Jan 2019)
34. What is data mining? Briefly explain the motivating challenges. (06 Marks, Jan 2019)
35. Explain data preprocessing steps. (10 Marks, Jan 2019)

MODULE- 3

1. Describe the frequent item set generation in apriori algorithm with example. (08 Marks, June2018)
2. Explain the uses of Hash Tree in support counting. (08 Marks, June2018)
3. Describe alternative methods for generating frequent item sets. (09 Marks, June2018)
4. Consider the following transaction dataset. Describe the construction of FP-Tree in FP-Growth algorithm.

Tid	Items
1	{a, b}
2	{b, c, d}
3	{a, c, d, e}

(07 Marks, June2018)

5. Define Apriori principle? explain frequent item set generation an algorithm.
6. What is FP-growth algorithm? Explain the construction of an FP-tree.
7. Explain Best split measures.
8. Association analysis
9. Explain FP- growth algorithm for discovering frequent item sets. What are its limitations?
10. What is Apriori algorithm? How it is used to find frequent item sets? Explain.
11. List the measures used for evaluating association patterns.
12. Explain web content mining.
13. What is text mining? Explain.
14. Explain 1) spatial data mining 2) Temporal data mining.
15. Explain frequent itemset generation of the Apriori algorithm. (08 Marks, Jan 2019)
16. Explain rule generation in Apriori algorithm. (08 Marks, Jan 2019)
17. Explain alternative methods for generating frequent itemsets. (08 Marks, Jan 2019)
18. Explain briefly FP-growth algorithm. (08 Marks, Jan 2019)

MODULE- 4

- 1) Illustrate hunt's algorithm to develop a decision tree. Consider the following training set and derive the decision tree.

Tid	Home Owner	Marital Status	Annual Income	Defaulted Borrower
1	Yes	Single	125 K	No
2	No	Married	100 K	No
3	No	Single	70 K	No
4	Yes	Married	120 K	No
5	No	Divorced	95 K	Yes
6	No	Married	60 K	No
7	Yes	Divorced	220 K	No
8	No	Single	85 K	Yes
9	No	Married	75 K	No
10	No	Single	90 K	Yes

(09 Marks, June2018)

- 2) What are the characteristics of decision tree induction algorithm? (07 Marks, June2018)
- 3) What are the characteristics of nearest neighbor classifiers? (06 Marks, June2018)
- 4) How Bayes theorem can be used for solving a classification problem? Explain. (10 Marks, June2018)
- 5) Explain K-nearest neighbor algorithm
- 6) How decision trees are used for classification? Explain decision tree induction algorithm for classification.



- 7) Explain the importance of evaluation criteria for classification methods.
- 8) What are Bayesian classifiers? Explain Baye's theorem for classification.
- 9) How rule based classifiers are used for classification? Explain.
- 10) What is classification? Write decision tree induction algorithm.
- 11) What are Nearest – Neighbor classifiers? Write and explain NN algorithm.
- 12) Explain the outline Evaluation criteria for classification method.
- 13) Explain classification method for estimating predictive accuracy.
- 14) With net block digram, explain general approach to solve classification problem. (08 Marks, Jan 2019)
- 15) Explain how to build a decision tree using Hunt's algorithm. (08 Marks, Jan 2019)
- 16) Explain rule based classifiers with illustration. (08 Marks, Jan 2019)
- 17) Explain K-nearest neighbor classification algorithm with example. (08 Marks, Jan 2019)

MODULE -5

1. Describe different types of clustering mechanisms. (06 Marks, June2018)
2. Explain DBSCAN algorithm. How the parameters are selected? (06 Marks, June2018)
3. List out important issues for cluster validation. (04 Marks, June2018)
4. Illustrate Grid-based clustering algorithm. How clusters are formed from Dense-Grid cells. (12 Marks, June2018)
5. Develop DENCLUE algorithm for kernel density estimation. (04 Marks, June2018)
6. Explain K-means clustering algorithm. What are its limitations?
7. How density based methods are used for clustering? Explain with example.
8. What is Text mining and text clustering?
9. What is temporal database mining?
10. Explain the desired features of cluster analysis.
11. Explain K-mean clustering method.
12. Write a note on DBSCAN.
13. What is cluster analysis? Explain different types of clustering. (08 Marks, Jan 2019)
14. Explain briefly agglomerative hierarchical clustering with example. (08 Marks, Jan 2019)
15. Explain DBSCAN algorithm with example. (08 Marks, Jan 2019)
16. Briefly explain BRICH scalable clustering algorithm. (08 Marks, Jan 2019)

15.0 University Result

Examination	FCD	FC	SC	Fail	Absent	% Passing
Jul-2021	25	18	00	00	-	100
Examination	FCD	FC	SC	Fail	Absent	% Passing
Jul-2022	11	14	24	02	-	96.07

Prepared By	Checked By		
Dr. K. B. Manwade	Prof. S. V. Manjaragi	HOD	Principal



Subject Title	NON-CONVENTIONAL ENERGY SOURCES		
Subject Code	18ME651	IA Marks(30)+Assignments(10)	40
Number of Lecture Hrs / Week	3+0 hrs	Exam Marks(appearing for)	60 (100)
Total Number of Lecture Hrs	40	Exam Hours	03
CREDITS – 03			

FACULTY DETAILS:

Name: Dr. M. M. Shivashimpi	Designation: Associate Professor	Experience: 15 Years
No. of times course taught: 01	Specialization: Thermal Power Engineering	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Students should have the knowledge of basic subjects	I/II	Mathematics, Physics and chemistry, EME

2.0 Course Objectives

Students belonging to all branches of Engineering are made to learn certain fundamental topics related to energy sources and conversion systems. So that they will have a minimum understanding and working of energy systems, equipment and process.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to understand construction and working mechanical systems.

CO'S	Course Outcome	Cognitive Level	POs
C317.1	Describe the environmental aspects of non-conventional energy resources.	L2	PO1,PO7, P12
C317.2	Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation, drying, cooking etc.	L3	PO1,PO2,PO3, PO6 PO7,PO12
C317.3	Understand The Performance Analysis Of Liquid Flat Plate Collectors	L3	PO1,PO2,PO3, PO6 PO7,PO12
C317.4	Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications. Acquire the knowledge of tidal power and Ocean Thermal Energy Conversion principles and applications.	L3	PO1,PO2,PO3, PO6 PO7,PO12
C317.5	Acquire the knowledge of fuel cells and geothermal principles and applications. Understand the concept of Biomass energy resources and their classification, types of	L3	PO1, PO3, PO5,PO6,PO7, PO12
Total Hours of instruction			40

4.0 Course Content

Module – 1

08 Hours

Introduction: Energy source, India's production and reserves of commercial energy sources, need for non-conventional energy sources, energy alternatives, solar, thermal, photovoltaic. Water power, wind biomass, ocean temperature difference, tidal and waves, geothermal, tar sands and oil shale, nuclear (Brief descriptions); advantages and disadvantages, comparison (Qualitative and Quantitative).

Solar Radiation: Extra-Terrestrial radiation, spectral distribution of extra terrestrial radiation, solar constant, solar radiation at the earth's surface, beam, diffuse and global radiation, solar radiation data. Measurement of Solar Radiation: Pyrometer, shading ring pyrheliometer, sunshine recorder, schematic diagrams and principle of working.

**Module- 2****08 Hours**

Solar Radiation Geometry: Flux on a plane surface, latitude, declination angle, surface azimuth angle, hour angle, and zenith angle, solar altitude angle expression for the angle between the incident beam and the normal to a plane surface (No derivation) local apparent time. Apparent motion of sun, day length, numerical examples. Radiation Flux on a Tilted Surface: Beam, diffuse and reflected radiation, expression for flux on tilted surface (no derivations) numerical examples.

Solar Thermal Conversion: Collection and storage, thermal collection devices, liquid flat plate collectors, solar air heaters concentrating collectors (cylindrical, parabolic, paraboloid) (Quantitative analysis); sensible heat storage, latent heat storage, application of solar energy water heating. Space heating and cooling, active and passive systems, power generation, and refrigeration. Distillation (Qualitative analysis) solar pond, principle of working, operational problems.

Module- 3**08 Hours**

Performance Analysis of Liquid Flat Plate Collectors: General description, collector geometry, selective surface (qualitative discussion) basic energy-balance equation, stagnation temperature, transmissivity of the cover system, transmissivity-absorptivity product, numerical examples. The overall loss coefficient, correlation for the top loss coefficient, bottom and side loss coefficient, problems (all correlations to be provided). Temperature distribution between the collector tubes, collector heat removal factor, collector efficiency factor and collector flow factor, mean plate temperature, instantaneous efficiency (all expressions to be provided). Effect of various parameters on the collector performance; collector orientation, selective surface, fluid inlet temperature, number covers, dust.

Photovoltaic Conversion: Description, principle of working and characteristics, application.

