

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Information Technology

Scheme of Evaluation

B. Tech. I Semester (Information Technology)

(for batch admitted in academic session 2020 – 21)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.					
				Theory Slot			Practical Slot				End Sem. Exam.	Continuous Evaluation									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Lab work & Sessional			Skill Based Mini Project									
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment														
1.	230102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO				
2.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ				
3.	100020	ESC	Basic Civil Engineering & Mechanics	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP				
4.	100021	ESC	Basic Mechanical Engineering	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	MCQ				
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ				
6.	160111	DLC	IT workshop	-	-	-	-	60	20	20	100	-	-	4	2	Offline	SO				
Total				250	50	100	100	180	60	60	800	11	04	08	19	-	-				

Induction program of first three weeks (MC):Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visit / Virtual Visit to local Areas, Familiarization to Dept/Branch & Innovations

⁵ proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question

AO: Assignment + Oral

PP: Pen Paper

SO: Submission + Oral

Mode of Teaching				Mode of Examination					Total Credits
Theory		Lab	Theory		Lab				
Offline	Online	Blended	Offline	Online	PP	A+O	MCQ	SO	
-	03	08	04	04	03	03	09	04	19
-	15.79%	42.11%	21.05%	21.05%	15.79%	15.79%	47.37%	21.05%	Credits %

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Department of Information Technology

Scheme of Evaluation

B. Tech. II Semester (Information Technology)

(for batch admitted in academic session 2020 – 21)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.				
				Theory Slot				Practical Slot				End Sem. Exam.									
				End Term Evaluation		Continuous Evaluation		Continuous Evaluation													
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment	Lab work & Sessional	Skill Based Mini Project	L			T	P							
1.	100011	BSC	Engineering Mathematics –I	50	10	20	20	-	-	100	3	1	-	4	Offline	PP					
2.	160211	DC	Data Structures	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP				
3.	160212	DC	Object Oriented Programming & Methodology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	AO				
4.	160213	DC	Digital Electronics	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP				
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP				
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO				
Total				250	50	100	100	180	60	60	800	13	03	06	19	-	-				

Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.

^s proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question

AO: Assignment + Oral

PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination					Total Credits	
Theory			Lab	Theory			Lab			
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO		
		Offline	Online							
04	-	08	04	03	13	03	-	03	19	
21.05%	-	42.11%	21.05%	15.79%	68.42%	15.79%	-	15.79%	Credits %	

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Department of Information Technology

Scheme of Evaluation

B. Tech. III Semester (Information Technology)

For batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.									
				Theory Slot			Practical Slot				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assign ment	Lab work & Sessional	Skill Based Mini Project	L	T	P						
				End Term Evaluation		Continuous Evaluation		Continuous Evaluation																	
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assign ment	Lab work & Sessional	Skill Based Mini Project																
1.	100025	BSC	Engineering Mathematics-II	50	10	20	20	-	-	100	2	1	-	3	—	Offline	PP								
2.	160311	DC	Computer System Organization	50	10	20	20	-	-	100	2	1	-	3	—	Blended (2/1)	PP								
3.	160312	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	200	3	-	2	4	—	Blended (2/1)	PP								
4.	160313	DC	Database Management System	50	10	20	20	60	20	200	2	1	2	4	—	Blended (2/1)	PP								
5.	160314	DC	Operating System	50	10	20	20	-	-	100	3	-	-	3	—	Blended (2/1)	PP								
6.	160315	DLC	Java Programming Lab	-	-	-	-	60	20	20	100	-	1	2	2	Offline	SO								
7.	160316	DLC	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO								
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO								
9.	160317	DLC	Summer Internship Project - I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO								
Total				250	50	100	100	290	100	60	950	12	4	14	23	-	-								
10.	100002	MAC	Biology for Engineers	50	10	20	20	-	-	100	2	-	-	Grade	Online	MCQ									

⁵ proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCO: Multiple Choice Questions

AO: Assignment - Oral

OB: Open Boo

PP: Pen Paper SO: Submission + Oral

Mode of Teaching					Mode of Examination					Total Credits 12	
Theory		Lab	NEC	Theory			Lab	NEC			
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
04	-	08	04	06	01	15	-	-	07	01	23
17.39%	-	44.78%	17.39%	26.09%	4.35%	65.22%	-	-	30.43%	4.35%	Credits 9 M

COLLEGE
DEAN (ACADEMICS)
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Department of Information Technology

Scheme of Evaluation

B. Tech. IV Semester (Information Technology)

For batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.				
				Theory Slot			Practical Slot				End Sem. Exam.	End Sem. Exam.	Continuous Evaluation							
				End Term Evaluation		Continuous Evaluation		Continuous Evaluation					Lab work & Sessional		Skill Based Mini Project					
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assign ment	End Sem. Exam.	End Sem. Exam.											
1.	100003	BSC	Engineering Mathematics- III	50	10	20	20	-	-	100	2	1	-	3	Offline	PP				
2.	160411	DC	Computer Graphics & Multimedia	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP			
3.	160412	DC	Software Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ			
4.	160413	DC	Computer Networks	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP			
5.	100009	MC	Cyber Security	50	10	20	20	-	-	-	100	2	-	-	2	Online	MCQ			
6.	160414	DLC	Python Programming Lab	-	-	-	-	60	20	20	100	-	1	2	2	Offline	SO			
7.	200XXX	CLC	Novel Emerging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO			
Total				250	50	100	100	230	60	60	850	10	5	8	19	-	-			
8.	1000001	MAC	Indian Constitution and Traditional Knowledge	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ			

Summer Internship Project-II (Soft skill Based) for two weeks duration; Evaluation in V Semester

⁵proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question **AO:** Assignment + Oral **OB:** Open Book **PP:** Pen Paper **SO:** Submission + Oral

ACADEMICS

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Department of Information Technology

Scheme of Evaluation

B. Tech. V Semester (IT)

(for batch admitted in academic session 2020 – 21)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.				
				Theory Slot			Practical Slot													
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation		Lab work & Sessional	Skill Based Mini Project								
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project										
1.	160511	BSC	Discrete Structures	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP			
2.	160512	DC	Data Science using Python	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	MCQ			
3.	160513	DC	Theory of Computation	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP			
4.	160514	DC	Microprocessor & Interfacing	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP			
5.	160515	DC	Soft Computing Techniques	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP			
6.	160516	DLC	Major Project-I**	-	-	-	-	60	40	-	100	-	-	4	2	Offline	SO			
7.	160517		Primer/ Self-Learning/Presentation/ Self-Study (SWAYAM/NPTEL/ MOOC)*	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO			
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO			
9.	160518	DLC	Summer Internship Project-II (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO			
Total				250	50	100	100	350	140	60	1050	14	02	18	25	-	-			
10.	100005	MAC	Project Management & Financing	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ			
11.	100006	MAC	Disaster Management	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ			

Additional Course for Honours or minor Specialization

Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization

*proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SO: Submission + Oral

** The minor project-I may be evaluated by an internal committee for awarding sessional marks.

*Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation

Mode of Teaching						Mode of Examination						Total Credits	
Theory			Lab	NEC	Blended	Theory			Lab	NEC			
Offline	Online	Blended				Offline	Interactive	PP					
04	-	08	04	08	01	13	-	03	08	01	25		
DEAN (ACADEMIC)	-	32.00%	16.00%	32.00%	4.00%	52.00%	-	12.00%	32.00%	4.00%	Credits %		

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List of courses to be opted for Honours or Minor specialization in V Semester

Honours* <i>(to be opted by students of Parent Department)</i>	
Course Code	Course Name
IT0522H1	Software Project Management (12 Weeks)
IT0522H2	Distributed Systems (8 Weeks)
IT0519H3	The Joy of Computing using Python (12 Weeks)

Minor specialization * <i>(to be opted by students of Other Department)</i>	
Course Code	Course Name
IT0521M1	Programming, Data Structures and Algorithms in Python (8 Weeks)
IT0521M2	Programming in Java (12 Weeks)
IT0520M1	Introduction to Operating Systems (8 Weeks)

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

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Department of Information Technology

Scheme of Evaluation

B. Tech. VI Semester (IT)

(for batch admitted in academic session 2020 – 21)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.			
				Theory Slot			Practical Slot			MOOCs			End Sem. Exam.	Assignment	Exam						
				End Term Evaluation		Continuous Evaluation	Lab work & Sessional	Continuous Evaluation													
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.		Quiz/ Assignment	Lab work & Sessional	Skill Based Mini Project											
1.	160611	DC	Compiler Design	50	10	20	20	60	20	20	-	-	200	2	1	2	4	Blended	PP		
2.	160612	DC	Data Mining & Pattern Warehousing	50	10	20	20	60	20	20	-	-	200	3	-	2	4	Blended	PP		
3.	160613	DC	Artificial Intelligence & Machine Learning	50	10	20	20	60	20	20	-	-	200	3	-	2	4	Blended	PP		
4.	DE	DE	Departmental Elective* (DE-1)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ		
5.	OC	OC	Open Category (OC-1)	50	10	20	20	-	-	-	-	-	100	3	-	-	3	Blended	PP		
6.	160614	DLC	Minor Project-II**	-	-	-	-	60	40	-	-	-	100	-	-	4	2	Offline	SO		
7.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	-	-	50	-	-	2	1	Interactive	SO		
Total				200	40	80	80	290	100	60	25	75	950	14	01	12	21	-	-		
8.	100000 7	MAC	Intellectual Property Rights (IPR)	50	10	20	20	-	-	-	-	-	100	2	-	-	GRADE	Online	MCQ		

Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester

Additional Course for Honours or minor Specialization	Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization
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* proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question

AO: Assignment + Oral

PP: Pen Paper

SO: Submission + Oral

** The minor project-II may be evaluated by an internal committee for awarding sessional marks.

Mode of Teaching					Mode of Examination					Total Credits
Theory			Lab	NEC	Theory			Lab	NEC	
Offline	Online	Blended	Offline	Interactive	PP	AO	MCQ	SO	SO	
00	03	12	05	01	12	00	03	05	01	21
00%	14.29%	57.14%	23.81%	4.76%	57.14%	00%	14.29%	23.81%	4.76%	Credits %

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

DEAN (ACADEMICS)
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27/12/22

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DE -1*		
S. No.	Subject Code	Subject Name
1.	160661	Introduction To Internet Of Things (12 Weeks)
2.	160662	Information Security - 5 - Secure Systems Engineering (8 Weeks)
3.	160663	Advanced Graph Theory (8 Weeks)

OC-1		
S. No.	Subject Code	Subject Name
1.	910102	Data Mining & Warehousing
2.	910103	Software Engineering

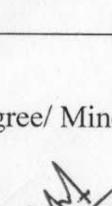
List of courses to be opted for Honours or Minor specialization in VI Semester

Honours* <i>(to be opted by students of Parent Department)</i>	
Course Code	Course Name
IT0623H1	Quantum Algorithms and Cryptography (12 Weeks)
IT0623H2	Object Oriented System Development Using UML, Java And Patterns (12 Weeks)
IT0620H2	GPU Architectures And Programming (12 Weeks)
IT0623H3	The Joy of Computing using Python (12 Weeks)
IT0623H4	Advanced Computer Architecture (12 Weeks)

Minor specialization * <i>(to be opted by students of Other Department)</i>	
Course Code	Course Name
IT0620M2	Programming, Data Structures and Algorithms in Python (8 Weeks)
IT0620M3	Programming in Java (12 Weeks)
IT0621M1	Design and analysis of algorithms (8 Weeks)
IT0623M1	Introduction to Database Systems (12 Weeks)

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

Note: In each semester (starting from V to VIII semester), it is required to opt for new subjects towards Honours Degree/ Minor Specialization.


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Department of Information Technology

Scheme of Evaluation

B. Tech. VII Semester (IT)

(for batch admitted in academic session 2020 – 21)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.			
				Theory Slot				Practical Slot			MOOCs		End Sem. Exam.	Lab work & Sessional	Skill Based Mini Project	Assignment	Exam				
				End Term Evaluation		Continuous Evaluation		Continuous Evaluation													
				End Sem. Exam.	\$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment	End Sem. Exam.	Lab work & Sessional	Skill Based Mini Project	Assignment	Exam									
1.	DE	DE	Departmental Elective (DE-2)	50	10	20	20	-	-	-	-	-	100	3	-	-	3	Blended	PP		
2.	DE	DE	Departmental Elective* (DE-3)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Blended	MCQ		
3.	DE	DE	Departmental Elective* (DE-4)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Blended	MCQ		
4.	OC	OC	Open Category (OC-2)	50	10	20	20	-	-	-	-	-	100	3	-	-	3	Blended	PP		
5.	160711	DLC	Departmental Lab (IoT)	-	-	-	-	60	20	20	-	-	100	-	-	4	2	Offline	SO		
6.	160712	DLC	Creative Problem Solving (Evaluation)	-	-	-	-	25	25	-	-	-	50	-	-	2	1	Offline	SO		
7.	160713	DLC	Summer Internship Project-III (04 weeks) (Evaluation)	-	-	-	-	60	-	-	-	-	60	-	-	4	2	Interactive	SO		
Total				100	20	40	40	145	45	20	50	150	610	12	-	10	17				
8.	1000008	MAC	Universal Human Values & Professional Ethics(UHVPE)	50	10	20	20	-	-	-	-	-	100	2	-	-	GRADE	Online	MCQ		
Additional Course for Honours or minor Specialization				Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization																	

^{\$} proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

MCQ: Multiple Choice Question

AO: Assignment + Oral

PP: Pen Paper

SO: Submission + Oral

Mode of Teaching						Mode of Examination						Total Credits	
Theory			Lab	NEC		Theory			Lab	NEC			
Offline	Online	Blended	Offline	Interactive	PP	AO	MCQ	SO	SO	SO	SO		
-	-	12	05	-	06	-	06	05	-	-	-	17	
00	-	70.58%	29.42%	-	35.29%	-	35.29%	29.42%	-	-	-	Credits %	

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

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DE -2

S. No.	Subject Code	Subject Name
1.	160731	Optimization Methods in Engineering
2.	160732	Pattern Recognition
3.	160733	Mobile Computing

OC-2

S. No.	Subject Code	Subject Name
1.	910203	IoT and Its Applications
2.	910204	Software Testing

DE-3*

S. No.	Subject Code	Subject Name
1.	160761	Software Testing (12 Weeks)
2.	160762	Google Cloud Computing Foundations (8 Weeks)
3.	160763	Social Network Analysis (12 Weeks)

DE-4*

S. No.	Subject Code	Subject Name
1.	160764	Deep Learning (12 Weeks)
2.	160765	Big Data Computing (8 Weeks)
3.	160766	Computer Vision (12 Weeks)

List of courses to be opted for Honours or Minor specialization in VII Semester

Honours* <i>(to be opted by students of Parent Department)</i>		Minor specialization * <i>(to be opted by students of Other Department)</i>	
Course Code	Course Name	Course Code	Course Name
IT0623H3	The Joy of Computing using Python (12 Weeks)	IT0520M1	Introduction to Operating Systems (8 Weeks)
IT0723H1	Reinforcement Learning (12 Weeks)	IT0521M2	Programming in Java (12 Weeks)
IT0723H2	Introduction To Haskell Programming (8 Weeks)	IT0620M2	Programming, Data Structures and Algorithms Using Python (8 Weeks)
IT0723H3	Advanced Distributed Systems (12 Weeks)	IT0621M1	Design and analysis of algorithms (8 Weeks)
		IT0723M1	Distributed Systems (8 Weeks)
		IT0723M2	Introduction To Internet Of Things (12 Weeks)
		IT0723M3	Computer Graphics (8 Weeks)

*** Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform**

Note: In each semester (starting from V to VIII semester), it is required to opt for new subjects towards Honours Degree/ Minor Specialization.

