

ProgrammeCode:UG056

## **SCHEME AND SYLLABUS**

***B.Tech Computer Science and Engineering  
(Artificial Intelligence and Machine Learning)***



**Department of Computer Science and Engineering  
University Institute of Engineering Technology  
Sant Baba Bhag Singh University  
Batch 2024 Onwards**

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## *ABOUT THE DEPARTMENT*

The Department of Computer Science and Engineering focuses not only on the theoretical aspects but emphasize the overall development of the students. There are Special Interest Groups among the faculty who are focused in their research domains like Data Mining and Big Data Analytics, Wireless & Mobile Computing, Security & Trust Computing, Wireless Sensor Networks & IOT, Soft Computing, Image Processing, Machine Learning and Data Analytics, Natural Language Processing, Cloud Computing and Social Networking, Network Security, Service Oriented Architecture and Theoretical Computer Sciences. The departments many strengths include its high faculty to student ratio, state of the art facilities, strong focus on teaching learning balanced with leading-edge research and emphasis on leadership, service and ethics. The efficacy of the Teaching-Learning process is reflected in the consistently excellent results being achieved every year. To augment professional competence, the department supports outside talents to gain more inputs, organizes hackathons, seminars, workshops, industrial visits and expert lectures not only to offer a new dimension to the learning process but also infuse leadership qualities in the budding engineers.

## *SALIENT FEATURES OF THE DEPARTMENT*

1. Provides a learning environment strongly focused on collaborative and interdisciplinary research under the guidance of experienced and qualified faculty. Majority of the faculty members are doctorates.
2. The teaching programme, here, is devised keeping in view the significance of Industry-Academia interaction enabling the students to face the global competitiveness with effective communication skills.
3. The CSE Department regularly organizes conferences, hackathons, seminars, student symposia, short-term training program and value-added courses. This provides a wide range of opportunities for faculty and students to bring out their potential and innovative skills in a variety of fields.
4. The department has well equipped computing laboratories and a rich repository of software covering a wide spectrum of applications. The department in collaboration with IIT has setup Virtual lab for remote experiments. Besides this department takes in NEPTEL and MOOC courses both for its students and faculty.
5. Digital Library with access to journals and video lectures of eminent professors.

## *B. TECH (BACHELORS IN TECHNOLOGY)*

Educational qualification matters a lot in gaining success. Along with academic qualification, technical skills are also required. Job openings for Software professionals are much higher in the corporate sector than in public sector. Professionals can join as junior programmer, database administrator, junior network manager, Data Analyst, Software Developer, Software Engineer, and Client-Server Systems Manager etc in the initial stage.

Students have job opportunities at organizations like, IBM, Intel, HP, TCS, INFOSYS, WIPRO, TECHMAHINDRA, CTS and Dell in India and abroad.

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## VISION

Empower every student to be innovative, creative and acquire skills in Computer Science & Engineering to enrich society and achieve a happy, successful and meaningful life.

## MISSION

Our mission is to provide a high-quality undergraduate and post graduate education in Computer Science & Engineering that provides all-round growth of an individual by creating futuristic environment that fosters critical thinking, dynamism and innovation to transform them into globally competitive professionals and empowering the youth in rural communities with computer education.

## ELIGIBILITY CRITERIA

- Passed 10+2 examinations with Physics & Mathematics as a compulsory subject along with one of the Chemistry/ Computer Science/ Biology/Biotechnology/ Technical Vocational subjects. Obtained at least 45% marks (40% in case of candidate belonging to reserved category) in the above subjects taken together.
- B. Tech (Lateral Entry) Diploma in Engineering & technology from AICTE approved institution or B.Sc (N.M) from UGC approved university at least 45% marks. (40% in case of reserved category)

## DURATION

*B.Tech CSE- 4 years*

*B.Tech CSE Leet- 3 years*

## CAREER PATHWAY

Job openings for Software professionals are much higher in the corporate sector than in public sector. Professionals can join as junior programmer, database administrator, junior network manager, Data Analyst, Software Developer, Software Engineer, and Client-Server Systems Manager etc in the initial stage.

Students have job opportunities at organizations like- IBM, Intel, HP, TCS, INFOSYS, WIPRO, TECHMAHINDRA, CTS and Dell in India and abroad.

These are some of the big names that aspiring software engineers are aware of. On the other hand, there are companies like Infosys, Capgemini, Accenture, Cognizant, etc that pay anywhere between **3–3.5 lac P.A** to fresher. All the companies mentioned above are the leading companies that hire B. Tech CSE freshers. So as a B. Tech CSE graduate, candidate can be happy with 2 LPA or 10 LPA, it totally depends on him/her. But there's definitely so much money to make.