Module- 4**08 Hours**

Wind Energy : Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, wind machines; Types of wind machines and their characteristics, horizontal and vertical axis wind mills, elementary design principles; coefficient of performance of a wind mill rotor, aerodynamic considerations of wind mill design, numerical examples.

Tidal Power: Tides and waves as energy suppliers and their mechanics; fundamental characteristics of tidal power, harnessing tidal energy, limitations.

Ocean Thermal Energy Conversion: Principle of working, Rankine cycle, OTEC power stations in the world, problems associated with OTEC.

Module- 5**08 Hours**

Geothermal Energy Conversion: Principle of working, types of geothermal station with schematic diagram, geothermal plants in the world, problems associated with geothermal conversion, scope of geothermal energy.

Energy from Bio Mass: Photosynthesis, photosynthetic oxygen production, energy plantation, bio gas production from organic wastes by anaerobic fermentation, description of bio-gas plants, transportation of bio-gas, problems involved with bio-gas production, application of bio-gas, application of bio-gas in engines, advantages.

Hydrogen Energy: Properties of Hydrogen with respect to its utilization as a renewable form of energy, sources of hydrogen, production of hydrogen, electrolysis of water, thermal decomposition of water, thermo chemical production bio-chemical production.

5.0 Relevance to future subjects

Sl. No	Semester	Subject	Topics
01	VIII	Project work	Fundamental concepts
02	V/VI	Design of Machine Elements I/II	Fasteners, Keys and Joints, Rivets and Assembly drawings
03	III/IV	Power plant engineering, I C Engines, Energy Engineering.	Internal combustion engines, gas cycles, Turbines, Refrigeration & air conditioning.

6.0 Relevance to Real World

SL.No	Real World Mapping
01	Electricity generation, Energy harnessing.
02	Working and operation of wind, solar, biomass, geothermal, OTEC, Tidal power plants
03	Fuel cells and hydrogen energy.

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	NPTEL Tutorial	Topic: Non Conventional Energy resources, Renewable Energy, Environmental pollution.



8.0 Books Used and Recommended to Students

Text Books

1. Non-Convention Energy Resources, B H Khan, McGraw Hill Education (India) Pvt. Ltd. 3rd Edition.
2. Solar energy, Subhas P Sukhatme, Tata McGraw Hill, 2nd Edition, 1996.
3. Non-Conventional Energy Sources, G.D Rai, Khanna Publishers, 2003.

Reference Books

1. Renewable Energy Sources and Conversion Technology, N.K. Bansal, Manfred Kleeman & Michael Meliss, Tata McGraw Hill. 2004
2. Renewable Energy Technologies, Ramesh R & Kumar K U, Narosa Publishing House New Delhi.
3. Conventional Energy Systems, K M, Non, Wheeler Publishing Co. Ltd., New Delhi, 2003.
4. Non-Conventional Energy, Ashok V Desai, Wiley Eastern Ltd, New Delhi, 2003.

Additional Study material & e-Books

NPTEL Videos, E- Books

9.0 Relevant Websites (Reputed Universities and Others) for Notes / Animation / Videos Recommended

Website and Internet Contents References

- 1) <https://nptel.ac.in/courses/121/106/121106014/>
- 2) <https://nptel.ac.in/content/storage/121/106/121106014/MP4/mod03lec08.mp4>
- 3) https://onlinecourses.nptel.ac.in/noc20_ph14/preview
- 4) <https://www.youtube.com/watch?v=GExTwRNkQBg>
<https://www.youtube.com/watch?v=F2YsrxpQPwE>
<https://www.youtube.com/watch?v=DD0Y6SnxpdK>
- 5) <https://nptel.ac.in/content/storage2/courses/121106014/Week9/lecture27.pdf>
https://nptel.ac.in/content/storage2/courses/108108078/pdf/chap7/teach_slides07.pdf
<https://www.youtube.com/watch?v=-yYrc1-thxQ>

10.0 Magazines/Journals Used and Recommended to Students

Sl. No	Magazines/Journals	website
1	Elsevier	https://www.journals.elsevier.com
2	Journal of Composite Materials	http://journals.sagepub.com
4	International Journal of Renewable Energy Research (IJRER)	http://www.ijrer.org

11.0 Examination Note

Internal Assessment (30 Marks)

Questions shall be answered in Internal Assessment books (blue book). Internal assessment book shall be submitted.

Scheme of Evaluation for Internal Assessment (30 Marks)


Internal Assessment test in the same pattern as that of the main examination (Better of the three Tests): 30 marks.

Assignments/Quiz (10 Marks)

Assignments for each module are to be submitted and evaluated for 10 marks for each. Average of five modules is to be considered.

SCHEME OF EXAMINATION: Two full questions (with a maximum of four sub questions) of twenty mark each to be set from each module. Each question should cover all the contents of the respective module. Students have to answer five full questions choosing one full question from each module. From each module out of two full questions one full question to be answered and each carries 20 Marks. Five full question to be answered 5x20 = 100 Marks. Later after evaluation total marks are reduced to 60 marks.

12.0 Course Delivery Plan

	S J P N Trust's Hirasugar Institute of Technology, Nidasoshi <i>Inculcating Values, Promoting Prosperity</i> Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi Recognized under 2(f) & 12B of UGC Act, 1956 Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA: CSE & ECE.	Dept. of CSE
		Academic
		Course Plan
		2022-23 EVEN

Module	Lecture No.	Content of Lecturer	% of Portion
1	1	Introduction: Energy source, India's production and reserves of commercial energy sources,	20%
	2	Need for non- conventional energy sources, energy alternatives, solar, thermal, photovoltaic.	
	3	Water power, wind biomass, ocean temperature difference, tidal and waves,	
	4	geothermal, tar sands and oil shale, nuclear (Brief descriptions);	
	5	advantages and disadvantages, comparison (Qualitative and Quantitative).	
	6	Solar Radiation: Extra-Terrestrial radiation, spectral distribution of extra terrestrial radiation, solar constant,	
	7	Solar radiation at the earth's surface, beam, diffuse and global radiation, solar radiation data.	
	8	Measurement of Solar Radiation: Pyrometer, shading ring pyrheliometer, sunshine recorder, schematic diagrams and principle of working.	
2	9	Solar Radiation Geometry: Flux on a plane surface, latitude, declination angle, surface azimuth angle, hour angle, zenith angle, solar altitude angle	40%
	10	expression for the angle between the incident beam and the normal to a plane surface (No derivation) local apparent time. Apparent motion of sun, day length, numerical examples.	
	11	Radiation Flux on a Tilted Surface: Beam, diffuse and reflected radiation, expression for flux on a tilted surface (no derivations) numerical examples.	
	12	Solar Thermal Conversion: Collection and storage, thermal collection devices, liquid flat plate collectors,	
	13	solar air heaters concentrating collectors (cylindrical, parabolic, paraboloid) (Quantitative analysis);	
	14	sensible heat storage, latent heat storage, application of solar energy water heating.	
	15	Space heating and cooling, active and passive systems, power generation, refrigeration.	
	16	Distillation (Qualitative analysis) solar pond, principle of working, operational problems.	
3	17	Performance Analysis of Liquid Flat Plate Collectors: General description,	60%
	18	collector geometry, selective surface (qualitative discussion)	
	19	basic energy-balance equation, stagnation temperature, transmissivity of the cover system, transmissivity – absorptivity product, numerical examples.	
	20	The overall loss coefficient, correlation for the top loss coefficient, bottom and side loss coefficient, problems (all correlations to be provided).	
	21	Temperature distribution between the collector tubes,	
	22	collector heat removal factor, collector efficiency factor and collector flow factor, mean plate temperature, instantaneous efficiency (all expressions to be provided).	
	23	Effect of various parameters on the collector performance; collector orientation, selective surface, fluid inlet temperature, number covers, dust.	
	24	Photovoltaic Conversion: Description, principle of working and characteristics, application.	
4	25	Wind Energy : Properties of wind, availability of wind energy in India, wind velocity and power from wind;	80%
	26	major problems associated with wind power, wind machines; Types of wind machines and their characteristics, horizontal and vertical axis wind mills,	
	27	elementary design principles; coefficient of performance of a wind mill rotor, aerodynamic considerations of wind mill design, numerical examples.	
	28	Tidal Power: Tides and waves as energy suppliers and their mechanics;	
	29	fundamental characteristics of tidal power, harnessing tidal energy,	
	30	limitations.	
	31	Ocean Thermal Energy Conversion: Principle of working, Rankine cycle,	
	32	OTEC power stations in the world, problems associated with OTEC.	
5	33	Geothermal Energy Conversion: Principle of working, types of geothermal station with schematic diagram, geothermal plants in the world,	100%
	34	problems associated with geothermal conversion, scope of geothermal energy	
	35	Energy from Bio Mass: Photosynthesis, photosynthetic oxygen production, energy plantation, bio gas production from organic wastes by anaerobic fermentation,	



36	description of bio-gas plants, transportation of bio- gas, problems involved with bio-gas production,
37	Application of bio-gas, application of bio-gas in engines, advantages.
38	Hydrogen Energy: Properties of Hydrogen with respected to its utilization as a renewable form of energy, sources of hydrogen,
39	production of hydrogen, electrolysis of water, thermal decomposition of water,
40	Thermo chemical production bio-chemical production.