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INTRODUCTION TO COMPUTER PROGRAMMING
230102

COURSE OBJECTIVES

- To familiar with program readability/understanding including program style/formatting and self-documenting code.
- To familiar with debugging process.
- To design and implement basic programming solutions including statements, control structures, and methods.

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

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Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
- Paul Deitel and Harvey M. Deitel , How to Program, Pearson Publication.
- Yashavant Kanetkar , Let Us C, BPB publication.
- E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1: identify situations where computational methods and computers would be useful.

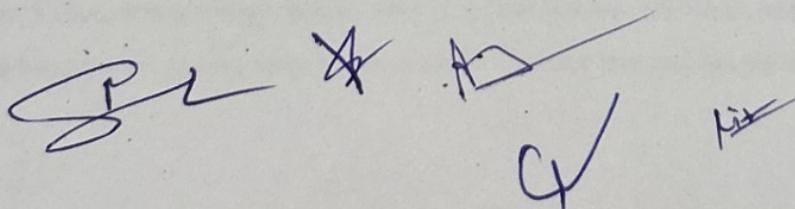
CO2: describe the basic principles of imperative and structural programming.

CO3: develop a pseudo-code and flowchart for a given problem.

CO4: analyze the problems and choose suitable programming techniques to develop solutions.

CO5: design, implement, debug and test programs.

CO6: design computer programs to solve real world problems.



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DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO COMPUTER PROGRAMMING

(160112/230102)

LIST OF EXPERIMENTS

1. Write a C program to add two numbers and display its sum.
2. Write a C program to input two number from the user and display the multiplication of these numbers.
3. Write a Program to calculate and display the volume of a cylinder for height and radius parameters to be input from the user.
4. Write C program to realize the following expressions:
 - a. $V = u + at$
 - b. $S = ut + 1/2a$
 - c. $T = 2*a + \sqrt{b} + 9c$
5. Write a program to take input of name, rollno and marks obtained by a student in 5 subjects of 100 marks each and display the name, rollno with percentage score secured.
6. Write a program to swap values of two variables with and without using third variable.
7. Write a program to illustrate the use of unary prefix and postfix increment and decrement operators.
8. Write a program to find the largest of three numbers using ternary operators.
9. Write a program to find the roots of quadratic equation.
10. Write a Program to Check Whether a Number is Prime or not.
11. Write a program to compute grade of students using if else ladder as per MITS norms.
12. Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)
13. Write a program to print the sum of digits of a number using for loop.
14. Write a program to display the following pattern using for loops.

(i)	(ii)	(iii)	(iv)
* * * * *	1	1	A
* * * *	2 2	1 2	A B
* * *	3 3 3	1 2 3	A B C
* *	4 4 4 4	1 2 3 4	A B C D
*	5 5 5 5 5	1 2 3 4 5	A B C D E

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DEPARTMENT OF INFORMATION TECHNOLOGY

(v)	*	(vi)	* * * * * * * * *	(vii)	1 1 2 1 1 2 3 2 1 1 2 3 4 3 2 1 1 2 3 4 5 4 3 2 1	(viii)	A B C D E F A B C D E A B C D A B C A B A
	*			*			
	***		*** * * * *				
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(ix)	1	(x)	* * * * * * *	(xi)	* * * * * * *	(xii)	* * * * *
1	1 2 3		*** * * * *		*		*
1 2 3 4 5	1 2 3		** * * * *		*		*
1			*		*		*
					*		*

15. Write a program to insert 10 elements into an array and print the elements of the array.
 16. Write a program to calculate factorial of a number using recursion.

Sachin Patel
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DEPARTMENT OF INFORMATION TECHNOLOGY

IT WORKSHOP (160111)

L	T	P	Total Credits
-	-	4	2

COURSE OBJECTIVES:

- To make use of computers for various purposes like surfing the net, sending/ receiving emails, preparation of various documents and presentations, preparing small databases, maintenance of accounts.
- To acquire the knowledge of computer system, mother board and its processing unit.
- To be aware of different memories, windows installation, hardware and software troubleshooting.

Unit-I

Computer Hardware: Introduction to Hardware Peripherals like RAM, ROM, Keyboard, Hard disk drive, Mouse , Processors, Generation of processor , Working of SMPS , Study of various ports, Assembly and Disassembly of Computer, Study of Networking Cable and it's types, Installation and Partition of Hard Disk, Troubleshooting & Fault finding.

Unit-II

Operating System and software installations: Introduction to Operating System, Types of Operating System (Windows and Linux), Evolution of Operating System, Introduction of Software, Types of Software, Installation steps for Operating System (Windows, Linux etc), Creating Virtual Machine using VMware/ VirtualBox.

Unit-III

Word & Excel Orientation: Overview of Microsoft office word / Excel, New Features of Microsoft Office, Working with Documents in Microsoft Word /Excel, Saving the File, Formatting the Text, Alignment of Text, Applying Fonts, Spell Checking, Inserting Header and Footer , Charts and Graphics in Microsoft Word/Excel, Working with Tables, functions and Macros in Microsoft Word/Excel, Validating Data in Microsoft Excel, Using formulae in Excel, Creating project/certificates/Newsletter using Word.

*Mr. K. S. S. Acharya
Date: 20/01/2016*

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PowerPoint Presentation: Introduction to Microsoft PowerPoint, Use of Standard Formatting toolbar, Working with Charts and Tables, Editing slides, Changing templates, Slide Layouts, Inserting clipart & Pictures into slide, Slide Transitions, Animation, Inserting sound and movies into slides, Create & Deliver dynamic presentation.

Unit-IV

V Computer Application: Microsoft Disk Operating System (MS-DOS): Internal Commands, External Commands, Batch File etc. Overview of Linux, Common Linux Features, **Essential Linux commands**, Advantage of Linux, Creating E-mail Account, E-mail Writing , Blog Writing, Net Surfing and Chatting ,Customize Web Browser with the LAN proxy setting, Bookmarks, Search Toolbars and Pop up Blockers, Install Antivirus Software, Configure personal firewall and Window update, Customize browser to block pop ups, Cyber Hygiene.

Unit-V

Internet: Introducing the Networking concept using LAN & WAN, Introduction, Evolution and Uses of Internet, Concepts of Web Browser, Web Page and Web Site, Study of various Internet based services like Email, Social Network, Chat, Introduction to Cyber Security and Cyber Laws.

Server: Introduction to Server, Difference between server and normal desktop, Evolution of servers, Study of various servers. Web designing using HTML/CSS.

RECOMMENDED BOOKS

- Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
- The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech.
- Introduction to Information Technology, ITL Education Solutions Limited, Pearson Education.
- PC Hardware and A+ Handbook - Kate J. Chase PHI (Microsoft)

COURSE OUTCOMES

After completion of the course student would be able to:

CO1. understand the basic concept and structure of computer hardware and networking

CO2. demonstrate installation of windows and connections through ports of the hardware and networking.

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- CO3. identify the existing configuration of the computers and peripherals.
- CO4. apply the knowledge about computer peripherals to identify/rectify problems onboard.
- CO5. explain the concept of Memory, Motherboard, Bus and SMPS.
- CO6. manage data backup and restore operations on computer and update application software.

A M *S* *Surat* *Appliance* *PD*
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B *C*

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**IT WORKSHOP
(160111)
LIST OF PROGRAMS**

1. Design Resume on Word.
2. Prepare powerpoint presentation on one latest technology.
3. Write a request and apology email.
4. Run MS-DOS commands/Linux commands.
5. Study of Computer Hardware (RAM, ROM, Keyboard, Hard disk drive, Mouse, processors, hard disk etc).
6. Installation and partition of hard disk.
7. Installations of OS (Windows/Linux etc).
8. Disassemble and assemble the PC.
9. Study of PC troubleshooting.
10. Creating Virtual Machine using VMWARE.
11. Design Webpage using HTML & CSS.

Mr. Sajid Javedullah
QMSK CW

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DATA STRUCTURES
160211 (DC-1)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
- To understand various techniques of searching and sorting.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations. arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

*Dr. A. S.
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Unit-V

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. outline the basics of Algorithms and their performance criteria's.
- CO2. explain the working of linear/Non Linear data structures.
- CO3. identify the appropriate data structure to solve specific problems.
- CO4. analyze the performance of various Data Structures & their applications.
- CO5. evaluate the time/space complexities of various data structures & their applications.
- CO6. design the optimal algorithmic solutions for various problems.

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OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
160212 (DC-2)

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of OOPS, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

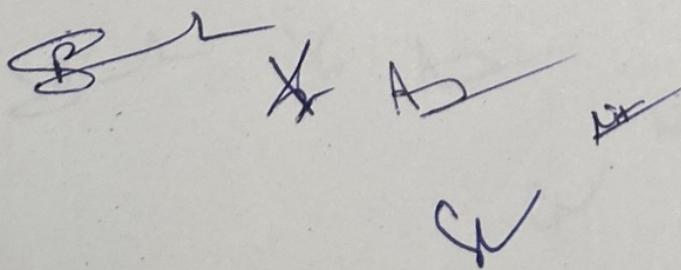
Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

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Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. tell the concepts of classes & objects and their significance in real world.
- CO2. explain the benefits of object oriented design.
- CO3. build C++ classes using appropriate encapsulation and design principles.
- CO4. analyze the utilization of inheritance and polymorphism in the solution of problems.
- CO5. choose appropriate object orient programming concepts for solving real world problems.
- CO6. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.

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DIGITAL ELECTRONICS
160213 (DC-3)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
- To learn various number systems, boolean algebra and logic gates.
- To understand the concept of counters, latches and flip-flops.

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

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RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the computer architecture for defining basic component and functional unit.
- CO2. recall different number system and solve the basic arithmetic operations.
- CO3. develop the understanding of combinational circuits.
- CO4. analyze the basic concept of sequential circuits.
- CO5. compare various memories.
- CO6. solve the boolean functions using logic gates.

*Dr. S. K. Ray
Under Graduate Curriculum
Siv*

DEPARTMENT OF INFORMATION TECHNOLOGY

DATA STRUCTURES
(160211/230202)
LIST OF EXPERIMENTS

1. Write a program for implementing the following sorting methods to arrange a list of integers in ascending order:
 - a. Selection sort
 - b. Quick sort
 - c. Merge sort
2. Write a program to implement Stack using array.
3. Write a program to count the number of nodes in the binary search tree.
4. Write a program to implement stack using linked list.
5. Write a program to implement AVL Tree.
6. Write a program to implement Breadth First Search and Depth First Search.
7. Write a program to implement graph using array.
8. Write a program to implement Spanning Tree.
9. Write a program to implement Heap Sort.
10. Write a program to implement binary search algorithm.

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DEPARTMENT OF INFORMATION TECHNOLOGY

OBJECT ORIENTED PROGRAMMING AND METHODOLOGY

(160212/230203)

LIST OF PROGRAMS

1. WAP to swap two integers without using a third variable. The swapping must be done in a different method in a different class.
2. WAP that uses a class where the member functions are defined outside a class.
3. WAP to find the greater of two given numbers in two different classes using friend function.
4. Create an abstract class Shape which has a field PI=3.14 as final and it has an abstract method Volume. Make two subclasses Cone and Sphere from this class and they print their volume.
5. Create a class called LIST with two pure virtual function store() and retrieve(). To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.
6. WAP to define the function template for calculating the square of given numbers with different data types.
7. Design a class to represent a bank account. Which include contains account number, name of the depositor, type of the account, balance amount in the account. Define Methods, to assign initial values, to Deposit an amount, to Withdraw amount after checking balance, to display name and balance.
8. Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviors, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods.
9. WAP Containing a Possible Exception. Use a Try Block to Throw it and a Catch Block to Handle it Properly.
10. WAP to raise an exception if any attempt is made to refer to an element whose index is beyond the array size.

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Department of Information Technology

COMPUTER SYSTEM ORGANIZATION
160311

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVE

- To provide the fundamental knowledge of a computer system and its processing units.
- To provide the details of input & output operations, memory management and performance measurement of the computer system.
- To understand how computer represents and manipulate data.

Unit -I

Introduction: Von Newman Model, Various Subsystems, CPU, Memory, I/O, System Bus, CPU and Memory Registers, Program Counter, Accumulator, Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Tree-State Bus Buffers, Bus and Memory Transfers, Arithmetic Micro-Operation, Logic Micro-Operation, Shift Micro-Operation Register Transfer Micro Operations, Arithmetic Micro-Operations, Logic Micro-Operations and Shift Micro-Operations.

Unit- II

Computer Arithmetic: Addition and Subtraction with Signed-Magnitude, Multiplication Algorithm, Division Algorithm, Division Algorithms, Floating-Point Arithmetic Operations.

Central Processing Unit (CPU): General Purpose Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC), Hardwired and Microprogrammed Control.

Unit -III

Microprocessors: Introduction of 8085 Microprocessor: Architecture, Instruction Set, Addressing Modes, Interrupts and Basic Assembly Language Programming.

Unit -IV

Input-Output Organization: Peripheral Devices, I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA (DMA Controller, DMA

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Department of Information Technology

Transfer), Input-Output Processor (IOP), Data Transfer- Serial/Parallel, Simplex/ Half Duplex/ Full Duplex.

Unit-V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory- Organization and Mappings, Memory Management Hardware, Introduction to Pipelining & Multiprocessors.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
- Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar, Penram International Publishing (India) Pvt.Ltd.
- Computer Organization, Carl Hamacher, THM.
- Computer Architecture and Organization, J P Hayes, Mc-Graw Hills, New Delhi.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. recall the basic building blocks of computer Architecture.
- CO2. compare different memories.
- CO3. apply the concept of memory mapping, multiprocessor and pipelining in solving real world problems.
- CO4. analyze various modes of Input-Output data transfer.
- CO5. evaluate the arithmetic related to the number system.
- CO6. develop the skill of writing low level programming.