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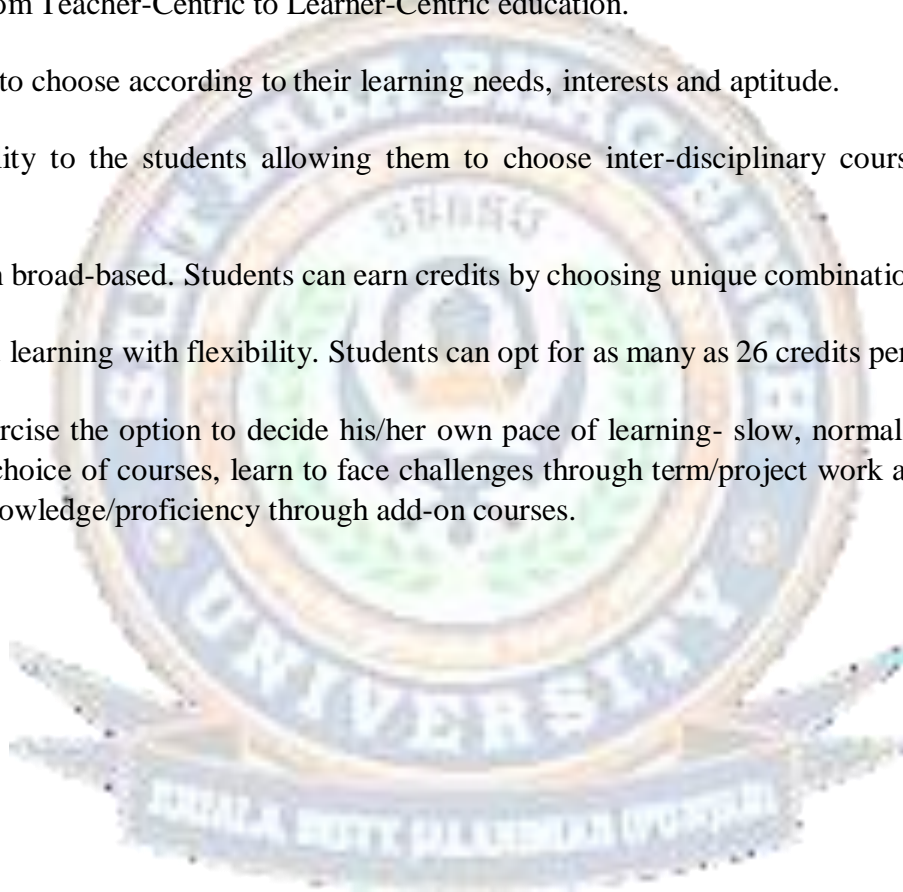
## CHOICE BASED CREDIT SYSTEM (CBCS)

### PREAMBLE:

The University Grants Commission, New Delhi, in its 12th Plan Guidelines, directed the Universities in the country to implement the Choice Based Credit System (CBCS) to set a benchmark in the University education and fulfil expectations of all the stakeholders.

### OBJECTIVES

1. Shift in focus from Teacher-Centric to Learner-Centric education.
2. Allow students to choose according to their learning needs, interests and aptitude.
3. Provide flexibility to the students allowing them to choose inter-disciplinary courses, change majors, programs
4. Make education broad-based. Students can earn credits by choosing unique combinations.
5. Help self-paced learning with flexibility. Students can opt for as many as 26 credits per semester.
6. Student can exercise the option to decide his/her own pace of learning- slow, normal or accelerated plan and sequence the choice of courses, learn to face challenges through term/project work and may venture out to acquire extra knowledge/proficiency through add-on courses.





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*All India Council for Technical Education, New Delhi*

## UPDATION/ADDENDUM

*in*

### **Model Curriculum for Undergraduate Degree Courses in Engineering & Technology**

### **January 2018 (Volume-II)**

*(As per Inputs of Experts)*

1. The curriculum of **Humanities, Social Science including Management courses (HSMC)**
  - (i) Human Values courses is updated.
  - (i) Course Code HSMC (HU-102) may be read as (H-102) along with the following:-
    - a Name of the course 'Universal Human Values 2: Self, Society and Nature' is re-named as "**Universal Human Values 2: Understanding Harmony**".
    - b Contents of "**Universal Human Values 2: Understanding Harmony**" to be included.

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## All India Council for Technical Education Model curriculum for Undergraduate Degree Courses in Engineering & Technology

### COMPUTER SCIENCE AND ENGINEERING

#### Chapter -1

##### General, Course structure & Theme & Semester-wise credit distribution

###### A. Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hours Practical(Lab)/week	1 credit

**B. Range of credits-**A range of credits from 150 to 160 for a student to be eligible to get Under Graduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honours or additional Minor Engineering, if he/she completes an additional 20 credits. These could be acquired through MOOCs.