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl.No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions on Energy Resources	Students study the Topics and prepare the multiple choice questioner with answer.	Module-1 of the syllabus	2	Group Activity. Each group should prepare minimum 05 questions expected.	Book 1, 2 of the reference list. Website of the Reference list
2	Assignment 2: University Questions on Solar Energy	Students study the Topics and explain solar energy.	Module-2 of the syllabus	4	Individual Activity.	Book 1, 2 of the reference list. Website of the Reference list
3	Assignment 3: University Questions on Solar energy	Students study the Topics and explain solar energy.	Module-3 of the syllabus	6	Individual Activity.	Book 1, 2 of the reference list. Website of the Reference list
4	Assignment 4: University Questions on Wind, Tidal and OTEC energy.	Students study the Topics and explain Wind, Tidal and OTEC energy.	Module-4 of the syllabus	8	Individual Activity.	Book 1, 2 of the reference list. Website of the Reference list
5	Assignment 5: University Questions on Geothermal, Biomass and Hydrogen energy.	Students study the Topics and explain Geothermal, Biomass and Hydrogen energy.	Module-5 of the syllabus	10	Individual Activity.	Book 1, 2 of the reference list. Website of the Reference list

14.0 QUESTION BANK

Sample Questions	Questions
1.	Module 1 1. What are the limitations of conventional energy sources? 2. What are the prospects of non conventional energy sources in India? 3. What are the renewable energy sources? Write its advantages and obstacles to implement these sources. 4. What are the methods of direct energy conversion? Describe in brief. 5. What are limitations of renewable energy sources? 6. Show on a map, wind power plants, solar power plants, tidal power plants, nuclear power plants hydro power plants and thermal power plants. 7. What are the convention and non-conventional sources? Write advantages of non-conventional energy sources. 8. What is need of renewable energy?
2.	Module 2 9. Write a note on solar radiation on tilted surfaces. 10. Briefly explain different type of instruments used to measure solar radiation. 11. What is extraterrestrial , terrestrial radiation, solar radiation and solar flux 12. What are the challenges associated in the use of solar energy and give the Remedies and possible solutions. 13. Discuss energy requirement of rural consumers and state the possible alternative source of energy to meet the demand



	<p>14. Briefly describe Renewable Energy Scenario in India and world.</p> <p>15. What is Environmental Aspects of Energy Utilization in renewable and non- renewable energy sources?</p> <p>16. Enumerate the different types of concentrating type collectors.</p>
3.	<p>Module 3</p> <p>17. Enumerate the different types of concentrating type collectors.</p> <p>18. With the help of a neat sketch describe a solar heating system using water heating solar collectors and state the advantages and disadvantages of this method.</p> <p>19. How is the performance of flat plate collector evaluated?</p> <p>20. Explain the construction and uses of evacuated tube collectors?</p> <p>21. What are the factors effected on performance of solar flat plate collector?</p> <p>22. What is solar cell, and applications of PV system?</p> <p>23. Explain working principle of solar PV cells? What are the materials used for PV cells?</p> <p>24. What are the various methods to store solar energy? Discuss in detail any two processes?</p> <p>25. Draw neatly solar pond and explain each zone operation and how it is store energy?</p> <p>26. What are the different types of photovoltaic cell? Explain each one?</p>
4.	<p>Module 4</p> <p>27. What is wind power explain briefly?</p> <p>28. Describe with a neat sketch the working of wind energy system with main components</p> <p>29. How power extracted by wind turbine?</p> <p>30. List out type of wind turbine and what are the wind power plants are grouped</p> <p>31. Discuss the advantages and disadvantages of horizontal and vertical axis wind mill. What methods are used to overcome the fluctuate power generation of wind mill?</p> <p>32. What are the rules for site selection of wind turbine and advantages and disadvantages of wind turbine?</p> <p>33. How performance of the wind turbine is determined? Explain its operational characteristics.</p> <p>34. What is tide? Explain tidal energy and its conversion with neat diagram</p> <p>35. Explain the basic components of a tidal thermal power plant and state their advantages and disadvantages..</p> <p>36. What is the nature of tidal power extracted from single basin arrangement and double basin arrangement?</p> <p>37. What are the wave energy conversion machines, explain any one conversion methods.</p> <p>38. What is the basic principle of ocean thermal energy conversion ? What are the main types of OTEC power plants? Describe their working in brief.</p>
5.	<p>Module 5</p> <p>39. What are the geothermal power plants, explain binary cycle power plant with neat diagram</p> <p>40. Draw schematic diagram of an alkaline water electrolytic hydrogen cell and explain</p> <p>41. With a neat sketch explain biomass gasification?</p> <p>42. What is biomass, bio-fuel , bio energy and biogas?</p> <p>43. What are the methods used for biomass conversion to energy? Explain in brief.?</p> <p>44. What are the factors affecting the generation of bio gas?</p> <p>45. What are the constituents of biomass materials? Explain proximate and ultimate analysis.</p> <p>46. What is fermentation, aerobic and anaerobic, hydrolysis explain each.</p> <p>47. Compare fixed dome and float drum type bio digesters.</p>

15.0 University Result

Examination	No. Of students Appeared	No. of Students Passed	FCD	FC	SC	% Passing
June/July 2022	51	50	29	14	07	98.03

Prepared by	Checked by		
Dr. M. M. Shivashimpi	Dr. K. M. Akkoli	HOD	Principal



Subject Title	SYSTEM SOFTWARE LABORATORY		
Subject Code	18CSL66	IA Marks	40
Number of Lecture Hrs / Week	0 + 02 + 02	Exam Marks	60
Total Number of Lecture Hrs	36	Exam Hours	03
CREDITS – 02			

FACULTY DETAILS:

Name: Prof. S. I. Mane	Designation: Asst. Professor	Experience: 08 Years
No. of times course taught: 01		Specialization: Computer Science and Engineering

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Computer Science and Engineering	I/II	Programming in C and Data Structures
02	Computer Science and Engineering	IV	Object Oriented Concepts
03	Computer Science and Engineering	IV	Operating Systems

2.0 Course Objectives

This course will enable students to

- To make students familiar with Lexical Analysis and Syntax Analysis phases of Compiler Design and implement programs on these phases using LEX & YACC tools and/or C/C++/Java.
- To enable students to learn different types of CPU scheduling algorithms used in operating system.
- To make students able to implement memory management - page replacement and deadlock handling algorithms.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to:

	Course Outcome	Cognitive Level	POs
C322.1	Demonstrate the Lexical analysis using Lexer.	L2	PO-1, 2, 3, 4, 9, 10 PSO-1,2
C322.2	Demonstrate the syntax analysis phase of Compiler design using Parser.	L2	PO-1, 2, 3, 4, 9, 10 PSO-1,2
C322.3	Develop the different CPU scheduling algorithms.	L2	PO-1, 2, 3, 4, 9, 10 PSO-1,2
C322.4	Demonstrate the different memory management algorithms.	L2	PO-1, 2, 3, 4, 9, 10 PSO-1,2
C322.5	Demonstrate the deadlock handling algorithm.	L2	PO-1, 2, 3, 4, 9, 10 PSO-1,2
Total Hours of instruction			40

4.0 Course Content

Description (If any):

Exercises to be prepared with minimum three files (Where ever necessary):

- Header file.
- Implementation file.
- Application file where main function will be present.

The idea behind using three files is to differentiate between the developer and user sides. In the developer side, all the three files could be made visible. For the user side only header file and application files could be made visible, which means that the object code of the implementation file could be given to the user along with the interface given in the header file, hiding

the source file, if required. Avoid I/O operations (printf/scanf) and use data input file where ever it is possible.

Lab Experiments:

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

- Write a LEX program to recognize valid arithmetic expression. Identifiers in the expression could be only integers and operators could be + and *. Count the identifiers & operators present and print them separately.
 - Write YACC program to evaluate arithmetic expression involving operators: +, -, *, and /.
- Develop, Implement and Execute a program using YACC tool to recognize all strings ending with b preceded by n a's using the grammar anb (note: input n value).
- Design, develop and implement YACC/C program to construct Predictive / LL(1) Parsing Table for the grammar rules: $A \rightarrow aBa$, $B \rightarrow bB \mid \epsilon$. Use this table to parse the sentence: abba\$.
- Design, develop and implement YACC/C program to demonstrate Shift Reduce Parsing technique for the grammar rules: $E \rightarrow E+T \mid T$, $T \rightarrow T * F \mid F$, $F \rightarrow (E) \mid id$ and parse the sentence: id + id * id.
- Design, develop and implement a C/Java program to generate the machine code using Triples for the statement $A = -B * (C + D)$ whose intermediate code in three-address form:

$$T1 = -B$$

$$T2 = C + D$$

$$T3 = T1 * T2$$

$$A = T3$$
- Write a LEX program to eliminate comment lines in a C program and copy the resulting program into a separate file.
 - Write YACC program to recognize, valid identifier operators and keywords in the given text (C program) file.
- Design, develop and implement a C/C++/Java program to simulate the working of Shortest remaining time and Round Robin (RR) scheduling algorithms. Experiment with different quantum sizes for RR algorithm.
- Design, develop and implement a C/C++/Java program to implement Banker's algorithm. Assume suitable input required to demonstrate the results.
- Design, develop and implement a C/C++/Java program to implement page replacement algorithms LRU and FIFO. Assume suitable input required to demonstrate the results.