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Department of Information Technology

DESIGN & ANALYSIS OF ALGORITHMS
160312

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** B-Trees and Traversal Techniques, Topological sort.

Unit-II

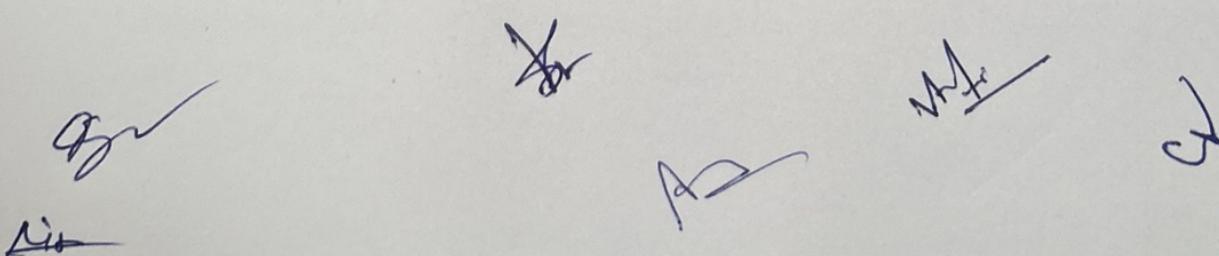
Divide and Conquer Method: Introduction and its Examples such as Finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication and additional real world problems on divide and conquer.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prims's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's single source shortest path algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, The Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling salesman problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design, Matrix chain multiplication



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Department of Information Technology

Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch & Bound:** Introduction and its Examples like - Traveling Salesperson Problem etc. **NP-Completeness:** Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP-Complete Problems.

RECOMMENDED BOOKS

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press.
- Introduction to Algorithms, Cormen Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullmann, Pearson.
- Algorithm Design, Michael T Goodrich, Roberto Tamassia, Wiley India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. demonstrate a familiarity with major algorithms and data structures.
- CO2. apply important algorithmic design paradigms and methods of analysis.
- CO3. analyze the asymptotic performance of algorithms.
- CO4. compare different design techniques to develop algorithms for computational problems.
- CO5. design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch n bound approach.
- CO6. understand the hardness and different classes of hardness. Further, design approximate solutions for computationally hard problems.

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Department of Information Technology

DATABASE MANAGEMENT SYSTEM

160313

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Database Approach v/s Traditional File Approach, Advantages of Database System, Database Users and Administrator, Database System Environment, Application Architectures, Schemas, Instances, Data Independence, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Entities and Relationship Model: Entity types, Entity sets, Attributes and Keys, Relationship Types and Sets, Constraints, Design issue, E-R Diagram, Weak Entity Sets.

Unit-II

Relational Model: Structure of Relational Databases: Relation, Attribute, Domain, Tuples, Degree, Cardinality, Views, Database Relations, Properties of Relations, Attributes, Keys, Attributes of Relation, Domain Constraints, Integrity Constraints.

Relational Algebra: Concepts and Operations: Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Relational Calculus: Tuple Relational Calculus, Domain Relational Calculus.

Unit-III

SQL: Purpose of SQL, Data Definition Language (DDL) Statements, Data Manipulation Language (DML) Statements Update Statements & Views in SQL, Data Control Language (DCL)

Department of Information Technology

Unit-IV

Relational Database Design: Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependency, The Process of Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Decomposition, Desirable Properties of Decomposition: Dependency Preservation, Lossless Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Management: Transaction Concept, Transaction State, Concurrent Executions, Serializability: Conflict and View Serializability, Concurrency Control: Lock-Based Protocol, Recovery: Log-Based Recovery.

RECOMMENDED BOOKS

- Database System Concepts, Abraham Silberschatz Henry F. Korth S. Sudarshan, McGraw-Hill 6th Edition.
- Database Management System, Raghu Ramakrishnan Johannes Gehrke, McGraw Hill 3rd Edition.
- Fundamentals of Database System, Elmasri & Navathe, Addison-Wesley Publishing, 5th Edition.
- An Introduction to Database Systems, Date C. J, Addison-Wesley Publishing, 8th Edition.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. demonstrate the concepts of different type of database system.
- CO2. apply relational algebra concepts to design database system.
- CO3. make use of queries to design and access database system.
- CO4. analyze the evaluation of transaction processing and concurrency control.
- CO5. determine the optimize database for real world applications.
- CO6. design a database system for a real world application.

Co-Pr *AK* *MT* *SD*

Department of Information Technology

OPERATING SYSTEM

160314

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
- To compare several different approaches to memory management, file management and process management.
- To understand various problems related to concurrent operations and their solutions.

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Unit IV

Memory Management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling.

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Department of Information Technology

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Wiley Publication.
- Operating Systems, Internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
- Modern Operating Systems, Tanenbaum, Fourth Edition. Pearson Publication.

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

- CO1. tell the basic concept of operating systems.
- CO2. explain the working procedure of the operating system.
- CO3. analyze the various operating system problems and issues.
- CO4. develop the solutions for various operating system problems and issues.
- CO5. measure the performance of various scheduling and allocation techniques.
- CO6. test the working of various scheduling and allocation techniques.

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Department of Information Technology

JAVA PROGRAMMING LAB
160315

L	T	P	Total Credits
-	1	2	2

COURSE OBJECTIVES

- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To acquire the ability to write a computer program to solve specified problems.
- To be able to use Java SDK environment to create, debug and run simple Java programs.

Unit-I

Introduction to Java programming: Overview and Characteristics of Java, The Java Virtual Machine, Installing Java, Java Program Development, Java Source File Structure, Compilation, Executions. Packages, Package access, Variables and data types, Conditional and looping constructs, Arrays.

Unit-II

Object-oriented programming with Java Classes and Objects: Fields and Methods, Constructors, Overloading methods, Nested classes, Overriding methods, Polymorphism, Making methods and classes final, Wrapper classes.

Unit-III

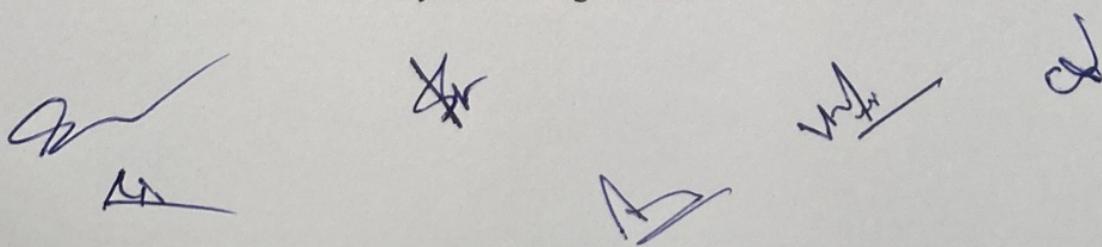
Extending Classes and Inheritance: Types of Inheritance in Java, Abstract classes and methods, Interfaces, use of 'super', Polymorphism in inheritance. Garbage collection in JAVA.

Exception handling: Try- Catch, Throw, Throws, Finally constructs, The Exception class.

Unit-IV

String Package and Multithreading: Operation on String, Mutable & Immutable String, Tokenizing a String, Creating Strings using String Buffer class.

Understanding Threads: Needs of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities and Synchronizing Threads.

A series of handwritten signatures and initials are scattered across the bottom of the page. From left to right, there are: a stylized 'A', a 'X', a 'V', a 'W', and a 'D'.

Department of Information Technology

Unit-V

The I/O Package: Input Stream and Output Stream classes, Reader and Writer classes, Basics of AWT, Swing and Applets: Layout Managers, Event Handling, Classes for various controls, such as label, choice, list, checkbox, etc., Dialogs and frames using menus.

Basic concepts of networking: Working with URLs, Concepts of URLs and Sockets. Basics of database connectivity with JDBC.

RECOMMENDED BOOKS

- Programming with JAVA: A Primer, E. Balagurusamy, Tata McGraw Hill.
- JAVA: The Complete Reference, Herbert Schildt, McGraw Hill Education.
- JAVA-2: The Complete Reference, Patrick Naughton, Herbert Schildt.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. tell the available features in Java programming language.
- CO2. illustrate Java programming concepts for solving problems.
- CO3. make use of the Java programming methods for connecting the various databases.
- CO4. test for bugs in a software application written in the Java programming language.
- CO5. determine different ways for handling exceptions, memory management, file handling, i/o management and internet based application development.
- CO6. build a project for application development using Java programming language.

Dr. M.

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DESIGN & ANALYSIS OF ALGORITHMS
(160312/230301/240301)

LIST OF PROGRAMS

1. WAP to implement the following using array as data structure and analyze its time complexity.
a. Insertion sort b. Selection sort c. Bubble sort d. Quick sort e. Merge sort
f. Bucket sort g. Shell sort h. Radix sort i. Heap sort
2. WAP to implement Linear and Binary Search and analyze its time complexity.
3. WAP to implement Matrix Chain Multiplication and analyze its time complexity.
4. WAP to implement Longest Common Subsequence Problem and analyze its time complexity.
5. WAP to implement Optimal Binary Search Tree Problem and analyze its time complexity.
6. WAP to implement Huffman Coding and analyze its time complexity.
7. WAP to implement Dijkstra's Algorithm and analyze its time complexity.
8. WAP to implement Bellman Ford Algorithm and analyze its time complexity.
9. WAP to implement DFS and BFS and analyze their time complexities.
10. WAP to Implement 0/1 knapsack using dynamic programming.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. relate the principles of algorithm design in solving problems.
- CO2. demonstrate basic algorithms and different problem solving strategies.
- CO3. build creativeness and confidence to solve non-conventional problems.
- CO4. analyze running times of algorithms using asymptotic analysis.
- CO5. compare various algorithm design approaches for solving real world problems.
- CO6. design and implement optimization algorithms in specific applications.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
(160312/230301/240301)

LIST OF SKILL BASED MINI PROJECT

1. Implement tree traversal techniques like pre-order, post-order and in-order.
2. Implementation of divide and conquer based merge sort algorithm, quick sort algorithm.
3. Implementation of divide and conquer based matrix multiplication algorithm.
4. Implement the greedy approach for single source shortest path.
5. Design a program for finding minimum cost tree for traversing all nodes of a graph.
6. Implement the Knapsack problem and 0/1 Knapsack problem.
7. Implement the travelling salesman problem using dynamic programming.
8. Implement matrix chain multiplication using dynamic programming.
9. Design a program for 4 and 8 queen problem.
10. Implement a program for polynomial reduction.

1. a. Address function
b. Character function
c. Conversion function
d. Data function
2. Implementation of different type of operators in C
a. Arithmetic operators
b. Logical operators
c. Set operators
d. Comparison Operators
e. Special operators
3. Implementation of type of joins.
a. Inner join
b. Outer join
c. Natural join etc.
4. Study and implementation of
a. Group by it having clause
b. order by clause
c. having
5. Study of Implementation of
a. Subquery
b. View
6. Study of different types of triggers
7. Implementation of database triggers
8. Study of Redo, Undo, Rollback, Commit, Save point
9. Creating Database Table

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATABASE MANAGEMENT SYSTEM
(160313/ 230304/240304)

LIST OF PROGRAMS

While creating tables, databases the name should have a prefix of your roll number.

Ex. If your roll number is 55 then every table name must start with 55 TABLE_NAME. 1. Write program name 2. Write description of command used for executing the query. 3. Write commands in bold letters. 4. Take the screenshot of the output.

1. Implementation of DDL commands of SQL with suitable examples.
 - a. Create table
 - b. Alter table
 - c. Drop Table
2. Implementation of DML commands of SQL with examples.
 - a. Insert
 - b. Update
 - c. Delete
3. Implementation of different type of function with suitable example
 - a. Number function
 - b. Aggregate function
 - c. Character function
 - d. Conversion function
 - e. Data function
4. Implementation of different type of operators in SQL.
 - a. Arithmetic operators
 - b. Logical operators
 - c. Set operator
 - f. Comparison Operator
 - g. Special operator
5. Implementation of type of joins.
 - a. Inner Join
 - b. Outer Join
 - c. Natural Join etc.
6. Study and implementation of
 - a. Group by & having clause
 - b. order By clause
 - c. Indexing
7. Study of Implementation of
 - a. Sub queries
 - b. Views
8. Study & implementation of different type of constraints.
9. Study & implementation of database backup & recovery command. Study & implementation of Rollback, commit, savepoint.
10. Creating Database /Table Space



DEPARTMENT OF INFORMATION TECHNOLOGY

- a. Managing Users: Create User, Delete User
- b. Managing roles: Grant, Revoke.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. construct database schema for a given problem domain.
- CO2. apply integrity constraints on a database schema using a state-of-the-art RDBMS.
- CO3. apply SQL queries using DDL and DML to design and access database systems
- CO4. make use of operators and functions used in query.
- CO5. distinguish Tables and Views for database systems.
- CO6. develop a small project for a real world scenario.

BOOK (Book_id, Programme_id, No_of_Copies)
BOOK_LENDING (Book_id, Programme_id, Card_No, Date_Out, Due_Date)
LIBRARY (Programme_id, Programme_Name, Address)

Write SQL queries to

1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2011 to Jun 2012.
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

Mini Skill Project I

Consider the following schema for Order Database:

SALESMAN (Salesman_id, Name, City, Commission)
CUSTOMER (Customer_id, City, State, City, Grade, Salesman_id)
ORDERS (Ord_No, Purchase_Amt, Ord_Use, Customer_id, Salesman_id)

Write SQL queries to

1. Count the customers with grades above Bangalore's average.
2. Find the name and numbers of all salesmen who had more than one customer.
3. List all the salesmen and indicate those who have had do not have customers in their cities (Use UNION operation.)
4. Create a view that finds the salesman who has the order with the highest order of a day.
5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be removed.