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	VI	Operating System	CPU Scheduling, Deadlock, Memory Management
02	VI	Compiler Design	Shift Reduce Parsing, Predictive/LL(1) Parsing, machine code
03	VIII	Project work	

6.0 Relevance to Real World

SL.No	Real World Mapping
01	Final year projects

7.0 Gap Analysis and Mitigation

Sl. No.	Delivery Type	Details
01	YouTube Videos	System software and Operating System algorithms



8.0 Books Used and Recommended to Students

Additional Reference

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 7th edition, Wiley-India, 2006.
2. LEX and YACC - John. R. Levine, Mason and Doug Brown, O'Reilly, SPD, 1998.
3. Compilers-Principles, Techniques and Tools by Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman. Pearson, 2nd edition, 2007

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

1. <https://youtu.be/IL1kaKzVUNU>

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	Website
1	EAX Operating System Software	https://ieeexplore.ieee.org/document/1091601/

11.0 Examination Note

Internal Assessment: 40 Marks

- Continuous evaluation of each lab experiment will be done for 24 marks and its average marks will be considered.

Lab experiment conduction procedure

A student has to perform one experiment every week.

Scheme of Evaluation for Continuous Assessment (24 Marks)

Description	Max. marks
Write-up & Conduction	18
Outcome & Conclusion	04
Viva-Voce	02
Total	24

Scheme of Evaluation for Internal Assessment (16 Marks)

- Lab IA will be conducted for 16 marks.

Description	Max. marks
Write-up & Conduction	03
Outcome & Conclusion	10
Viva-Voce	03
Total	16

Conduction of Practical Examination for Network Lab:

1. All laboratory experiments (NINE NOs) are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script
4. Marks distribution: Procedure + Conduction + Viva: 15 + 70 + 15 (100).
5. Change of experiment is allowed only once and marks allotted to the procedure part to be made zero.



12.0 Course Delivery Plan

Expt. No.	Lab. No.	Content of Experiment	% of Portion
1	1	a) Write a LEX program to recognize valid arithmetic expression. Identifiers in the expression could be only integers and operators could be + and *. Count the identifiers & operators present and print them separately. b) Write YACC program to evaluate arithmetic expression involving operators: +, -, *, and /.	11
2	2	Develop, Implement and Execute a program using YACC tool to recognize all strings ending with b preceded by n a's using the grammar $a^n b$ (note: input n value).	11
3	3	Design, develop and implement YACC/C program to construct Predictive / LL(1) Parsing Table for the grammar rules: $A \rightarrow aBa$, $B \rightarrow bB$ e. Use this table to parse the sentence: abba\$.	11
4	4	Design, develop and implement YACC/C program to demonstrate Shift Reduce Parsing technique for the grammar rules: $E \rightarrow E+T$ $T, T \rightarrow T * F$ $F, F \rightarrow (E)$ id and parse the sentence: id + id * id.	11
5	5	Design, develop and implement a C/Java program to generate the machine code using Triples for the statement $A = -B * (C + D)$ whose intermediate code in three-address form: $T1 = -B$ $T2 = C + D$ $T3 = T1 + T2$ $A = T3$	11
6	6	a) Write a LEX program to eliminate comment lines in a C program and copy the resulting program into a separate file. b) Write YACC program to recognize, valid identifier operators and keywords in the given text (C program) file.	11
7	7	Design, develop and implement a C/C++/Java program to simulate the working of Shortest remaining time and Round Robin (RR) scheduling algorithms. Experiment with different quantum sizes for RR algorithm.	11
8	8	Design, develop and implement a C/C++/Java program to implement Banker's algorithm. Assume suitable input required to demonstrate the results.	11
9	9	Design, develop and implement a C/C++/Java program to implement page replacement algorithms LRU and FIFO. Assume suitable input required to demonstrate the results.	11

13.0 QUESTION BANK





1. What is lex?
2. Give the structure of lex program.
3. What do you mean by regular expression?
4. What is lexical analyzer?
5. Expand YACC.
6. Define auxiliary definitions and transition rule.
7. Explain the running of LEX program
8. What is a regular expression? Give some examples for regular expressions
9. What is YACC?
10. Explain the structure of YACC program
11. Explain Lexer and parser communication.
12. Explain the Lexer compilation and running parser.
13. What is shift/reduce parsing?
14. What is ambiguous grammar?
15. What is valid variable?
16. What is the use of yywrap() function?
17. Explain the running process of YACC program.
18. What is scheduling?
19. What is FCFS scheduling algorithm?
20. What is preemptive SJF scheduling algorithm?
21. What is non-preemptive SJF scheduling algorithm?
22. What is Priority scheduling algorithm?



23. What is RR scheduling algorithm?
24. What is parallel program?
25. What is deadlock?
26. What are the necessary conditions to occur deadlock in the system?
27. What is safe state?
28. What is unsafe state?
29. What is Banker's algorithm?
30. Explain LRU page replacement algorithm.
31. Explain FIFO page replacement algorithm.
32. Explain Optimal page replacement algorithm.

14.0 University Result

Examination	FCD	FC	SC	FAIL	% Passing
July-22	35	15	01	00	100

Prepared by	Checked by		
			
Prof. S. I. Mane	Prof. A. A. Daptardar	HOD	Principal



Subject Title			
COMPUTER GRAPHICS LABORATORY WITH MINI PROJECT			
Subject Code	18CSL67	IA Marks	40
Number of Lecture Hrs / Week	0:2:2	Exam Marks	60
Total Number of Lab Contact	36	Exam Hours	03
CREDITS – 02			

FACULTY DETAILS:

Name: Dr. Mahesh G. Huddar	Designation: Associate Professor	Experience: 13.5 Years
No. of times course taught: 04		Specialization: Computer Science and Engineering

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Computer Science and Engineering	I/II	Programming in C and Data Structures
02	Computer Science and Engineering	VI	Computer Graphics and Visualization

2.0 Course Objectives

This course will enable students to

1. Demonstrate simple algorithms using OpenGL Graphics Primitives and attributes.
2. Implementation of line drawing and clipping algorithms using OpenGL functions.
3. Design and implementation of algorithms Geometric transformations on both 2D and 3D objects.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to:

	Course Outcome	Cognitive Level	Pos
C323.1	Demonstrate simple algorithms using OpenGL Graphics Primitives and attributes.	L2	1, 2, 3,5, 8,9, 10,11
C323.2	Demonstrate line drawing and clipping algorithms using OpenGL functions.	L2	1, 2, 3,5, 8,9, 10,11
C323.3	Demonstrate 2D and 3D Geometric transformations using OpenGL functions.	L2	1, 2, 3,5, 8,9, 10,11
C323.4	Demonstrate computer graphics applications using OpenGL.	L2	1, 2, 3,5, 8,9, 10,11
C323.5	Make use of OpenGL functions to animate real world problems.	L3	1, 2, 3,5,8,9, 10,11
Total Hours of instruction			40

4.0 Course Content

PART - A

Design, develop, and implement the following programs using OpenGL API

1. Implement Brenham's line drawing algorithm for all types of slope.
Refer: Text-1: Chapter 3.5
Refer: Text-2: Chapter 8
2. Create and rotate a triangle about the origin and a fixed point.
Refer: Text-1: Chapter 5-4
3. Draw a color cube and spin it using OpenGL transformation matrices.
Refer: Text-2: Modeling a Colored Cube



4. Draw a color cube and allow the user to move the camera suitably to experiment with perspective viewing.
Refer: Text-2: Topic: Positioning of Camera
5. Clip a lines using Cohen-Sutherland algorithm
Refer: Text-1: Chapter 6.7
Refer: Text-2: Chapter 8
6. To draw a simple shaded scene consisting of a tea pot on a table. Define suitably the position and properties of the light source along with the properties of the surfaces of the solid object used in the scene.
Refer: Text-2: Topic: Lighting and Shading
7. Design, develop and implement recursively subdivide a tetrahedron to form 3D Sierpinski gasket. The number of recursive steps is to be specified by the user.
Refer: Text-2: Topic: Sierpinski gasket.
8. Develop a menu driven program to animate a flag using Bezier Curve algorithm
Refer: Text-1: Chapter 8-10
9. Develop a menu driven program to fill the polygon using scan line algorithm

PART - B (MINI-PROJECT):

Student should develop mini project on the topics mentioned below or similar applications using Open GL API. Consider all types of attributes like color, thickness, styles, font, background, speed etc., while doing mini project.

(During the practical exam: the students should demonstrate and answer Viva-Voce)

Sample Topics: Simulation of concepts of OS, Data structures, algorithms etc.

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	VI	Computer Graphics and Visualization	Computer graphics algorithms

6.0 Relevance to Real World

SL.No	Real World Mapping
01	Final year projects
02	Game development

7.0 Gap Analysis and Mitigation

Sl. No.	Delivery Type	Details
01	YouTube Videos	Computer graphics algorithms

8.0 Books Used and Recommended to Students

Additional Reference
1. Donald Hearn & Pauline Baker: Computer Graphics-OpenGL Version,3rd Edition, Pearson Education,2011.
2. Edward Angel: Interactive computer graphics - A Top Down approach with OpenGL, 5th edition. Pearson Education, 2011.
3. M M Raikar, Computer Graphics using OpenGL, Fillip Learning / Elsevier, Bangalore / New Delhi (2013)

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References
1. https://www.opengl.org/



10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	Website
1	Incorporating Modern OpenGL into Computer Graphics Education	http://ieeexplore.ieee.org/document/6855305/
2	Computers & Graphics	https://www.journals.elsevier.com/computers-and-graphics/

11.0 Examination Note

- All laboratory experiments from part A are to be included for practical examination.
- Mini project has to be evaluated for 40 Marks.
- Report should be prepared in a standard format prescribed for project work.
- Students are allowed to pick one experiment from the lot.
- Strictly follow the instructions as printed on the cover page of answer script.
- Marks distribution: a) Part A: Procedure + Conduction + Viva: **09 + 42 + 09 = 60 Marks**
 b) Part B: Demonstration + Report + Viva voce: **20+14+06 = 40 Marks**
- Change of experiment is allowed only once and marks allotted to the procedure part to be made zero.

12.0 Course Delivery Plan

Expt. No.	Lab. No.	Content of Experiment	% of Portion
1	1	Implement Brenham's line drawing algorithm for all types of slope.	8.33
2	2	Create and rotate a triangle about the origin and a fixed point.	8.33
3	3	Draw a color cube and spin it using OpenGL transformation matrices.	8.33
4	4	Draw a color cube and allow the user to move the camera suitably to experiment with perspective viewing.	8.33
5	5	Clip a lines using Cohen-Sutherland algorithm.	8.33
6	6	To draw a simple shaded scene consisting of a tea pot on a table. Define suitably the position and properties of the light source along with the properties of the surfaces of the solid object used in the scene.	8.33
7	7	Design, develop and implement recursively subdivide a tetrahedron to form 3D sierpinski gasket. The number of recursive steps is to be specified by the user.	8.33
8	8	Develop a menu driven program to animate a flag using Bezier Curve algorithm.	8.33
9	9	Develop a menu driven program to fill the polygon using scan line algorithm.	8.33
Project: PART - B (MINI-PROJECT)			
10	10	Student should develop mini project on the topics mentioned below or similar applications using Open GL API. Consider all types of attributes like color, thickness, styles, font, background, speed etc., while doing mini project. (During the practical exam: the students should demonstrate and answer Viva-Voce) Sample Topics: Simulation of concepts of OS, Data structures, algorithms etc.	25

13.0 QUESTION BANK





- What is Computer Graphics?
- What are applications of computer graphics?
- What is OpenGL?
- List Control functions in OpenGL.
- List primitive functions in OpenGL.
- What are the types of Text?
- OpenGL functions to draw text.
- What is the significance of glutMainLoop() function?



9. What are the 3 main OpenGL libraries?
10. What is glutInit() function?
11. What is the function used to set the display mode?
12. Name any 2 functions used to register the callback function?
13. What is the header file used to include OpenGL library function?
14. What is the Parameter need to glClear() function?
15. What is glFlush() function?
16. What are the functions needed to set the color of the window?
17. How to set the position of the window on screen?
18. What is aspect ratio?
19. Name few functions in OpenGL, needed to interact with keyboard.
20. Name few functions in OpenGL, to interact with mouse?
21. Give any four properties of meshes.
22. What is model view matrix?
23. What is projection matrix?
24. What is viewport matrix?
25. What is the significance of glMatrixMode()?
26. What is the significance of gluOrtho2D()?
27. What is the significance of glOrtho()?
28. How to compose affine transformation?
29. What is differential scaling?
30. What are the different ways to view a transformation?
31. What is affine transformation?
32. List OpenGL transformation functions.
33. What are vertex arrays?
34. OpenGL functions used in Depth Buffer algorithm.
35. List logical OpenGL functions?

14.0 University Result

Examination	FCD	FC	SC	FAIL	Pass %
2022 July	49	02	00	00	100

Prepared by	Checked by		
			
Dr. Mahesh Huddar	Dr. Mahesh Huddar	HOD	Principal



Subject Title	MOBILE APPLICATION DEVELOPMENT		
Subject Code	18CSMP68	IA Marks	40
No of Lecture Hrs + Practical Hrs / Week	01L + 02P	Exam Marks	60
Total No of Lecture + Practical Hrs	40	Exam Hours	03
CREDITS – 02			

FACULTY DETAILS:

Name: Prof. P. G. Patil	Designation: Asst. Professor	Experience: 9 Years
No. of times course taught: 1 Time		Specialization: Computer Science & Engineering

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Computer Science and Engineering	I/II/III	Programming in C & Data Structure
02	Computer Science and Engineering	IV	Java Programming
03	Computer Science and Engineering	V	Data Base Management System

2.0 Course Objectives

6. Learn and acquire the art of Android Programming.
7. Configure Android studio to run the applications.
8. Understand and implement Android's User interface functions.
9. Create, modify and query on SQLite database.
10. Inspect different methods of sharing data using services.

3.0 Course Outcomes

The student, after successful completion of the course, will be able to


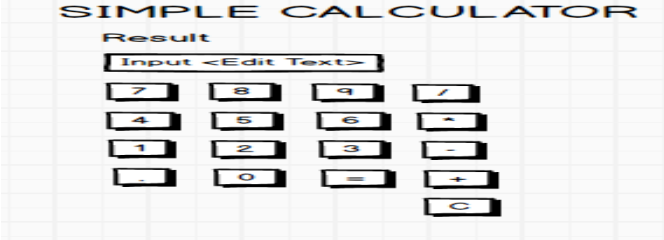
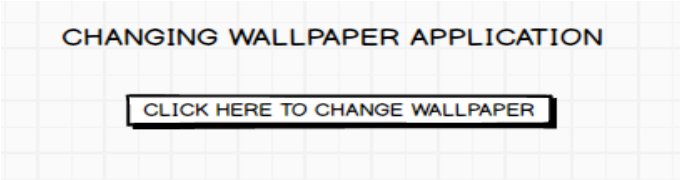
COs	Course Outcome	RBT Level	POs
C324.1	Create, test and debug Android application by setting up Android development environment.	L3	1,2,3,5,8,9,10,11,12
C324.2	Implement adaptive, responsive user interfaces that work across a wide range of devices.	L3	1,2,3,5,8,9,10,11,12
C324.3	Infer long running tasks and background work in Android applications.	L3	1,2,3,5,8,9,10,11,12
C324.4	Demonstrate methods in storing, sharing and retrieving data in Android applications.	L3	1,2,3,5,8,9,10,11,12
C324.5	Infer the role of permissions and security for Android applications.	L3	1,2,3,5,8,9,10,11,12
Total Hours of instruction			40

4.0 Course Content

Descriptions (if any):

1. The installation procedure of the Android Studio/Java software must be demonstrated and carried out in groups.
2. Students should use the latest version of Android Studio/Java/ Kotlin to execute these programs. Diagrams given are for representational purposes only; students are expected to improvise on them.
3. **Part B programs should be developed as an application and are to be demonstrated as a mini project in a group by adding extra features or the students can also develop their application and demonstrate it as a mini-project. (Projects/programs are not limited to the list given in Part B).**