Dr. B. S. Sankar

Dr. B. S. Sankar

Dr. B. S. Sankar



DEPARTMENT OF INFORMATION TECHNOLOGY

DATABASE MANAGEMENT SYSTEM
(160313/ 230304/240304)

LIST OF SKILL BASED MINI PROJECT

- Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.
- Design ER-Diagram, Create Schema and insert at least 5 records for each table. Add appropriate database constraints

Mini Skill Project 1

Consider the following schema for a Library Database:

BOOK (Book_id, Title, Publisher_Name, Pub_Year)
BOOK_AUTHORS (Book_id, Author_Name)
PUBLISHER (Name, Address, Phone)
BOOK_COPIES (Book_id, Programme_id, No-of_Copies)
BOOK_LENDING (Book_id, Programme_id, Card_No, Date_Out, Due_Date)
LIBRARY_PROGRAMME (Programme_id, Programme_Name, Address)

Write SQL queries to

1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

Mini Skill Project 2

Consider the following schema for Order Database:

SALESMAN (Salesman_id, Name, City, Commission)
CUSTOMER (Customer_id, Cust_Name, City, Grade, Salesman_id)
ORDERS (Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)

Write SQL queries to

1. Count the customers with grades above Bangalore's average.
2. Find the name and numbers of all salesman who had more than one customer.
3. List all the salesman and indicate those who have and do not have customers in their cities (Use UNION operation.)
4. Create a view that finds the salesman who has the customer with the highest order of a day.
5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.



DEPARTMENT OF INFORMATION TECHNOLOGY

Mini Skill Project 3

Consider the schema for Movie Database:

ACTOR (Act_id, Act_Name, Act_Gender)
DIRECTOR (Dir_id, Dir_Name, Dir_Phone)
MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)
MOVIE_CAST (Act_id, Mov_id, Role)
RATING (Mov_id, Rev_Stars)

Write SQL queries to

1. List the titles of all movies directed by 'Hitchcock'.
2. Find the movie names where one or more actors acted in two or more movies.
3. List all actors who acted in a movie before 2000 and in a movie after 2015 (use JOIN operation).
4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
5. Update rating of all movies directed by 'Steven Spielberg' to 5.

Mini Skill Project 4

Consider the schema for College Database:

STUDENT (USN, SName, Address, Phone, Gender)
SEMSEC (SSID, Sem, Sec)
CLASS (USN, SSID)
COURSE (Subcode, Title, Sem, Credits)
IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)

Write SQL queries to

1. List all the student details studying in fourth semester 'C' section.
2. Compute the total number of male and female students in each semester and in each section.
3. Create a view of Test1 marks of student USN '1BI15CS101' in all Courses.
4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.
5. Categorize students based on the following criterion:
If FinalIA = 17 to 20 then CAT = 'Outstanding'
If FinalIA = 12 to 16 then CAT = 'Average'
If FinalIA < 12 then CAT = 'Weak'

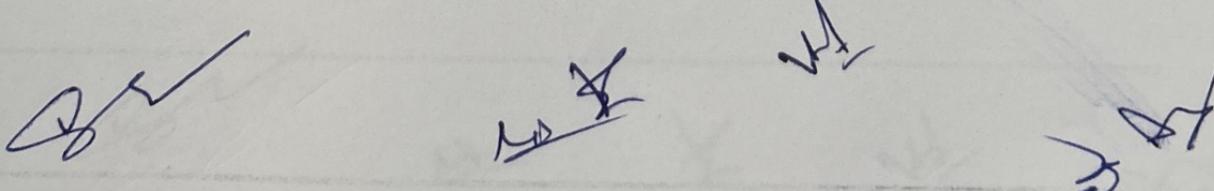
Give these details only for 8th semester A, B, and C section students.

Mini Skill Project 5

Consider the schema for Company Database:

EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)
DLOCATION (DNo, DLoc)
PROJECT (PNo, PName, PLocation, DNo)
WORKS_ON (SSN, PNo, Hours)

Write SQL queries to





DEPARTMENT OF INFORMATION TECHNOLOGY

1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.
3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.

Mini Skill Project 6

A university registrar's office maintains data about the following entities:

- (a) courses, including number, title, credits, syllabus, and prerequisites;
- (b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
- (c) students, including student-id, name, and program; and
- (d) instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.

Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

Mini Skill Project 7

Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.

Mini Skill Project 8

Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.

Mini Skill Project 9

Design an E-R diagram for keeping track of the exploits of your favourite sports team. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Summary statistics should be modeled as derived attributes.

Mini Skill Project 10

Consider a database used to record the marks that students get in different exams of different course offerings.

- a. Construct an E-R diagram that models exams as entities, and uses a ternary relationship, for the above database.
- b. Construct an alternative E-R diagram that uses only a binary relationship between students and course-offerings. Make sure that only one relationship exists between a particular student and course-offering pair, yet you can represent the marks that a student gets in different exams of a course offering.



JAVA PROGRAMMING LAB
(160315)

LIST OF PROGRAMS

1. Write a program to accept two numbers (int) as command line arguments and print their Sum.
2. Write a program to print Fibonacci series without using recursion and using recursion.
3. Write a program to check prime numbers and palindrome numbers.
4. Write a program to sort an array of elements using bubble sort algorithm.
5. Write a program to sort an array of elements using insertion sort algorithm.
6. Write a non-static function in java that prints the sum of two numbers.
7. Create an abstract class Shape which has a field PI=3.14 as final and it has an abstract method Volume. Make two subclasses Cone and Sphere from this class and they print their volume.
8. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.
9. Develop an Applet that receives an integer in one text field & compute its factorial value & returns it in another text field when the button "Compute" is clicked
10. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every first second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. tell the available features in Java programming language.
- CO2. illustrate Java programming concepts for solving problems.
- CO3. make use of the Java programming methods for connecting the various databases.
- CO4. test for bugs in a software application written in the Java programming language.
- CO5. determine different ways for handling exceptions, memory management, file handling, i/o management and internet based application development.
- CO6. build a project for application development using Java programming language.



MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005

(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

DEPARTMENT OF INFORMATION TECHNOLOGY

JAVA PROGRAMMING LAB
(160315)

LIST OF SKILL BASED MINI PROJECT

1. Design and implementation of Registration page for a system
2. Design and implementation of User name- password page for a system
3. Design and implementation of database connectivity using JDBC with SQL
4. Design and implementation of database connectivity using JDBC with MS Access
5. Update, deletion and search of items in a database using a web page/front end
6. Display of Database table in a webpage
7. Design of dynamic web pages with backward and forward functions
8. Display of a video file in a web page
9. Display of Graph Representation in a web page
10. Email notification using Java Library

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1: define the basic concept of Embedded System
- CO2: describe the basic principles of Arduino programming and IDE
- CO3: Familiarize with different types of sensors and related systems
- CO4: design, implement, debug and test programs applications
- CO5: design and develop Smart systems applications
- CO6: use Arduino board using different sensors

LIST OF SKILL BASED MINI PROJECT

1. Intelligent house keeping system
2. Intelligent wind energy system
3. Home automation using IOT
4. Rain gauge system
5. Intelligent traffic signal system

COMPUTER GRAPHICS & MULTIMEDIA

160411

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To become familiar with computer graphics techniques and display devices.
- To enhance the proficiency in image representations, 2D and 3D graphics transformations.
- To develop awareness with various illumination, color models and multimedia system.

Unit-I

Introduction to Computer Graphics: Interactive Computer Graphics, Application of Computer Graphics, Random and Raster Scan Displays, Storage Tube Graphics Display, Calligraphic Refresh Graphics Display, Flat Panel Display, Refreshing, Flickering, Interlacing, Resolution, Bit Depth, Aspect Ratio etc.

Unit-II

Scan Conversion Technique: Image representation, Line drawing: DDA, Bresenham's Algorithm. Circle Drawing: General Method, Mid-Point, DDA, Bresenham's Circle Generation Algorithm, Ellipse Generation Algorithm, Curves: Parametric Function, Bezier Method, B-Spline Method.

Unit-III

2D & 3D Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Inverse Transformation, Composite Transformation, World Coordinate System, Viewing Transformation, Representation of 3D object on Screen, Parallel and Perspective Projections.

Unit-IV

Clipping: Point clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Cohen Sutherland Line Clipping Algorithm etc, Polygon Clipping, Convex and Concave Polygon, Sutherland Hodgeman Polygon Clipping Algorithm etc, Hidden Surface Elimination: Z- Buffer algorithm and Painter's Algorithm, Area Filling, **Basic Illumination Models:** Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, Color Models: like RGB, YIQ, CMY, HSV etc.

Unit-V

Multimedia System: An Introduction, Multimedia hardware and software, Multimedia Applications, Multimedia System Architecture, Multimedia Authoring. Data & File Format standards: RTF, TIFF, MIDI, JPEG, DIB, MPEG. Audio: digital audio, MIDI, processing sound. Sampling, compression. Video: AVI, 3GP, MOV, MPEG, Compression standards, Compression through spatial and temporal redundancy.

RECOMMENDED BOOKS

- Donald Hearn and M.P. Becker : Computer Graphics, PHI Publication
- FoleyVandam, Feiner, Hughes : Computer Graphics principle and Practice
- Rogers : Principles of Computers Graphics, TMH
- Sinha and Udai : Computer Graphics, TMH
- Prabhat K. Andleigh, Kiran Thakrar : Multimedia Systems Design, Prentice Hall PTR

COURSE OUTCOMES

After completion of the course students will be able to:

CO1. explore various display devices and applications of computer graphics.
CO2. illustrate various scan conversion techniques like line, circle, curve and shape drawing algorithms.
CO3. apply 2-dimensional, 3-dimensional transformations and projections on images.
CO4. classify methods of image clipping and various algorithms for line and polygon clipping.
CO5. apply appropriate filling algorithms, hidden surface elimination algorithm on images.
CO6. summarize various color models, shading methods and multimedia system.

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SOFTWARE ENGINEERING

160412

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit - I

Introduction to Software Engineering: Definition, Software Engineering-Layered Technology, Software Characteristics and Components, **Software Model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection Criteria of Model:** Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , **Types of Requirement-** Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural Design, Procedural Design, Data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

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4 *4*

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project Domains, Software Measurement, Software Quality Metrics, **Project Management**- Basics-People, Product, Process, Project, **Estimation**- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) Based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic Issues, Criteria for Completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the various fundamental concepts of software engineering.
- CO2. develop the concepts related to software design & analysis.
- CO3. compare the techniques for software project management & estimation.
- CO4. choose the appropriate model for real life software project.
- CO5. design the software using modern tools and technologies.
- CO6. test the software through different approaches.

Adiaphel *Sar.* *A*
Nir *W*
Y *X* *Q*

COMPUTER NETWORKS
160413

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable Students to deal with various networking problems such as flow control, error control and congestion control.

Unit-I

Introduction: Computer Network, Types- LAN, MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fiber, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode, X.25.

Unit-II

Physical Layer: Network Topologies- Bus, Ring, Star & Mesh, Line Coding- Unipolar, Polar and Bipolar, Switching- Circuit Switching, Message Switching & Packet Switching, Multiplexing: FDM – Frequency Division Multiplexing, WDM – Wavelength Division Multiplexing & TDM – Time Division Multiplexing.

Unit-III

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- The Channel Allocation Problem, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

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Unit-IV

Network Layer & Transport Layer: Introduction, Design Issues, Services, Routing-Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd-Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token Bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

Unit-V

Presentation, Session & Application Layer: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the fundamental concepts of computer network.
- CO2. illustrate the basic taxonomy & terminologies of computer network.
- CO3. identify various parameter for affecting the performance of computer network.
- CO4. analyze the concepts of communication using various layer of OSI model.
- CO5. evaluate the performance of computer network in congestion and Internet.
- CO6. design the network environment and applications for implementation of computer networking concept.

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CYBER SECURITY

100009

L	T	P	Total Credits
2	-	-	2

COURSE OBJECTIVES

- To provide an understanding of cyber security fundamentals.
- To analyse various cyber-attacks and their countermeasures.
- To provide basics of Internet and networking.
- To identify various cyber security threats and vulnerabilities.
- To apply forensic science to investigate a cybercrime.

Unit-I

Introduction- Overview of Cyber Security, Cyber Crime, Cyber Warfare, Cyber Terrorism, Cyber Espionage, Cyber Vandalism (Hacking), Cyber Stalking, Internet Frauds and Software Piracy.

Unit-II

Basics of Internet & Networking- Wired and Wireless Networks, Internetworking Devices, Topologies, Web Browser, Web Server, OSI Model, IP Addressing, Firewall, E-Commerce, DNS, NAT, VPN, HTTP & HTTPS.

Unit-III

Cryptography and Network Security- Security Principles, Attacks, Cryptography, Steganography, Cryptanalysis, Symmetric Key and Public Key Cryptography, Digital Signature, Intrusion Detection System, Secure Socket Layer(SSL) & Secure Electronic Transaction(SET).

Unit-IV

Cyber Security Threats and Vulnerabilities- Hacker, Types of Hacker- White, Gray and Black, **Malicious Software's:** Virus, Worm, Trojan Horse, Backdoors and Spywares. Sniffers, Denial of Service Attack and Phishing.

Unit-V

Cyber Crime Investigation and Legal Issues: Intellectual Property, Privacy Issues, IT Act 2000, Basics of Cyber Crime Investigation- Cyber Forensics, Electronic Evidences and its Types.

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RECOMMENDED BOOKS:

- Cryptography and Network Security, 4/E, William Stallings, 4th edition, Pearson publication
- Computer Security: Principles and Practice, Stallings William, Pearson publication
- Investigating Network Intrusions and Cybercrime, EC-Council Press
- Network Forensics, Tracking Hackers through Cyberspace, Sherri Davidoff, Jonathan Ham, Prentice Hall.
- Cryptography and Network Security, 3e, Atul Kahate, McGraw Hill publication.

COURSE OUTCOMES:

After completion of the course students would be able to:

- CO1. tell the basic terminologies of cyber security.
- CO2. explain the basic concept of networking and internet.
- CO3. apply various methods used to protect data in the internet environment in real world situations.
- CO4. discover the concept of IP security and architecture.
- CO5. compare various types of cyber security threats/vulnerabilities.
- CO6. develop the understanding of cybercrime investigation and IT ACT 2000.

Suraj Adhikari
Mr. *Suraj* *Adhikari* *AV*
Suraj *Adhikari* *AV*
Suraj *Adhikari* *AV*

PYTHON PROGRAMMING LAB

160414

L	T	P	Total Credits
-	1	2	2

COURSE OBJECTIVES

- Implement an algorithm in Python by using standard programming constructs such as, functions, modules, aggregated data (arrays, lists, etc.)
- Explain the output of a given Python program and identify and correct errors in a given Python program
- Write programs using the features of object-oriented programming language such as, encapsulation, polymorphism, inheritance, etc.

Unit-I

Introduction to Python programming language Data and Expressions: Literals; Variables and Identifiers; Operators; Expressions and Data Types, Logical operator; Boolean operator; Boolean Expressions; Control Structures; Selection Control, Iterative Control. Lists & tuples: List Structures; Lists in Python, Iterating over Lists in Python.

Unit-II

Functions: Arguments in functions; Program routes; Calling Value Returning Functions; Calling Non- value Returning Functions Parameter Passing; Variable Scope; Modular design Modules; Top-Down Design Python Modules; File Handling Operation in file: Reading, Writing and appending in Text Files.

Unit-III

String Processing; Dictionaries and sets operations; Exception Handling: Exceptions Data Collections applying lists etc.

Unit-IV

Introduction to Object Oriented Programming, Class, Objects, Encapsulation, Data abstraction, Inheritance, Polymorphism.

Unit-V

Graphics Programming: Graphics Programming, Using Graphical Objects, Interactive Graphics, Displaying Images, Generating Colors, Graphics Objects, Entry Objects, Test Case: Numpy, scipy; Test Case: panda, Matplotlib.

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RECOMMENDED BOOKS

- C. Dierbach, Introduction to Computer Science Using PYTHON: A Computational Problem-Solving Focus (1st ed.), Wiley, 2015. ISBN 978-8126556014.
- Yashavant Kanetkar, Let Us Python (1st ed.), BPB Publishers, 2019. ISBN 978-9388511568

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. solve computational problem using python language
- CO2. familiar with basics syntax and features of python programming language
- CO3. hands on experience to online coding tools like colab.
- CO4. design a program utilizing the features of object oriented concept.
- CO5. utilize some of the libraries available for solving problems.
- CO6. apply skill of identifying appropriate python constructs for problem solving.

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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER GRAPHICS & MULTIMEDIA (160411)

LIST OF PROGRAMS

1. WAP to implement line generation using DDA algorithm.
2. WAP to implement line generation using Bresenham's line generation algorithm.
3. WAP to generate a circle using mid-point algorithm.
4. WAP to implement Bresenham's circle generation algorithm.
5. WAP to perform translation, rotation, scaling on 2D transformation.
6. WAP to perform scaling and shearing on 2D transformation.
7. WAP to implement translation of a line and triangle.
8. WAP to implement rotation of a line and triangle.
9. WAP to implement scaling transformation.
10. WAP to fill polygon using seed filling algorithm.
11. WAP to implement 3D rotation about an arbitrary axis.
12. WAP to implement Cohen Sutherland line clipping.

COURSE OUTCOMES

After completion of the course students will be able to:

- CO1. understand the basic concepts of computer graphics.
- CO2. demonstrate scan conversion problems using programming language.
- CO3. implement the concepts of geometric transformation of 2D and 3D objects.
- CO4. apply clipping and filling techniques for modifying an object.
- CO5. understand the practical implementation of modelling and rendering.
- CO6. demonstrate the concept of viewing of 2D objects.

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LIST OF EXPERIMENTS

Experiment 1: Identify the requirements from problem statements

Requirements, Characteristics of Requirements, Categorization of Requirements, Functional Requirements, Identifying Functional Requirements

Experiment 2: Estimation of project metrics using estimation techniques like COCOMO model

Project Estimation Techniques, COCOMO, Basic COCOMO Model, Intermediate COCOMO Model, Complete COCOMO Model, Advantages of COCOMO, Drawbacks of COCOMO, Halstead's Complexity Metrics

Experiment 3: Modeling UML Use Case diagrams and capturing Use Case Scenarios

Use case diagrams, Actor, Use Case, Subject, Graphical Representation, Association between Actors and Use Cases, Use Case Relationships, Include Relationship, Extend Relationship, Generalization Relationship, Identifying Actors, Identifying Use cases, Guidelines for drawing Use Case diagrams

Experiment 4: E-R modeling from the problem statements

Entity Relationship Model, Entity Set and Relationship Set, Attributes of Entity, Keys, Weak Entity, Entity Generalization and Specialization, Mapping Cardinalities, ER Diagram, Graphical Notations for ER Diagram, Importance of ER modeling

Experiment 5: Modeling UML Class diagrams and Sequence diagrams

Structural and Behavioral aspects, Class diagram, Elements in class diagram, Class, Relationships, Sequence diagram, Elements in sequence diagram, Object, Life-line bar, Messages

Experiment 6: Modeling Data Flow diagrams

Data Flow Diagram, Graphical notations for Data Flow Diagram, Explanation of Symbols used in DFD, Context diagram and leveling DFD

Experiment 7: Create flow chart for an algorithm using Raptor

Assignment, Call, Input, Output, Selection and Loop symbols.

Experiment 8: Estimation of Test coverage metrics and structural complexity

Control Flow Graph, Terminologies, McCabe's Cyclomatic Complexity, Computing Cyclomatic Complexity, Optimum Value of Cyclomatic Complexity, Merits, Demerits.

Experiment 9: Designing Test Suites

Software Testing, Standards for Software Test Documentation, Testing Frameworks, Need for Software Testing, Test Cases and Test Suite, Types of Software Testing, Unit Testing, Integration Testing, System Testing, Example, Some Remarks.

RECOMMENDED TOOLS

- Selenium

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DEPARTMENT OF INFORMATION TECHNOLOGY

PYTHON PROGRAMMING LAB
(230406)

LIST OF PROGRAMS

1. Write a program to demonstrate different number data types in python.
2. Write a program to perform different arithmetic operations on numbers in python.
3. Write a program to create, concatenate and print a string and accessing substring from a given string.
4. Write a python program to create, append and remove lists in python.
5. Write a program to demonstrate working with tuples in python.
6. Write a program to demonstrate working with dictionaries in python.
7. Write a python program to find the factorial of a number using recursion.
8. WAP to swap two integers without using a third variable. The swapping must be done in a different method in a different class.
9. WAP to find the greater of two given numbers in two different classes using friend function.
10. Write a python program to define a module and import a specific function in that module to another program.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. write, test, and debug simple Python programs.
- CO2. solve computational problem using python language.
- CO3. familiar with basics syntax and features of python programming language.
- CO4. use Python lists, tuples, dictionaries for representing compound data.
- CO5. design a program utilizing the features of object oriented concept.
- CO6. utilize some of the libraries available for solving problems.

*Mr. Jay Soni
Asst. Prof.
A/C ✓*

LIST OF SKILL BASED MINI PROJECT

1. Using C/C++/Python language, draw a Flag using any three colors in the center of the computer screen.
2. Draw a Pyramid using the star key of the keyboard in C/C++/Python language.
3. Design a front face of the House with door and window in C/C++/Python language.
4. Implement a Balloon with multicolor in the center of the computer screen.
5. The task is to draw a smiley face using graphics in C/C++/Python language.
6. Implement a project to draw the scenario of Rainfall.
7. Using C/C++/Python to draw a football ground using computer graphics.
8. Design a wheel in the center of the screen using C/C++.
9. Draw a car using computer graphics programming in C/C++.
10. To draw a traffic light signal using computer graphics in C/C++/Python language.

Mr. S. S. Madhukar
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SOFTWARE ENGINEERING LAB

(160412/230403/240403)

LIST OF SKILL BASED MINI PROJECT

Note: In every project students must have to

- Design the SRS of the project.
- Draw the various ER diagram, DFD and Use Case diagram of the project.
- Design the test case of the project.

Mini Skill Project 01

Delivery Agent System

There are many online shopping portals such as Flipkart, Amazon, Snapdeal, etc. are active in the Indian market. One major task is to deliver an online books T-shirt to the customers as first as possible in a cost-effective (cheapest) manner. A delivery agent system, which would automatically receive a delivery request from an online portal and identify the couriers, whom the delivery job can be assigned.

Input:

- Shipping details (source and destination) locations
- Couriers' details in different localities.
- Service offering for each courier company.

Functions:

- Booking delivery
- Status of delivery
- Cancellation of booking

Output:

- Booking confirmation, if booking is successful.
- Reporting delivery status
- Cancellation of booking confirmation

Mini Skill Project 02

Payroll Management System (PMS)

The Employee and Payroll Systems objective is to provide a system which manages the employee details, the Payroll activity done in a company depending upon the employees attendance and its calculation which is very huge. The users will consume less amount of time through computerized system rather than working manually. The system will take care of all the payroll activities like managing each employee's attendance, the number of leaves taken by that particular employee and calculation in a very quick manner and it avoids Data storing is easier. Paper work will be reduced and the company staffs spend more time on monitoring the progress. The system is user friendly and easy to use. All the important data's will be stored in the database and it avoids any miscalculation. The "Employee and Payroll System "is based on maintaining each employee records and calculating his/her salary depending on the workdays. The first activity is based on saving the employees details where each employee will be given a unique Employee ID. Now based on the no of days an employee attended per month,

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salary will be calculated by checking the no of workdays of a company and his/her basic salary and a separate salary slip will be provided for reference.

Inputs:

- Employee details (employee no, name, address, designation, department, achievements)
- Accounts details (salary of each employee, deduction, TA, DA, HRA, other allowance, PF)
- Leave information (no of leave taken by each employee)

Output:

- Salary slip
- Detailed salary report
- Deduction details
- Leave information

Mini Skill Project 3

Online Toll Plaza System

Now-a-days, cashless transaction is becoming popular among the users because it is easy to handle, and it does not require to carry cash in hand. Typically, in India, road tolls are collected from cars manually for which the cars need to stop to pay the toll fee. In contrast, the objective is to make the system Online, so that the toll fee is automatically deducted from the user. Therefore, users credit their Online account (consider this as eWallet), and money is automatically deducted when the cars pass the toll system. As a result, the users do not have to wait for manual toll fee payment. Concurrently, administrator can also view all transactions from anywhere. Finally, the administrator can view the total income in a day-to-day basis, and can also analyze the traffic pattern as well.

Inputs:

- User Information (Name, Car Number, Email Address, Password, Money in eWallet)
- Administrator Information (Email Address, Password)

Operations:

- User
 - Log-In
 - Credit in eWallet
 - Check eWallet Balance
 - Log-Out
- System
 - Check the car number
 - Required Fee Available
 - Allow the car to pass
 - Deduct money from eWallet
 - Required Fee NOT Available
 - Do Not Allow the car to pass
 - Fee Payment is done manually
 - Allow the car to pass
 - Total Income is stored in a database
- Administrator
 - Log-In

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DEPARTMENT OF INFORMATION TECHNOLOGY

- View transactions
- View total income

Outputs:

- Display day-wise transactions to administrator
- User can view his/her own transactions

Mini Skill Project 04

Online Examination System

Now-a-days, Online examination system has become popular for competitive examinations because of its unique features such as auto-evaluation, speed and accuracy. Moreover, it also helps environments by reducing the use of paper. In such a system, students are asked to select answers from multiple options given for a single question. Likewise, there are several questions which appear in the students' systems. The questions and multiple options are saved in a database along with desired answers. Typically, a student can edit an answer after saving it, however, editing cannot be done after submitting the answer. Another user is also there – administrator. The administrator can create, modify and delete questions and accordingly, the question is updated in the system.

Inputs:

- Subject Information with Code, so that all subjects can be identified using unique codes.
- User Information
- If Student- Student Information (Name, Roll No, Email Address, Contact Number, Password)
- If Administrator (Email Address, Password)
- Set of Questions with multiple answers for each stored in a database along with desired answers

Operations:

- Administrator
 - Log-In
 - CREATE, MODIFY or DELETE questions. Accordingly, the question set must be updated.
 - Log-Out
- Student
 - Log-In (Time starts)
 - Answer the questions – SAVE and SUBMIT
 - Log-Out (Automatically logged out after Timeout)

Outputs:

- Display the result in DESCENDING order according to obtained marks with Roll Number.
- The result is also saved into a database for future use.

Mini Skill Project 5

Online Health Monitoring System

Online health monitoring or Online patient monitoring system (OHMS) is a promising technology to enable patient monitoring outside the conventional clinical system, i.e., the patient can be monitored remotely. Consequently, such system increases the access to care the patients and decreases the delivery cost related to healthcare. Typically, in OHMS, two type of users are there – doctors and patients. Different physiological parameters of the patient are monitored (using sensors), and the monitored data is stored in a server. The stored data is accessible from anywhere through user authentication. On the other hand, doctors can check the health status of a patient registered with the doctor. Therefore, the doctor can only access the physiological data of a patient if and only if he/she is registered with the doctor. Depending on the monitored values, adequate measures can be taken by the doctors. The patient can also view his/her health status. For authenticity, both the users need to login into the system.

Inputs:

- User Information
- Doctor – (Name, Email Address, Password)
- Patient – (Name, Email Address, Password, DOB)
- Predefined Sensors (such as temperature, blood pressure and heart rate)

Operations:

- Patient
 - Log-In
 - View health status
 - Ask doctor(s) to consult
 - Payment (Consultancy Fee)
 - Log-Out
- Doctor
 - Log-In
 - Monitor health status of registered patients to him/her
 - Ask patient(s) to consult
 - Log-Out

Outputs:

- Display health status
- Consult with doctors/patients

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Mr. S. S. A. *Y* *Mr. S. S. A.*

PYTHON PROGRAMMING LAB

(230406)

LIST OF SKILL BASED MINI PROJECT

1. Implement a calculator using Tkinter library.
2. Design and implementation of Animal Kingdom Classification.
3. Design and implementation of a real-time, User friendly Currency Converter.
4. Design and implementation of a File Manager which supports various types of files.
5. Design a program for Number Guessing using random number generator library. Make a play game with the defined library.
6. Design any game of your choice like tic-tac-toe etc.
7. Implement a contact book (command line project) capable of storing user data like name, address, phone number, email etc. Use any database for storing the information so that updation and deletion can also be carried out.
8. Implement binary search algorithm by creating a list from random numbers between any predefined ranges.
9. Design a program for spam filtering.
10. Design a dice rolling simulator generating random number from 1 to 6 every time dice is rolled.
11. Implement countdown clock and timer.

Abigail

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DISCRETE STRUCTURES

160511

L	T	P	Total Credits
3	1	-	4

COURSE OBJECTIVES

- To perceive the knowledge of basic algebra
- To describe function and its relation
- To familiarize propositional logic
- To know about the graph theory and its application in computer engineering
- To familiarize the discrete numeric function and generating function

Unit-I

Finite and Infinite Sets, Mathematical Induction, Principles of Inclusion and Exclusion, Multisets, Functions and Relations, Binary Relations, Equivalence Relations and Partitions, Partial Ordering Relations and Lattices, Chains, Pigeonhole Principle.

Unit-II

Prepositional Logic, Syntax, Semantics of ATF (Atomic Formula), WFF (Well Formed Formula's), Validity and Satisfiability of WFF by Quine's Method, Normal and Closure Form of Prepositional Calculus.

Unit-III

Introduction and Basic Terminology of Graphs, Planner Graphs, Multi-Graphs and Weighted Graph, Shortest Path in Weighted Graph, Introduction to Eularian Paths and Circuits, Hamiltonian Paths and Circuits, Introduction to Trees, Rooted Trees, Path Length in Rooted Trees, Spanning Trees and Cut Trees.