PART - A

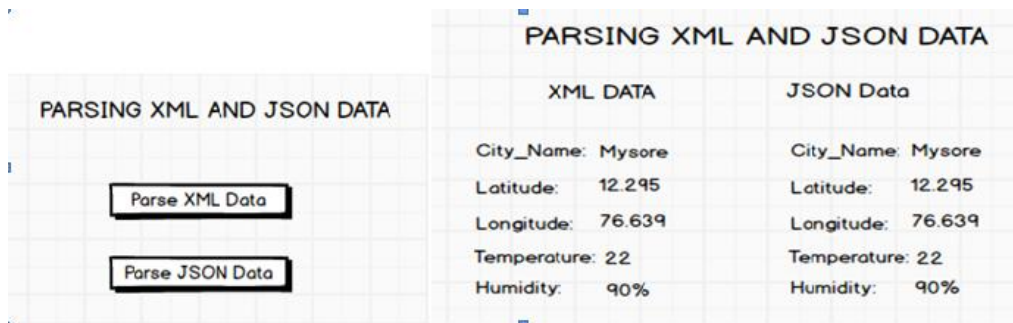
1	<p>Create an application to design a Visiting Card. The Visiting card should have a company logo at the top right corner. The company name should be displayed in Capital letters, aligned to the center. Information like the name of the employee, job title, phone number, address, email, fax and the website address is to be displayed. Insert a horizontal line between the job title and the phone number.</p> <div style="text-align: center; border: 1px solid gray; padding: 10px; width: fit-content; margin: 10px auto;">  </div>
2	<p>Develop an Android application using controls like Button, TextView and EditText for designing a calculator having basic functionality like Addition, Subtraction, Multiplication and Division.</p> <div style="text-align: center; border: 1px solid gray; padding: 10px; width: fit-content; margin: 10px auto;">  </div>
3	<p>Create a SIGN-Up activity with Username and Password. Validation of password should happen based on the following rules:</p> <ul style="list-style-type: none"> Password should contain uppercase and lowercase letters. Password should contain letters and numbers. Password should contain special characters. Minimum length of the password (the default value is 8). <p>On successful SIGN UP proceed to the next Login activity. Here the user should SIGN IN using the Username and Password created during signup activity. If the Username and Password are matched then navigate to the next activity which displays a message saying “Successful Login” or else display a toast message saying “Login Failed”. The user is given only two attempts and after that display a toast message saying “Failed Login Attempts” and disable the SIGN IN button. Use Bundle to transfer information from one activity to another.</p> <div style="display: flex; justify-content: space-around; margin: 10px 0;"> <div style="border: 1px solid gray; padding: 5px; text-align: center;"> <p>SIGNUP ACTIVITY</p> <p>Username: <input style="width: 100%;" type="text"/></p> <p>Password: <input style="width: 100%;" type="password"/></p> <p style="text-align: center;">SIGN UP</p> </div> <div style="border: 1px solid gray; padding: 5px; text-align: center;"> <p>LOGIN ACTIVITY</p> <p>Username: <input style="width: 100%;" type="text"/></p> <p>Password: <input style="width: 100%;" type="password"/></p> <p style="text-align: center;">SIGN IN</p> </div> </div>
4	<p>Develop an application to set an image as wallpaper. On click of a button, the wallpaper images should start to change randomly every 30 seconds.</p> <div style="text-align: center; border: 1px solid gray; padding: 10px; width: fit-content; margin: 10px auto;">  </div>



5 Write a program to create an activity with two buttons START and STOP. On pressing of the START button, the activity must start the counter by displaying the numbers from One and the counter must keep on counting until the STOP button is pressed. Display the counter value in a TextViewcontrol.



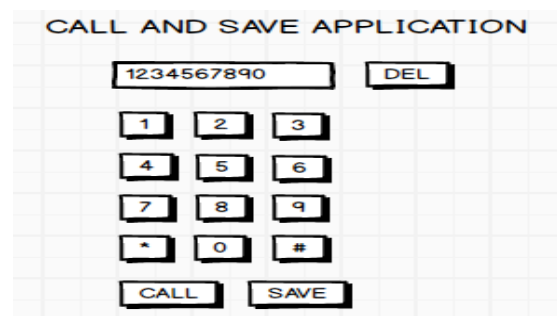
6 Create two files of XML and JSON type with values for City_Name, Latitude, Longitude, Temperature, and Humidity. Develop an application to create an activity with two buttons to parse the XML and JSON files which when clicked should display the data in their respective layouts side by side.



7 Develop a simple application with one EditText so that the user can write some text in it. Create a button called "Convert Text to Speech" that converts the user input text into voice.



8 Create an activity like a phone dialer with CALL and SAVE buttons. On pressing the CALL button, it must call the phone number and on pressing the SAVE button it must save the number to the phone contacts.





PART-B

1 Write a program to enter Medicine Name, Date and Time of the Day as input from the user and store it in the SQLite database. Input for Time of the Day should be either Morning or Afternoon or Evening or Night. Trigger an alarm based on the Date and Time of the Day and display the Medicine Name.

MEDICINE DATABASE

Medicine Name:

Date:

Time of the Day:

2 Develop a content provider application with an activity called "Meeting Schedule" which takes Date, Time and Meeting Agenda as input from the user and store this information into the SQLite database. Create another application with an activity called "Meeting Info" having DatePicker control, which on the selection of a date should display the Meeting Agenda information for that particular date, else it should display a toast message saying "No Meeting on this Date".

MEETING SCHEDULE

Date:

Time:

Meeting Agenda:

MEETING INFO

Pick a date to get meeting info:

3 Create an application to receive an incoming SMS which is notified to the user. On clicking this SMS notification, the message content and the number should be displayed on the screen. Use appropriate emulator control to send the SMS message to your application.

SMS APPLICATION

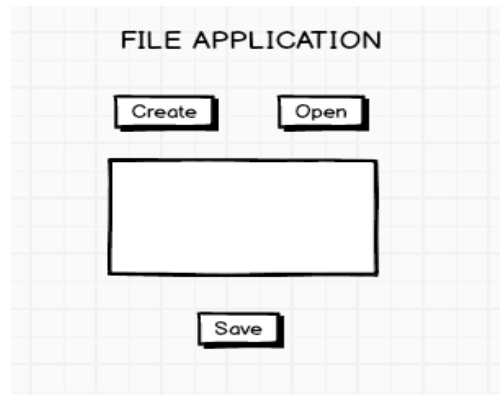
Display SMS Number

Display SMS Message

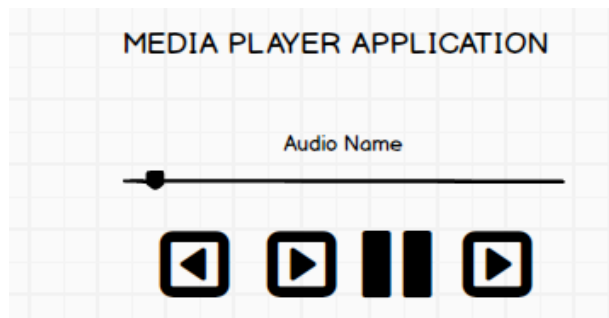
4 Write a program to create an activity having a Text box, and also Save, Open and Create buttons. The user has to write some text in the Text box. On pressing the Create button the text should be saved as a text file in Mksdcard. On subsequent changes to the text, the Save button should be pressed to store the latest content to the same file. On pressing the Open button, it should display the contents from the previously stored files in the Text box. If the user



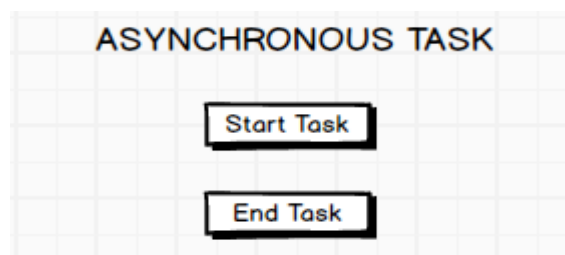
tries to save the contents in the Textbox to a file without creating it, then a toast message has to be displayed saying "First Create a File".



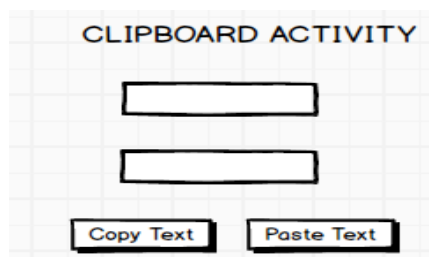
5 Create an application to demonstrate a basic media player that allows the user to Forward, Backward, Play and Pause an audio. Also, make use of the indicator in the seek bar to move the audio forward or backward as required.



6 Develop an application to demonstrate the use of Asynchronous tasks in android. The asynchronous task should implement the functionality of a simple moving banner. On pressing the **Start Task** button, the banner message should scroll from right to left. On pressing the **Stop Task** button, the banner message should stop. Let the banner message be "Demonstration of Asynchronous Task".



7 Develop an application that makes use of the clipboard framework for copying and pasting of the text. The activity consists of two EditText controls and two Buttons to trigger the copy and paste functionality.





8 Create an AIDL service that calculates Car Loan EMI. The formula to calculate EMI is

$$E = P * (r(1+r)^n)/((1+r)^n - 1)$$

where

- E = The EMI payable on the car loan amount
- P = The Car loan Principal Amount
- r = The interest rate value computed on a monthly basis
- n = The loan tenure in the form of months

The down payment amount has to be deducted from the principal amount paid towards buying the Car. Develop an application that makes use of this AIDL service to calculate the EMI. This application should have four EditText to read the Principal Amount, Down Payment, Interest Rate, Loan Term (in months) and a button named as "Calculate Monthly EMI". On click of this button, the result should be shown in a TextView. Also, calculate the EMI by varying the Loan Term and Interest Rate values.