Unit-IV

Introduction to Discrete Numeric Functions and Generating Functions, Introduction to Recurrence Relations and Recursive Algorithms, Linear Recurrence Relations With Constant Coefficients, Homogeneous Solutions, Particular Solutions and Total Solutions.

Unit-V

Introduction to Group, Subgroups, Generations and Evaluation of Power, Cosets and Lagrange's Theorem, Group Codes, Isomorphism and Automorphism, Homomorphism and Normal Sub Groups, Ring, Integral Domain and Field.

Mr. Mehta *✓* *3/2/2023*
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RECOMMENDED BOOKS

- J. Tremblay and Manohar: Discrete Mathematical Structures with Application to Computer science. Narsingh Deo: Graph Theory.
- Kenneth Rosen: Discrete mathematics and its applications (6th edition).2006. McGraw-Hill
- C. Liu, D. Mohapatra: Elements of Discrete Mathematics. 2008. Tata McGraw-Hill.
- T. Koshy: Discrete mathematics with applications.2003. Academic Press.
- J. Hein: Discrete structures, logic and computability.2009. Jones & Bartlett Publishers.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the basic concept of set theory, propositional logic, graph theory, discrete numeric function and algebraic structure.
- CO2. illustrate the knowledge of course content and distinguish between them in terms of their applications.
- CO3. identify the concepts of graph and tree for solving problems in the computer science.
- CO4. apply the concepts of studied topics with suitable technique faced in engineering problems
- CO5. analyze the set theory, propositional logic, graph theory, discrete numeric function and algebraic structure to examine the real world problem.
- CO6. build analytical skill and interpret applications of engineering beneficial in real time troubleshooting.

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DATA SCIENCE USING PYTHON

160512

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To provide fundamental knowledge of Data Science.
- To present the basic representation and exploratory data analysis used in Data Science.
- To understand the working of techniques used in Data Science.

Unit-I

Basics of Python Tool, Introduction to Data Science, Various Fields of Data Science, Impact of Data Science, Data Analytics Life Cycle, Data Science Toolkit, Version Controlling.

Unit-II

Understanding data, Types of data: Numeric, Categorical, Graphical, High Dimensional Data, Classification of Digital Data: Structured, Semi-Structured and Unstructured, Source of Data: Time Series, Transactional Data, Biological Data, Special Data, Social Network Data, Data Evolution.

Unit-III

Data Acquisition and Data wrangling: Accessing Database, CSV and JSON Data, Data Cleaning and Transformation using Pandas and Sklearn, Data Visualization, Missing Value Analysis, Correction Matrix, Outlier Detection Analysis, Feature Engineering.

Unit -IV

Descriptive Statistics: Measures of Center and Spread, Estimation Distributions, Inferential Statistics: Sampling Distributions, Hypothesis Testing, Probability Theory, Conditional Probability, Maximizing and Minimizing Algebraic Equations, Matrix Manipulation and Multiplication.

Unit -V

Supervised Learning: Regression, classification, decision trees, random forest, Unsupervised Learning: PCA, Clustering. Application of Data Science, Use Case:

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Consumer Product usage Analysis, Search Engines, Targeting Recommendation, Gaming etc.

RECOMMENDED BOOKS

- Introduction to linear algebra - by gilbert strang
- Applied statistics and probability for engineers – by douglas montgomery
- Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing, and Presenting Data – EMC Education
- Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython – Wes McKinney.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define the fundamentals of data science and its importance.

CO2. contrast the basics of python and libraries related to data science

CO3. classify different types of data analytics

CO4. organize the data collected from various sources

CO5. analyze pre-processing and data reduction strategies.

CO6. create the graphical representation of the data through visualization tool on various applications.

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DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION

160513

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction of Automata Theory: Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and mealy machines, composite machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Meaning of union, intersection, concatenation and closure, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Unit-IV

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

Unit-V

Turing Machine: Techniques for construction. Universal Turing machine Multitape, multihead and multidimensional Turing machine, N-P complete problems. Decidability

DEPARTMENT OF INFORMATION TECHNOLOGY

and Recursively Enumerable Languages, decidability, decidable languages, undecidable languages, Halting problem of Turing machine & the post correspondence problem.

RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis & Christors, Pearson.
- Theory of Computation, Chandrasekhar & Mishra, PHI.
- Theory of Computation, Wood, Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen, Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the basic concepts of switching and finite automata theory & languages.
- CO2. relate practical problems to languages, automata, computability and complexity.
- CO3. construct abstract models of computing and check their power to recognize the languages.
- CO4. analyze the grammar, its types, simplification and normal form.
- CO5. interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.
- CO6. develop an overview of how automata theory, languages and computation are applicable in engineering application.

*Sanjay Bhatia
Mr. Rakesh
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MICROPROCESSOR & INTERFACING

160514

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To understand different processors and basic architecture of 16 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand 8051 microcontroller.

Unit-I

Micropocessors: Introduction to x86 microprocessors, RISC and CISC processors, 8086 Architecture-Functional Diagram, Register Organization, Memory Segmentation, Programming Model, Memory Address, Physical Memory Organization, Minimum and maximum mode signals, Bus Cycle and Timing Diagrams, Instruction Formats, Addressing Modes, Instruction Set, Interrupts of 8086.

Unit-II

Basic Peripherals and Interfacing: 8212, 8155, 8255, 8755, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing.

Unit-III

Special Purpose Programmable Peripheral Devices and Interfacing: 8253, 8254 programmable interval timer, 8259A programmable interrupt controller and 8257 DMA controllers, Keyboard and Display Interfacing.

Unit-IV

Serial and Parallel Data Transfer: Serial and Parallel data transmission, Types of communication system, Baud rate RS-232C, Modem and various bus standards, USART – 8251A.

Unit-V

Introduction to Microcontrollers: 8051 Microprocessor and its Architectures, Pin Description, Input-Output configurations, Interrupts, Addressing Modes, An overview of 8051 Instruction Set.

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RECOMMENDED BOOKS

- The Intel Microprocessors, Architecture, Programming and Interfacing, B.B. Brey, PHI.
- Microprocessor 8086: Architecture, Programming and Interfacing, Sunil Mathur, PHI.
- Advanced Microprocessor and Interfacing, D.V. Hall, Mc-Graw Hill.
- Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
- Interfacing Techniques in Digital Design with Emphasis on Microprocessors, R.L. Krutz, John Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. compare the architecture and feature of different 16-bit microprocessor interfacing chips & microcontrollers.
- CO2. develop programming skills in assembly language of 8086 microprocessor and 8051 microcontroller.
- CO3. demonstrate the concept of interfacing with peripheral devices.
- CO4. make use of different interrupts and addressing modes.
- CO5. design an interfacing for I/O devices.
- CO6. build a system based on 8086 microprocessor and 8051 microcontroller.

Sanjay *A* *Mr. Bala* *X*
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SOFT COMPUTING TECHNIQUES

160515

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction to Soft Computing: Soft Computing v/s Hard Computing, Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, Supervised Learning Networks: Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopfield networks.

Unit-II

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, Defuzzification: Lambda-Cuts for Fuzzy sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

Unit-III

Evolutionary Algorithm: Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

Unit-IV

Introduction to Nature-Inspired Optimization Algorithms: Particle Swarm Optimization (PSO) Algorithm, Differential Evolution (DE) Algorithm, Artificial Bee

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DEPARTMENT OF INFORMATION TECHNOLOGY

Colony (ABC) Algorithm, Ant Colony Optimization (ACO) Algorithm, Cuckoo Search (CS), Firefly Algorithm (FA), Immune Algorithm (IA), Grey Wolf Optimization (GWO), Spider Monkey Optimization.

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications- S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
- Neural Networks and Learning Machines-Simon Haykin PHI.
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH.
- Evolutionary Optimization Algorithms, D. Simon (2013), Wiley.
- Fundamentals of Natural Computing: Basic Concepts, Algorithms, and Applications, L. N. de Castro (2006), CRC Press.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. define basic concepts of neural network and fuzzy systems.
- CO2. compare solutions by applying various soft computing approaches on a given problem.
- CO3. develop and train different supervised and unsupervised learning.
- CO4. classify various nature inspired algorithms according to their application aspect.
- CO5. compare the efficiency of various hybrid systems.
- CO6. design a soft computing model for solving real world problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA SCIENCE USING PYTHON

160512

LIST OF PROGRAMS

1. Write a python program to compute
 - a. Central Tendency Measures: Mean, Median, Mode
 - b. Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for data science such as Pandas and Matplotlib
4. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
5. Write a Python program to implement Simple Linear Regression
6. Implementation of Multiple Linear Regression for House Price Prediction using sklearn
7. Implementation of Decision tree using sklearn and its parameter tuning
8. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample
9. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets
10. Implementation of KNN using sklearn
11. Implementation of Logistic Regression using sklearn
12. Implementation of K-Means Clustering
13. Performance analysis of Classification Algorithms on a specific dataset.

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DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION 160513

LIST OF PROGRAMS

1. Design a Program for creating machine that accepts three consecutive one.
2. Design a Program for creating machine that accepts the string always ending with 101.
3. Design a program for accepting decimal number divisible by 5.
4. Design a Program for creating machine, which accepts $2 \bmod 3$.
5. Design a program for creating a machine, which accepts even of 1's and 0's.
6. Design a Program to find 2's complement of a given binary number.
7. Design a Program, which will increment the given binary number by 1.
8. Design a Program to convert NDFA to DFA.
9. Design a program to create PDA to accept $a^n b^n$ where $n > 0$.
10. Design a Program to create PDA machine that accept the well-formed parenthesis.
11. Design a program to create PDA to accept WCWR where w is any string, WR is reverse of that string, and C is a Special symbol.
12. Design a Turing machine that accepts the following language $a^n b^n c^n$ where $n > 0$.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. judge various computational models.
- CO2. construct abstract models of computing.
- CO3. justify the power of abstract models in computing to recognize the languages.
- CO4. demonstrate analytical thinking and intuition for problem solving in the related areas.
- CO5. discuss the limitations of computation in problem solving.
- CO6. follow set of rules for syntax verification.

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DEPARTMENT OF INFORMATION TECHNOLOGY

MICROPROCESSOR & INTERFACEING

160514

LIST OF EXPERIMENTS

1. Write an assembly language program to perform the subtraction of two 8-bit number using 8085/8086 instruction set.
2. Write an assembly language program to move data block starting at location 'X' to location 'Y' without overlap using 8085/8086 instruction set.
3. Write an assembly language program to move data block starting at location 'X' to location 'Y' with overlap using 8085/8086 instruction set.
4. Write an assembly language program to arrange set of 8-bit numbers starting at location in ASCENDING/DESCENDING order. Display the stored vector in address data field using 8085/8086 instruction set.
5. Write an assembly language program to perform the multiplication of two 8-bit numbers using 8085/8086 instruction set.
6. Write an assembly language program to perform the division of two 8-bit numbers using 8085/8086 instruction set.
7. Write an assembly language program to find the larger number in array of data using 8085/8086 instruction set.
8. Write an assembly language program to convert two BCD numbers in memory of the equivalent HEX number using 8085/8086 instruction set.
9. Write an assembly language program to convert given hexadecimal number into its equivalent BCD number using 8085/8086 instruction set.
10. Write an assembly language program to convert given hexadecimal number into its equivalent ASCII number using 8085/8086 instruction set.
11. Write an assembly language program to convert given ASCII character into its equivalent hexadecimal number using 8085/8086 instruction set.
12. Write an ALP program to generate a Fibonacci series using 8085/8086 instruction set.
13. Write an ALP to find the factorial of a given number using recursive procedure using 8085/8086 instruction set.
14. Write an ALP to separate odd and even numbers using 8085/8086 instruction set.
15. Write an ALP to separate positive and negative numbers using 8085/8086 instruction set.
16. Write an ALP to transfer of a string in forward direction using 8086 instruction set.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. differentiate the various types of instructions and addressing modes.
- CO2. identify the Hex code/ Machine code of instructions in assembly language.
- CO3. perform interfacing of various peripheral devices and memory with microprocessor.
- CO4. demonstrate the arithmetic & Logical operation using instruction set of 8086 /8051 microprocessor.
- CO5. use of 8086/8051 for interfacing with I/O devices.
- CO6. build the assembly language programs in 8086/8051 to solve real world problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA SCIENCE USING PYTHON
160512

LIST OF SKILL BASED MINI PROJECT

1. Movie Recommendation System- A recommendation system sends out suggestions to users through a filtering process based on other users' preferences and browsing history. If A and B like Home Alone and B likes Avengers, it can be suggested to A. Dataset: MovieLens dataset.
2. Customer Segmentation- Identify segments of customers to target the potential user base using clustering (i.e. K-means clustering). Divide customers into groups according to common characteristics like gender, age, interests and spending habits. Dataset: Mall_Customers dataset.
3. Fake News Detection- Fake news is sometimes transmitted through the internet by some unauthorised sources, which creates issues for the targeted person and it makes them panic and leads to even violence. Dataset: fake-news kaggle.
4. Cab Pickups Analysis- cab pickup and distribution, time, days when pickup happens regularly, Dataset: Uber-Pickups dataset.
5. Price Recommendation for Online Sellers.

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DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION

LIST OF SKILL BASED MINI PROJECT

1. Construct a machine to recognize identifier.
2. Construct a machine to recognize signed or unsigned decimal number.
3. Construct a machine to recognize string, which ends with Gwalior or Bhopal.
4. Design a machine which accept at least single a followed by at least single b followed by at least single c.
5. Design a machine that will read sequence made up of letter A,E,I,O,U and will give as output the same sequences except that in case where an I directly follows an E, it will be changed to u.
6. Design a machine for binary input sequence such that if it has substring 101 the machine outputs A if input has substring 110 it outputs B otherwise it Output C.
7. Design a machine which accepts the string consist of a & b in which number of a's are more than number of b's.
8. Design a machine which accepts the string consist of a & b in which number of a's are less than number of b's.
9. Construct a machine for checking the palindrome of the string of even length.
10. Construct a machine for concatenation of the two strings of urinary number.

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DEPARTMENT OF INFORMATION TECHNOLOGY

MICROPROCESSOR & INTERFACEING
160514

LIST OF SKILL BASED MINI PROJECT

1. Traffic light controller using 8085/8086 microprocessor.
2. Night light saver using 8085/8086 microprocessor.
3. Interfacing 8085 with Stepper Motor controller.
4. Interfacing 8085 with DC motor controller.
5. Interfacing 8085 with keypad.
6. Interfacing 8085 with LED's.
7. Interfacing 8085 with switches.
8. Interfacing 8085 with ADC.
9. Interfacing 8085/8086 with 8255 PPI.
10. Interfacing 8085/8086 with 8251.

(Students Admitted in 2009-10)

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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPILER DESIGN 160611/230601/240601

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To learn finite state machines and context free grammar.
- To learn, various phases of compiler
- To understand process of compiler implementation.

Unit-I

Overview of Translation Process: Introduction to Compiler, Translator, Interpreter and Assembler, Overview and use of Linker and Loader, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting, Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool Based Approach to Compiler Construction.

Unit-II

Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation. Regular Grammar & Language Definition, Transition Diagrams, Design of a Typical Scanner using LEX.

Unit-III

Syntax Analysis: Context Free Grammars (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing LL(1) Grammar, Bottom-UP Parsing, Operator Precedence Parsing, LR Parsers (SLR, CLR, LALR), Design of a Typical Parser Using YACC.

Unit-IV

Semantic Analysis: Compilation of Expression, Control, Structures, Conditional Statements, Various Intermediate Code Forms, Syntax Directed Translation, Memory Allocation and Symbol Table Organizations, Static and Dynamic Array Allocation, String Allocation, Structure Allocation etc., Error Detection Indication and Recovery, Routines or Printing Various Lexical, Syntax and Semantic Errors.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Unit-V

Code Generation and Code Optimization: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG Representation of Programs, Code Generation from DAGS, Peep-hole Optimization, Code Generator Generators, Specification of Machine. Code Optimization: Source of Optimizations, Optimization of Basic Blocks, Loops, Global Data Flow Analysis, Solution to Iterative Data Flow Equations, Code Improving Transformations, Dealing with Aliases, Data Flow Analysis of Structured Flow Graphs.

RECOMMENDED BOOKS

- Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. D. Ullman, Pearson Education.
- Compiler Construction: Principles and Practice, K.C. Louden, Cengage Learning.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. define the concepts of finite automata and context free grammar.
- CO2. build the concept of working of compiler.
- CO3. examine various parsing techniques and their comparison.
- CO4. compare various code generation and code optimization techniques.
- CO5. analyze different tools and techniques for designing a compiler.
- CO6. design various phases of compiler.

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Unit - III

Mining Association Rules in Large Databases. Association Rule Mining: Market Basket Analysis. Rule Concepts, Mining Single-Dimensional Bucket Association Rules from Transactional Databases. The Apriori Algorithm: Generating Association Rules from Transactional Databases. Improving the Efficiency of Apriori, Other Association Rule Mining Algorithms. Mining Multilevel Association Rules. Multi-dimensional Association Rule Mining. Constraint-Based Association Rule Mining.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA MINING & PATTERN WAREHOUSING

160612/230602/240602

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To understand the significance of data mining in real-world perspective.
- To gain understanding of data mining techniques, algorithms and commonly used tools.
- To develop ability for applying data mining techniques and tools for solving real-world problems.

Unit - I

Introduction: Motivation, importance, Data type for Data Mining: Relational Databases, Data Ware-Houses. Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities, Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis, Classification of Data Mining Systems, Major Issues in Data Mining.

Unit - II

Data Pre-processing: Data Cleaning, Data Integration and Transformation and Data Reduction. Discretization and Concept Hierarchy Generation. Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical, Characterization.

Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology.

Unit - III

Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, other Algorithms & their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Unit - IV

Classification & Prediction and Cluster Analysis: Issues Regarding Classification & Prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, Currently Available Tools.

Unit - V

Pattern Warehousing System: Pattern Warehouse, Process flow for Pattern Warehouse, Benefits of Pattern Warehousing, Difference between Pattern Warehousing and Data Warehousing, Architectural aspects of Pattern Warehousing, Types of Pattern Warehouses, Challenging Issues in Pattern Warehouse, Profitable Pattern Mining, Hesitation Mining, Case Study in Stock Market, Super Market.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain various basic concept of data mining and data warehousing.
- CO2. classify various database systems and data models / schemas of data warehouse.
- CO3. compare various methods for storing & retrieving data from different data sources/repository.
- CO4. apply data mining techniques for knowledge extraction from large amount of data .
- CO5. analyze data for knowledge discovery & prediction using appropriate algorithms.
- CO6. develop real world application using data mining techniques.

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- Middle right: A 'K', a 'D', and a 'M'.
- Bottom right: A 'V' and a 'C'.
- Bottom center: A 'Bulbu' signature, a 'D', a 'A', a 'R', and a 'G'.
- Bottom left: An 'A' and a 'B'.

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DEPARTMENT OF INFORMATION TECHNOLOGY

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

160613/230603

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES:

- To provide the fundamental knowledge of Artificial Intelligence and Machine Learning.
- To present the basic representation and reasoning paradigms used in AI & ML.
- To understand the working of techniques used in AI & ML.

Unit I

Introducing Artificial Intelligence: Definition, Goals of AI, Task of AI, Computation, Psychology and Cognitive Science, Perception, Understanding and Action. Artificial Intelligence vs Machine Learning vs Deep Learning and other related fields. Applications of Artificial intelligence and Machine Learning in real world.

Unit II

Problem, Problem Space and Search:

Production System, Blind Search: BFS & DFS, Heuristic Search, Hill Climbing, Best First Search.

Introduction to Neural Networks:

History, Biological Neuron, Artificial Neural Network, Neural Network Architectures, Classification, & Clustering.

Unit III

Introduction to Machine Learning: Traditional Programming vs Machine Learning.

Key Elements of Machine Learning: Representation, Process (Data Collection, Data Preparation, Model Selection, Model Training, Model Evaluation and Prediction), Evaluation and Optimization. **Types of Learning:** Supervised, Unsupervised and Reinforcement Learning. Regression vs Classification Problems.

Unit IV

Supervised Machine Learning: Linear Regression: Implementation, Applications & Performance Parameters, Decision Tree Classifier, Terminology, Classification vs Regression Trees, Tree Creation with Gini Index and Information Gain, IDE3

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Creation with Gini Index and Information Gain, IDE3

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DEPARTMENT OF INFORMATION TECHNOLOGY

Algorithms, Applications and Performance Parameters. Random Forest Classifier, Case Study on Regression and Classification for solving real world problems.

Unit V

Unsupervised Machine Learning: Introduction, Types: Partitioning, Density Based, DBSCAN, Distribution Model-Based, Hierarchical, Agglomerative and Divisive, Common Distance Measures, K-Means Clustering Algorithms, Case Study on Clustering for solving real world problems.

RECOMMENDED BOOKS:

- Artificial Intelligence: A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
- Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
- Introduction to AI & Expert System: Dan W. Patterson, PHI.
- Pattern Recognition and Machine Learning, Christopher M. Bishop
- Introduction to Machine Learning using Python: Sarah Guido
- Machine Learning in Action: Peter Harrington

COURSE OUTCOMES

after completing the course, the student will be able to:

- CO1. define basic concepts of Artificial Intelligence & Machine Learning.
- CO2. illustrate various techniques for search and processing.
- CO3. identify various types of machine learning problems and techniques.
- CO4. analysis various techniques in Artificial Intelligence, ANN & Machine Learning.
- CO5. apply AI and ML techniques to solve real world problems.
- CO6. build AI enabled intelligent systems for solving real world problems.

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Brute Force Search, Uniform Cost Search, Depth First Search, Heuristic Search, A* Algorithm, Optimal Solution

DEPARTMENT OF INFORMATION TECHNOLOGY

DATA MINING & WAREHOUSING

910102 (OC-1)

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To understand the significance of data mining in real-world perspective.
- To gain understanding of data mining techniques, algorithms and commonly used tools.
- To develop ability for applying data mining techniques and tools for solving real-world problems.

Unit - I

Introduction: Motivation, important, Data type for Data Mining: Relational Databases, Data Ware-Houses. Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis Classification of Data Mining Systems, Major Issues in Data Mining.

Unit - II

Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, Emerging Scenario of Pattern Warehousing System.

Unit - III

Data Pre-processing: Data Cleaning, Data Integration and Transformation, Data Reduction Discretization and Concept Hierarchy Generation. Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical Characterization.

Unit - IV

Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, other Algorithms & their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

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Unit - V

Classification & Predication and Cluster Analysis: Issues Regarding Classification & Predication, Different Classification Methods, Predication, Cluster Analysis, Major Clustering Methods, Currently Available Tools, Case Study.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain various data mining tasks.
- CO2. classify various databases systems and data models / schemas of data warehouse.
- CO3. compare various methods for storing & retrieving data from different data sources/repository.
- CO4. apply pre-processing techniques for construction of data warehouse.
- CO5. analyze data for knowledge discovery & prediction using appropriate algorithms.

Unit - II

Requirement Engineering: Definition, Requirements Engineering Activity, Types of Requirements- Functional and Non-Functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Object-oriented Design, Design Representations, Architectural Design, Procedural Design, Data Directed Design, Real Time Design, Object Oriented Design, Cohesion and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project Domains, Software Management, Software Project Management, Management- Basics-People, Product, Process, Project.

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DEPARTMENT OF INFORMATION TECHNOLOGY

SOFTWARE ENGINEERING

910103 (OC-1)

L	T	P	Total Credits
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COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, scrum and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit - I

Introduction to Software Engineering: Definition, Software Engineering-Layered Technology, Software Characteristics and Components, Software Model: Software Development of Life Cycle Model (SDLC), Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. Selection Criteria of Model: Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , Types of Requirement- Functional and Non-Functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural Design, Procedural Design, Data Directed Design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project Domains, Software Measurement, Software Quality Metrics, Project Management- Basics-People, Product, Process, Project, Estimation- Software Project

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) Based Estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic Issues, Criteria for Completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. explain the various fundamental concepts of software engineering.
- CO2. develop the concepts related to software design & analysis.
- CO3. compare the techniques for software project management & cost estimation.
- CO4. choose the appropriate model for real life software project.
- CO5. design the software using modern tools and technologies.
- CO6. test the software through different approaches.

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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPILER DESIGN LAB
160611/230601/240601

LIST OF PROGRAMS

1. Write a program to convert NFA to DFA.
2. Write a program to minimize DFA.
3. Develop a lexical analyzer to recognize a few patterns.
4. Write a program to parse using Brute force technique of Top down parsing.
5. Develop LL (1) parser (Construct parse table also).
6. Develop an operator precedence parser (Construct parse table also).
7. Develop a recursive descent parser.
8. Write a program for generating for various intermediate code forms.
 - i. Three address code
 - ii. Polish notation
9. Write a program to simulate Heap storage allocation strategy.
10. Generate Lexical analyzer using LEX.
11. Generate YACC specification for a few syntactic categories.
12. Given any intermediate code form implement code optimization techniques.

COURSE OUTCOMES

After completion of this course, the students would be able to:

- CO1. discuss the knowledge of patterns, tokens & regular expressions in programming for problem solving.
- CO2. design and Implement various parsing techniques.
- CO3. operate different types of compiler tools.
- CO4. develop programs for implementing code optimization techniques.
- CO5. build symbol table and intermediate codes.
- CO6. demonstrate the functionalities of different phases of the compilation process.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA MINING & PATTERN WAREHOUSING

160612/230602/240602

LIST OF PROGRAMS

1. To perform basic operation for mining data (Preprocessing, Regression, Classification, Association, Clustering and Visualization) using WEKA simulator
2. Setting up a flow to load an ARFF file (batch mode) and perform a cross validation using J48 (WEKA's C4.5 implementation).
3. Draw multiple ROC curves in the same plot window for J48 and RandomForest as classifiers using Knowledge flow in weka.
4. Training and Testing of naive Bayes classifier incrementally using Knowledge flow in weka.
5. Write a program to count the occurrence frequency of items in the given data set
6. Write a program to generate frequent itemset from given data set
7. Write a program to generate Association rules from the generated frequent itemsets.
8. Write a program to implement of various Association Rule Mining algorithms such as Apriori, Eclat, FP growth and FP Tree.
9. Write a program to implement different type of clustering algorithms such as Kmean, Heirachical, DBScan and EM Clustering.

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DEPARTMENT OF INFORMATION TECHNOLOGY

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

160613/230603

LIST OF PROGRAMS

1. Study of PROLOG programming language and its functions.
2. Write simple fact for the statements using PROLOG
3. WAP to implement factorial, Fibonacci of a given number using PROLOG.
4. Write a program to solve the 4-Queen problem using PROLOG and Python both.
5. Explore numpy, Pandas, SciPy, Matplotlib and Scikit Learn libraries in Python
6. Study and implement various Dimensionality reduction, Feature selection and Normalization techniques in Python
7. Implement Linear Regression model in Python.
8. Implement Logistic Regression model in Python.
9. Implement decision tree Classification Model using C4.5 and CSRT algorithms in Python.
10. Implement K-means clustering technique.
11. Implement Fuzzy C-means clustering technique.
12. Study various performance parameters used for evaluating the performance of various regression, classification and clustering models.

COURSE OUTCOMES

After completing the course, the student will be able to:

- CO1. illustrate the concepts of PROLOG programming language.
- CO2. implement various techniques for knowledge representation and processing.
- CO3. explore different AI and ML tools in Python.
- CO4. analysis various Artificial Intelligence & Machine Learning techniques over various performance parameters.
- CO5. apply AI and ML techniques to solve real world problems.
- CO6. build AI enabled intelligent systems for solving real world problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPILER DESIGN LAB
160611/230601/240601

SKILL BASED MINI PROJECTS

1. Design a Lexical scanner to recognize keyword, identifier and its total count presented in source program.
2. Design a Lexical scanner to identify operators, digits (0-9) and numbers (like integer, floating point, fractional and exponential) in source program.
3. Design a Lexical scanner to count no. of words, character, small characters, capital characters and capital words within source program.
4. Design a Lexical analyzer to ignore comments, redundant spaces, tabs and new lines from input source program.
5. Design a Lexical scanner to recognize and count the number of vowels and consonants in a sentence.
6. Design a YACC analyzer to implement a Calculator and recognize a valid Arithmetic expression.
7. Design a YACC analyzer to recognize string with grammar $\{a^n b^n \mid n \geq 0\}$ and $\{ a^n b \mid n \geq 5 \}$.
8. Design a YACC that accepts strings that starts and ends with Zero or One.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA MINING & PATTERN WAREHOUSING
160612/230602/240602

SKILL BASED MINI PROJECTS

1. Application in real estate industries to predict the house prices.
2. Detecting Phishing website using data mining techniques.
3. Intelligent Transport System.
4. Credit Card Fraud Detection System.
5. Opinion Mining for Social Networking Site.
6. Weather forecasting using Data mining Technique.
7. Stock Market Analysis and Prediction.
8. Online book recommendation system using Collaborative filtering.
9. Customer behavior prediction using web usage mining.
10. Secure E Learning Using Data Mining Techniques.