CAR EMI CALCULATOR

Principal Amount:

Down Payment:

Interest Rate:

Loan Term (in months):

EMI: Result

5.0 Relevance to future subjects

SL. No	Semester	Subject	Topics / Relevance
01	VI	Project work	Academic Mini Project
02	VIII	Project work	Academic Project

6.0 Relevance to Real World

SL. No	Real World Mapping
01	Development of Android Applications
02	Development of Database Applications using Android

7.0 Books Used and Recommended to Students

Text Books	
1.	Google Developer Training, "Android Developer Fundamentals Course – Concept Reference", Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details (Download pdf file from the above link)
Reference Books	
1.	Erik Hellman, "Android Programming – Pushing the Limits", 1 st Edition, Wiley India Pvt Ltd, 2014. ISBN-13: 978-8126547197



2. Dawn Griffiths and David Griffiths, “**Head First Android Development**”, 1st Edition, O’Reilly SPD Publishers, 2015. ISBN-13: 978-9352131341
3. Bill Phillips, Chris Stewart and Kristin Marsicano, “**Android Programming: The Big NerdRanch Guide**”, 3rd Edition, Big Nerd Ranch Guides, 2017. ISBN-13: 978-0134706054

Additional Study material & e-Books

1. <https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details>
2. <https://www.w3schools.com/xml/>
3. <https://developer.android.com/docs>
4. <https://developer.android.com/courses/fundamentals-training/toc-v2>

8.0

Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

1. <https://www.coursera.org/>
2. <https://swayam.gov.in/>
3. <https://nptel.ac.in/>
4. <https://www.udemy.com/>
5. <https://www.mooc.org/>

9.0

Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	CSI communications	www.csi-india.org

10.0

Examination Note

External Assessment

SCHEME OF EXAMINATION:

Conduction of Practical Examination:

1. Experiment distribution
 - For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
 - For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.
2. Change of experiment is allowed only once and marks allotted for procedure to be made ~~z~~of the changed part only.
3. Marks Distribution (Coursed to change in accordance with university regulations)
 - For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15= 100Marks
 - For laboratories having PART A and PART B
 1. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks
 2. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

Internal Assessment:

Scheme of Evaluation for Continuous Assessment (30 Marks)

Description	Max. marks
Write-up	10
Conduction & Outcome	15
Viva-Voce	05
Total	30



Scheme of Evaluation for Internal Assessment (10 Marks)

- Lab IA will be conducted for 10 marks.

Description	Max. marks
Write-up & Conduction	05
Outcome & Conclusion	03
Viva-Voce	02
Total	10

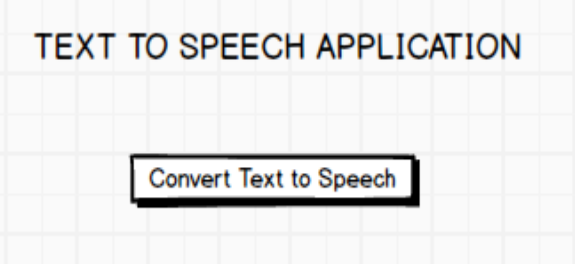
11.0 Course Delivery Plan

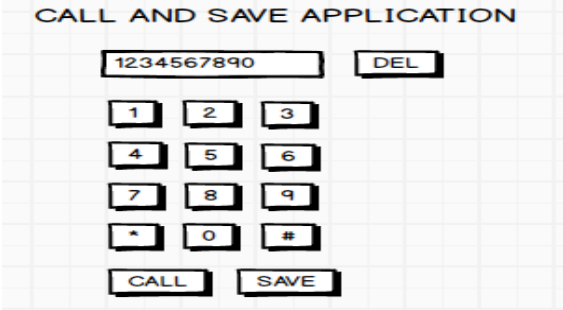
Expt. No	Lecture / Practical No	Name of the Experiment	% Of Portion
PART-A			
1		<p>Create an application to design a Visiting Card. The Visiting card should have a company logo at the top right corner. The company name should be displayed in Capital letters, aligned to the center. Information like the name of the employee, job title, phone number, address, email, fax and the website address is to be displayed. Insert a horizontal line between the job title and the phone number.</p> <div style="text-align: center; border: 1px solid gray; padding: 10px; width: fit-content; margin: 10px auto;"> </div>	6.25%
2		<p>Develop an Android application using controls like Button, TextView and EditText for designing a calculator having basic functionality like Addition, Subtraction, Multiplication and Division.</p> <div style="text-align: center; border: 1px solid gray; padding: 10px; width: fit-content; margin: 10px auto;"> </div>	6.25%
3		<p>Create a SIGN Up activity with Username and Password. Validation of password should happen based on the following rules:</p> <ul style="list-style-type: none"> • Password should contain uppercase and lowercase letters. • Password should contain letters and numbers. • Password should contain special characters. • Minimum length of the password (the default value is 8). <p>On successful SIGN UP proceed to the next Login activity. Here the user should SIGN IN using the Username and Password created during signup activity. If the Username and Password are matched then navigate to the next activity which displays a message saying “Successful Login” or else display a toast message saying “Login Failed”. The user is given only two attempts and after that display a toast message saying “Failed Login Attempts” and disable the SIGN IN button. Use Bundle to transfer information from one activity to another.</p>	6.25%



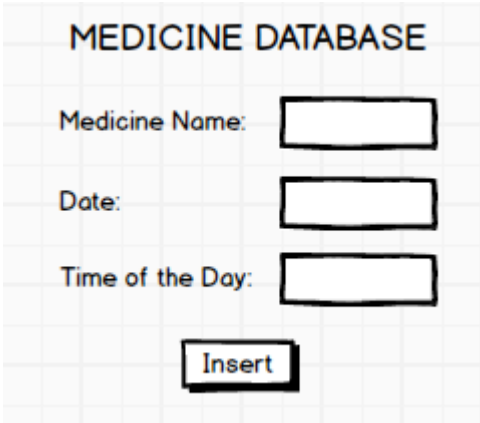
4		<p>Develop an application to set an image as wallpaper. On click of a button, the wallpaper images should start to change randomly every 30 seconds.</p> <div style="text-align: center;"> </div>	6.25%																								
5		<p>Write a program to create an activity with two buttons START and STOP. On pressing of the START button, the activity must start the counter by displaying the numbers from One and the counter must keep on counting until the STOP button is pressed. Display the counter value in a Text View control.</p> <div style="text-align: center;"> </div>	6.25%																								
6		<p>Create two files of XML and JSON type with values for City_Name, Latitude, Longitude, Temperature, and Humidity. Develop an application to create an activity with two buttons to parse the XML and JSON files which when clicked should display the data in their respective layouts side by side.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> </div> <div style="text-align: center;"> <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">XML DATA</th> <th colspan="2">JSON Data</th> </tr> </thead> <tbody> <tr> <td>City_Name:</td> <td>Mysore</td> <td>City_Name:</td> <td>Mysore</td> </tr> <tr> <td>Latitude:</td> <td>12.295</td> <td>Latitude:</td> <td>12.295</td> </tr> <tr> <td>Longitude:</td> <td>76.639</td> <td>Longitude:</td> <td>76.639</td> </tr> <tr> <td>Temperature:</td> <td>22</td> <td>Temperature:</td> <td>22</td> </tr> <tr> <td>Humidity:</td> <td>90%</td> <td>Humidity:</td> <td>90%</td> </tr> </tbody> </table> </div> </div>	XML DATA		JSON Data		City_Name:	Mysore	City_Name:	Mysore	Latitude:	12.295	Latitude:	12.295	Longitude:	76.639	Longitude:	76.639	Temperature:	22	Temperature:	22	Humidity:	90%	Humidity:	90%	6.25%
XML DATA		JSON Data																									
City_Name:	Mysore	City_Name:	Mysore																								
Latitude:	12.295	Latitude:	12.295																								
Longitude:	76.639	Longitude:	76.639																								
Temperature:	22	Temperature:	22																								
Humidity:	90%	Humidity:	90%																								
7		<p>Develop a simple application with one EditText so that the user can write some text in it. Create a button called "Convert Text to Speech" that converts the user input text into voice.</p>	6.25%																								