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DEPARTMENT OF INFORMATION TECHNOLOGY

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
160613/230603

SKILL BASED MINI PROJECTS

1. Design and implement Handwritten Digits Recognition system.
2. Design and implement a Spam classification system using Machine Learning algorithm.
3. Design and implement a Music Recommendation App.
4. Design and implement heart disease prediction using different classification algorithm and analyse the best over the dataset.
5. Design and implementation of Animal Kingdom Classification using CNN with the help of available libraries in python.
6. Apply the classification algorithms over the time series dataset by transforming the dataset into static values.
7. With the help of random forest classifier, classify any suitable dataset available over the trusted repository.
8. Design a program for Number Guessing using random number generator library. Make a play game with the defined library.

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DEPARTMENT OF INFORMATION TECHNOLOGY

OPTIMIZATION METHODS IN ENGINEERING

160731/230731

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVE

- To provide basic understanding of constraints optimization.
- To understand the fundamental theory and concepts of single and multivariable optimization.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction to optimization: Optimal Problem Formulation, Design Variables, Constraints, Objective Function, Variable Bounds, Engineering Optimization Problems, Classification of Optimization Algorithms.

Unit-II

Single-variable optimization algorithm: Bracketing methods, Region elimination methods; Interval halving method, Fibonacci search method, Point-estimation method; Successive quadratic estimation method. Gradient-based methods: Newton-Raphson method, Bisection method, Secant method.

Unit-III

Multivariable optimization algorithm: Optimality criteria, Unidirectional search, Direct search methods: Evolutionary optimization method, Simplex search method, Hooke-Jeeves pattern search method.

Unit-IV

Constrained optimization algorithm: Kuhn Tucker Condition, Rosen's Gradient projection method, Penalty function method.

Unit-V

Evolutionary optimization algorithms and its applications: Genetic Algorithm, Differential Evolution and Particle Swarm Optimization, Application of optimization techniques in engineering design problems.

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RECOMMENDED BOOKS

- S. S. Rao, Engineering Optimization- Theory and Practice, New Age International, 1996.
- Kalyanmoy Deb, Optimization for Engineering Design, Algorithms and Examples, Prentice Hall, 1995.
- Kalyanmoy Deb, Multiobjective Optimization Using Evolutionary Algorithms, Wiley.
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson
- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications- S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI

COURSE OUTCOMES

After completion of the course, students would be able to:

- CO1. define the basic of optimization algorithms.
- CO2. classify the concept of evolutionary optimization techniques.
- CO3. make use of single and multivariable optimization.
- CO4. apply the concepts of optimization in engineering design problems.
- CO5. compare various evolutionary optimization techniques.
- CO6. adapt optimization techniques for real world problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

PATTERN RECOGNITION

160732/230733/240733

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVE

- To analyse the usability of image processing application.
- To choose appropriate ML algorithms for specific application.
- To understand the implementation of python in the real-world application.

Unit-I

Introduction to pattern Recognition: Overview of Pattern Recognition, Applications of Pattern Recognition, Pattern Recognition Techniques, Challenges in Pattern Recognition.

Unit-II

Data Pre-processing Types of Data, Data Acquisition Techniques, Data Pre-processing Techniques, Image Enhancement Techniques, Feature Selection and Extraction Techniques, Feature Scaling and Transformation, Feature Extraction.

Unit-III

Introduction to Deep Learning, Neural Networks and Convolutional Neural Networks, Deep Learning, Transfer Learning, Feature Fusion Techniques, Hyper-parameter Optimization, Ensemble Methods in Pattern Recognition.

Unit-IV

Implementation: Overview of Object Detection and Segmentation, Feature-Based Object Detection, Deep Learning-Based Object Detection, Image Segmentation Techniques.

Unit-V

Application: Introduction to Time Series Analysis, Applications of Time Series Analysis in Real-world application, Time Series Analysis Techniques, Time Series Analysis.

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RECOMMENDED BOOKS

- Pattern Recognition and Machine Learning by Christopher Bishop.
- Deep Learning by Ian Goodfellow, Yoshua Bengio Aaron Courville, 2016.
- Deep Learning with Python by Francois Chollet.

COURSE OUTCOMES

After completion of the course, students would be able to:

- CO1. explain the basic principle of image processing
- CO2. apply the advance pattern recognition algorithms on images
- CO3. analyse the potential of basic image processing
- CO4. compare different pattern recognition algorithms on different domain
- CO5. develop the real world application of pattern recognition
- CO6. design basic programming structure for image processing using python

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DEPARTMENT OF INFORMATION TECHNOLOGY

MOBILE COMPUTING

160733

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To introduce the basic concepts and principles in mobile computing.
- To provide a computer systems perspective on the converging areas of wireless networking, mobile devices, and network protocols.
- To introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices.

Unit-I

Review of Personal Communication Services (PCS): Basic Concepts of Cellular Systems, Global System for Mobile Communication (GSM), Protocols, Handover, Data Services, and Multiple Division Techniques.

Unit-II

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 Standard, Mobile IP.

Unit-III

Wireless Application Protocol (WAP): Mobile Internet Standard. WAP Gateway and Protocols, Wireless Markup Languages (WML).

Unit-IV

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of Services in 3G.

Unit-V

Wireless Local Loop (WLL): Introduction to WLL Architecture, WLL Technologies. Global Mobile Satellite Systems: Case Studies of IRIDIUM and GLOBALSTAR Systems. Bluetooth Technology, Wi-Fi and Wi-Max.

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RECOMMENDED BOOKS

- Mobile communications, J. Schiller, Pearson Education.
- Wireless and Mobile Networks Architecture, by Yi —Bing Lin, John Wiley & Sons. Mobile & Personnel Communication Systems and Services, Raj Pandya, Prentice Hall India.
- Wireless Communication- Principles and Practices, Theodore S. Rappaport, Pearson Education.
- The Wireless Application Protocol, Singhal & Bridgman, Pearson Education.

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the basic concepts of mobile telecommunications system.
- CO2. demonstrate the infrastructure to develop mobile communications system.
- CO3. classify the different generations and technology for mobile communications.
- CO4. examine the working of different protocols of wireless mobile communication technology.
- CO5. determine the importance of each technology suitable for different situation of mobile and wireless communications.
- CO6. develop protocols for adhoc and infrastructure based wireless networks.

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DEPARTMENT OF INFORMATION TECHNOLOGY

IoT AND ITS APPLICATIONS **910203**

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To understand basic terminology, concepts, structure, and protocols of IoT.
- To understand Sensors, Devices & Components.
- To attain knowledge of integrated development environment.
- To be able to organize and analyze the vast data of IoT
- To be able to develop different IoT applications.

UNIT I

Introduction to IoT and network architecture– Evolution of Internet of Things (IoT), IoT Components, Impact of IoT, Challenges and security issues in IoT. IoT World Forum (IoTWF) standardized architecture, Simplified IoT Architecture: Core IoT Functional Stack, IoT data management and compute stack (Cloud, edge, fog).

UNIT II

IoT Protocols: Communication Protocols: IEEE 802.15.4, Zigbee, 6LoWPAN, Z-Wave, Bluetooth, RFID. Networking Protocols: CoAP and MQTT.

UNIT III

Things in IoT: Sensor: light sensor, moisture sensor, temperature sensor, etc. Actuator: DC motor, different types of actuators. Controllers: microcontrollers and their role as a gateway to interfacing sensors and actuators.

IoT Platform overview: Raspberry pi, Arduino Board details, Introduction to Arduino IDE, Embedded ‘C’ Language basics, Interfacing sensors, LEDs.

UNIT IV

Cloud computing and data analytics in IoT: Introduction to Cloud Computing- Definition, Characteristics, Components, Cloud provider: Microsoft Azure, AWS, Google Cloud. Structured Versus Unstructured Data, Data in Motion versus Data at Rest, IoT Data Analytics Challenges, Data Acquiring, Organizing in IoT.

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UNIT V

IoT Applications: Business models for the internet of things, Smart city, Smart mobility and transport, Industrial IoT, Smart health, Environment monitoring and surveillance, Home Automation, Smart Agriculture, Examples for new trends – AI, ML penetration to IoT.

RECOMMENDED BOOKS

- IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017.
- Internet of Things – A hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2015.
- Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education.

COURSE OUTCOMES

At the completion of course, student will able to-

- CO1. define basic understanding of IoT, its architecture.
- CO2. compare the communication models and protocols for IoT.
- CO3. implement hardware and software platforms for application in IoT.
- CO4. examine the security issues involved in IoT.
- CO5. choose appropriate data analytics and cloud offerings related to IoT.
- CO6. develop IoT based applications for real world.

DEPARTMENT OF INFORMATION TECHNOLOGY**SOFTWARE TESTING
910204**

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To know about an introduction to software testing, focusing on the principles, techniques, and best practices used in the field.
- To become familiar with the fundamental concepts of software testing and gain practical skills in planning, designing, and executing software tests.
- To cover the various testing methodologies, test case creation, test automation, and defect tracking.

Unit I

Introduction to Software Testing: Importance and goals of software testing, Testing life cycle and its phases, Role of testing in the software development process, Testing principles and fundamentals, V & V Model.

Unit II

Testing Techniques: Black-box and white-box testing, Equivalence partitioning, Boundary value analysis, Decision table testing, State transition testing, Use case testing, Error guessing and exploratory testing.

Unit III

Test Case Design: Test case components, Test case design techniques, Test case prioritization, Test data management, Test coverage criteria, Traceability matrix.

Test Planning and Management: Test planning process, Test strategy and test plan development, Test estimation and scheduling, Test environment setup and management, Test metrics and reporting.

Unit IV

Specialized Testing: Unit testing, Integration testing, System testing, Acceptance testing, Regression testing, Performance testing, Security testing, Usability testing, Compatibility testing, localization testing.

Unit V

Quality Assurance and Best Practices: Quality assurance processes and activities, Code reviews and inspections, Static analysis and code coverage, Test-driven development and agile testing, Emerging trends in software testing

RECOMMENDED BOOKS

- "Foundations of Software Testing: ISTQB Certification" by Dorothy Graham, Erik van Veenendaal, Isabel Evans, and Rex Black.
- "Software Testing: Concepts and Practices" by Srinivasan Desikan and Gopalaswamy Ramesh.
- "The Art of Software Testing" by Glenford J. Myers, Corey Sandler, and Tom Badgett.
- "Agile Testing: A Practical Guide for Testers and Agile Teams" by Lisa Crispin and Janet Gregory.
- "How Google Tests Software" by James A. Whittaker, Jason Arbon, and Jeff Carollo.

COURSE OUTCOMES

At the completion of course, student will able to-

- CO1. understand the fundamental principles and concepts of software testing.
- CO2. gain practical knowledge of different testing techniques and methodologies.
- CO3. learn to create effective test cases and test plans.
- CO4. develop skills in test execution, analysis, and defect tracking.
- CO5. understand the role of test automation in software testing.
- CO6. apply industry best practices for software testing.

DEPARTMENT OF INFORMATION TECHNOLOGY**INTERNET OF THINGS LAB
160711/ 230701****LIST OF PROGRAMS**

1. Introduction to Arduino Board and Arduino IDE (Installation and Setup)
2. Write a Program to develop a basic LED glowing and fading circuit.
3. Write a Program to control the LED using Button and count the number of button pushes, control the intensity of light.
4. Write a Program to read an analog input and prints the voltage to the serial monitor.
5. Write a program to control the fire alarm.
6. Write a Program to Control Electronic Appliances using RELAY SHIELD Sensor after detecting motion using Motion Sensor (PIR sensor).
7. Write a program to control the movement of a stepper motor.
8. Write a program to control electronic appliances using Bluetooth.
9. Write a program to monitor the moisture, temperature, and humidity levels of the surrounding environment.
10. Write a program to determine the pH level and turbidity in water.
11. Write a program to monitor the heartbeat.

DEPARTMENT OF INFORMATION TECHNOLOGY**INTERNET OF THINGS LAB
160711/ 230701****LIST OF MINI SKILL BASED PROJECTS****List of Micro Projects:**

1. Design a sleep detection system using an eye blink sensor.
2. Design a Burglar Alarm system for home security.
3. Distance calculation using ultrasonic sensor
4. Detect the intensity of light using LDR.
5. Design an LED chaser using multiple-colored LEDs.
6. Calculate the heartbeat per minute using a Heart rate monitor
7. Design a Shadow alarm using a light detection resistor.
8. Design a system for water level monitoring.
9. Design an object detection system using an infrared sensor
10. Waste Management: Build an IoT solution for smart waste management, integrating sensors in waste bins to monitor fill levels. Implement optimization algorithms to optimize waste collection routes and reduce operational costs.

List of Macro Projects:

1. Use a PIR sensor to detect the motion and indicate the motion detection with LEDs/bulbs.
2. Design a Digital dice that generates a random number.
3. Using a sound sensor, design a sound pollution monitoring system.
4. Design an electronic door opener using an RFID reader.
5. Using suitable temperature and humidity sensors, design a weather reporting system.
6. Design an Arduino-based mail notifier.
7. Design a smart alarm clock using motion sensors/light sensors etc.
8. Design an automatic light dimmer using light sensors and relay switch.
9. Smart Parking: Create an IoT-based parking system that monitors parking space availability and guides drivers to vacant spots using sensors and mobile applications. Implement real-time updates and payment integration for efficient parking management.
10. Asset Tracking: Create an IoT solution for tracking assets such as vehicles, packages, or equipment. Use GPS or RFID technology to monitor the location and status of assets in real-time and develop a web or mobile application for visualization.

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DEPARTMENT OF INFORMATION TECHNOLOGY

List of Mini Projects:

1. Design a human-following robot using suitable sensors and actuators
2. Design a line following robot using suitable sensors and actuators
3. Design an obstacle-avoiding robot using suitable sensors and actuators
4. Design a Plant watering system using suitable sensors and actuators
5. Design a home automation system using suitable sensors and actuators
6. Design an automated toll deduction system using RFID
7. Design a Fire-fighting robot using suitable sensors and actuators
8. Design a vehicle accident prevention system using suitable sensors and actuators
9. Design theft management using suitable sensors and actuators
10. Design a floor-cleaning robot using suitable sensors and actuators
11. Design Smart sticks for blind people using suitable sensors and actuators
12. Design a Gesture control robot using suitable sensors and actuators
13. Design a Bluetooth-controlled device using HC-05 Bluetooth module
14. Smart Parking: Create an IoT-based parking system that monitors parking space availability and guides drivers to vacant spots using sensors and mobile applications. Implement real-time updates and payment integration for efficient parking management.