			
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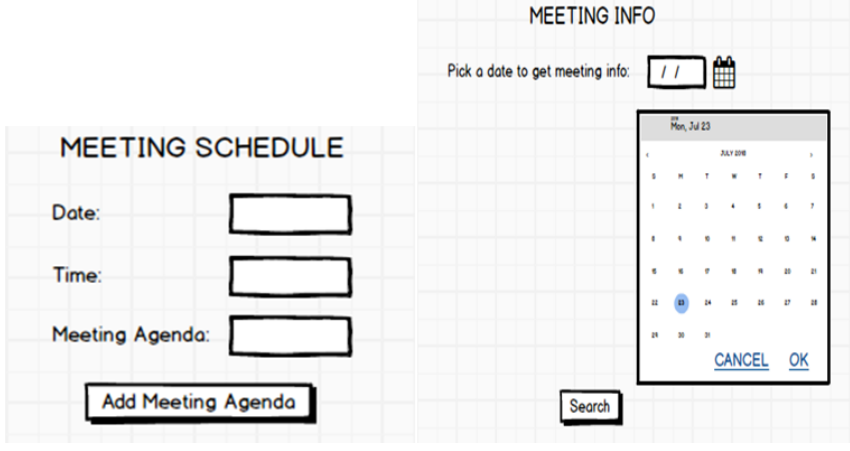
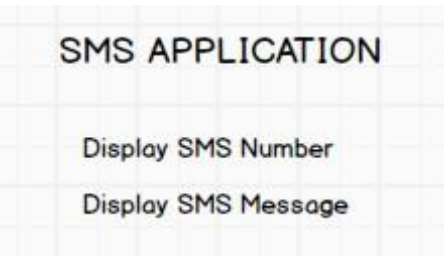
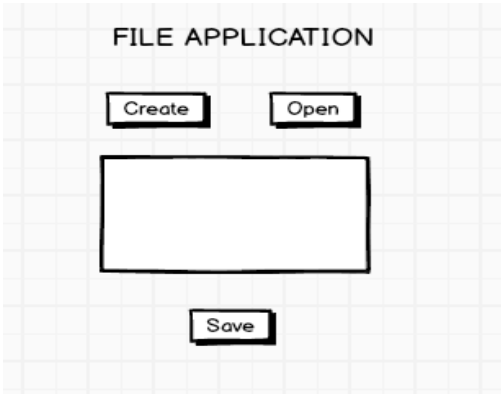
8		<p>Create an activity like a phone dialer with CALL and SAVE buttons. On pressing the CALL button, it must call the phone number and on pressing the SAVE button it must save the number to the phone contacts.</p> <div style="text-align: center;">  </div>	6.25%
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PART-B

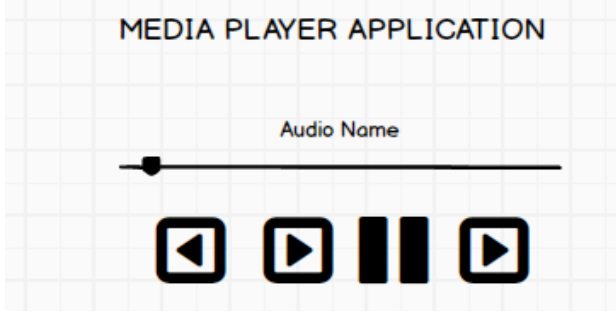
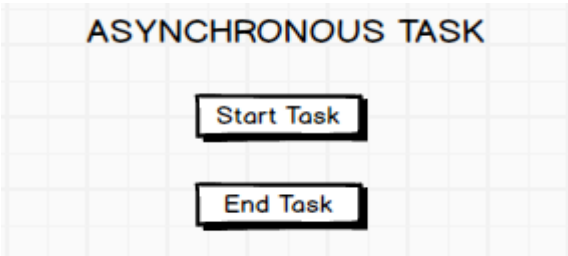
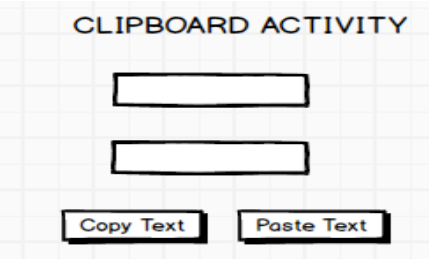
1		<p>Write a program to enter Medicine Name, Date and Time of the Day as input from the user and store it in the SQLite database. Input for Time of the Day should be either Morning or Afternoon or Evening or Night. Trigger an alarm based on the Date and Time of the Day and display the Medicine Name.</p> <div style="text-align: center;">  </div>	6.25%
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2		<p>Develop a content provider application with an activity called "Meeting Schedule" which takes Date, Time and Meeting Agenda as input from the user and store this information into the SQLite database. Create another application with an activity called "Meeting Info" having Date Picker control, which on the selection of a date should display the Meeting Agenda information for that particular date, else it should display a toast message saying "No Meeting on this Date".</p>	6.25%
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3		<p>Create an application to receive an incoming SMS which is notified to the user. On clicking this SMS notification, the message content and the number should be displayed on the screen. Use appropriate emulator control to send the SMS message to your application.</p> 	6.25%
4		<p>Write a program to create an activity having a Text box, and also Save, Open and Create buttons. The user has to write some text in the Text box. On pressing the Create button the text should be saved as a text file in Mk SD card. On subsequent changes to the text, the Save button should be pressed to store the latest content to the same file. On pressing the Open button, it should display the contents from the previously stored files in the Text box. If the user tries to save the contents in the Textbox to a file without creating it, then a toast message has to be displayed saying "First Create a File".</p> 	6.25%
5		<p>Create an application to demonstrate a basic media player that allows the user to Forward, Backward, Play and Pause an audio. Also, make use of the indicator in the seek bar to move the audio forward or backward as required.</p>	6.25%



			
6		<p>Develop an application to demonstrate the use of Asynchronous tasks in android. The asynchronous task should implement the functionality of a simple moving banner. On pressing the Start Task button, the banner message should scroll from right to left. On pressing the Stop Task button, the banner message should stop. Let the banner message be “Demonstration of Asynchronous Task”.</p> <div style="text-align: center;">  </div>	6.25%
7		<p>Develop an application that makes use of the clipboard framework for copying and pasting of the text. The activity consists of two Edit Text controls and two Buttons to trigger the copy and paste functionality.</p> <div style="text-align: center;">  </div>	6.25%
8		<p>Create an AIDL service that calculates Car Loan EMI. The formula to calculate EMI is</p> $E = P * (r(1+r)^n)/((1+r)^n - 1)$ <p>where</p> <p>E = The EMI payable on the car loan amount P = The Car loan Principal Amount r = The interest rate value computed on a monthly basis = The loan tenure in the form of months</p> <p>The down payment amount has to be deducted from the principal amount paid towards buying the Car. Develop an application that makes use of this AIDL service to calculate the EMI. This application should have four EditText to read the Principal Amount, Down Payment, Interest Rate, Loan Term (in months) and a button named as “Calculate Monthly EMI”. On click of this button, the result should be shown in a TextView. Also, calculate the EMI by varying the Loan Term and Interest Rate values.</p>	6.25%



	<div style="border: 1px solid black; padding: 10px; background-color: #f9f9f9;"> <h3 style="margin: 0;">CAR EMI CALCULATOR</h3> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 60%;"> <p>Principal Amount: <input style="width: 100%;" type="text"/></p> <p>Down Payment: <input style="width: 100%;" type="text"/></p> <p>Interest Rate: <input style="width: 100%;" type="text"/></p> <p>Loan Term (in months): <input style="width: 100%;" type="text"/></p> <p style="text-align: center; margin-top: 10px;"><input type="button" value="Calculate Monthly EMI"/></p> </div> <div style="width: 35%; text-align: right;"> <p>EMI: <input style="width: 50px;" type="text"/> Result <input style="width: 50px;" type="text"/></p> </div> </div> </div>	
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12.0 Question Bank

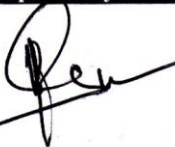



SL. NO.	Viva Questions
1	What is Android?
2	What is the Android SDK?
3	What are the different versions of Android OS that you remember?
4	What is the difference between Mobile Application Testing and Mobile Testing?
5	Name the languages supported for Android development.
6	What are the advantages of the Android Operating System?
7	Explain Android Architecture briefly.
8	Define and explain the Android Framework.
9	Which components are necessary for a New Android project?
10	Provide the important core components of Android.
11	Explain briefly – what is meant by Activities?
12	What is meant by Services?
13	Explain Activity Lifecycle briefly.
14	What is Intent?
15	Explain Implicit and Explicit Intents.
16	What is the importance of setting up permission in app development?
17	What is .apk extension in Android?
18	What is the database used for the Android platform?
19	What is ANR in Android?
20	Which are the dialog boxes supported by the Android platform?
21	What is ADB?
22	What is Activity Creator?
23	What is Orientation?
24	What is AIDL?
25	What are the data types supported by AIDL?
26	Explain the AndroidManifest.xml file and why do you need this?
27	What all devices have you worked on?
28	Which tools are used for debugging on the Android platform?
29	Which scenario can test only on real devices but not on an emulator?
30	Name the mobile automation tools that are available in the market.



31	How do you troubleshoot the android application which is crashing frequently?
32	How do you find memory leaks in the mobile app on the Android platform?
33	What is DDMS?
34	What are the different data storage options available on the Android platform?
35	Explain Sensors in Android.
36	Who is the founder of Android?
37	What are the advantages of Android?
38	Does android support other languages than java?
39	What are the core building blocks of android?

13.0 University Result

Examination	# of Students Appeared	# of Students Passed	FCD	FC	SC	Fail	% Passing
2021-22 Even	51	51	51	00	00	00	100
2020-21 Even	43	43	38	05	00	00	100

Prepared by	Checked by		
 Prof. Prasanna Patil	 Prof. S. V. Manjaragi	 HOD	 Principal