###### C. Structure of Undergraduate Engineering program:

S. No.	Category	Credit Breakup for CSE students
1	Humanities and Social Sciences including Management courses	15
2	Basic Science courses	23
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc	29
4	Professional core courses	49
5	Professional Elective courses relevant to chosen specialization/branch	18
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	15
8	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition]	(non-credit)
	<b>Total</b>	<b>162</b>

*\*Minor variation is allowed as per need of the respective disciplines.*

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## *D. Course code and definition:*

<b>Course code</b>	<b>Definitions</b>
BS	Basic Science Courses
ES	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PC	Professional core courses
PE	Professional Elective courses
OE	Open Elective courses
MC	Mandatory courses
SI	Summer Industry Internship
PROJ	Project

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## Induction Program (Please refer Appendix-A for guidelines)

<b>Induction program (mandatory)</b>	<b>3 weeks duration</b> (Please refer Appendix-A for guidelines & also details available in the curriculum of Mandatory courses)
Induction program for students to be offered right at the start of the first year.	<ul style="list-style-type: none"><li>• Physical activity</li><li>• Creative Arts</li><li>• Universal Human Values</li><li>• Literary</li><li>• Proficiency Modules</li><li>• Lectures by Eminent People</li><li>• Visits to local Areas</li><li>• Familiarization to Dept./Branch &amp; Innovations</li></ul>

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<u>Under graduate Programme Outcomes (PO)</u>	
<u>At the end of Programme/Degree mentioned above , the graduates will be able to .....</u>	
PO1.	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.
PO2.	<b>Problem analysis:</b> Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences.
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
P10	<b>Communication:</b> Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions
P11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments
P12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



**Under Graduate Programme Specific Outcomes (PSO)**

PSO1	Ability to acquire knowledge in Computer Science and Engineering and develop innovative solutions to complex problems.
PSO2	Design and build websites, android apps, automated projects using the knowledge of programming, testing, life cycle models, artificial intelligence, machine learning and CASE tools.
PSO3	Pursue life long learning in advanced technologies of Computer Science and Engineering and apply it for the benefit of the society.

**Under Graduate Programme Educational Objective (PEO)**

**The Graduate/Undergraduate will be....**

<b>PEO1</b>	<b>Acquiring knowledge of Computer Science and other engineering disciplines for analyzing and developing innovative solutions to real world problems.</b>
<b>PEO2</b>	<b>Developing interdisciplinary projects using latest tools, techniques and models for the benefit of the society and environment</b>
<b>PEO3</b>	<b>Demonstrating team leadership and effective communication skills while pursuing a career in life-long learning, research and development or generating employments through startups.</b>
<b>PEO4</b>	<b>Preparing competitive examinations for higher studies abroad or for getting job in private, public or multinational companies.</b>

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## Semester-wise structure of curriculum [L=Lecture, T=Tutorials, P=Practicals & C=Credits]

### SEMESTER I

Scheme for B.Tech.1<sup>st</sup> Semester (common to all branches)

#### I. Theory Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	ES	CSE111	Introduction to programming in C	4:0:0	4:0:0	4	4
2	AEC-1	AEC0010	Communication Skills –I	2:0:0	2:0:0	2	2
3	ES	CE101	Basics of Civil Engineering	4:0:0	4:0:0	4	4
4	BS	*PHY115	Engineering Physics (include semiconductor unit)	4:0:0	4:0:0	4	4
5	VAC	VAC022	Environmental Education	3:0:0	3:0:0	3	3

#### II. Practical Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	ES	CSE113	Programming in C Practical	0:0:2	0:0:1	2	1
2	SEC-1	ME105	Workshop /Manufacturing Practices Practical	0:0:6	0:0:3	6	3
3	BS	*PHY107	Engineering Physics Practical	0:0:2	0:0:1	2	1
4	PT	*PT101/PT103 /PT105	Physical Training-I (NSO/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours=29

Total Credit Hours= 22

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## SEMESTER II

Scheme for B.Tech. 2<sup>nd</sup> semester (common to all branches)

### I. Theory Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	BS	CHM105	Engineering Chemistry	4:0:0	4:0:0	4	4
2	BS	MAT154	Engineering Mathematics	4:0:0	4:0:0	4	4
3	ES	ME101	Engineering Graphics and Design	4:0:0	4:0:0	4	4
4	ES	*EE102	Basic Electrical Engineering	4:0:0	4:0:0	4	4
5	MDC-I	MDC023	Indian Knowledge System	3:0:0	3:0:0	3	3
6	VAC	VAC015	YOGA	3:0:0	3:0:0	3	3
7	AEC-1	AEC0011	Communication Skills –II	2:0:0	2:0:0	2	2

### II. Practical Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	BS	CHM107	Engineering Chemistry Practical	0:0:2	0:0:1	2	1
2	ES	*EE104	Basic Electrical Engineering Laboratory	0:0:2	0:0:1	2	1
3	PT	*PT102/PT104/PT106	Physical Training-II(NSO/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours= 30

Total Credits Hours = 26

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## SEMESTER III

### I. Theory subjects:

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE251	Computer Organization and Architecture	4:0:0	4:0:0	4	4
2	PC	CSE253	Data structure and Algorithms	4:0:0	4:0:0	4	4
3	PC	CSE255	Operating System	4:0:0	4:0:0	4	4
4	AEC	AEC0014	Creative Writing in English	2:0:0	2:0:0	2	2
5	PC	CSE259	Computer Programming using python	2:0:0	2:0:0	2	2

### II. Practical subjects:

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE259	Computer Organization and Design Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE261	Data structure and Algorithms Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE263	Computer Programming using python laboratory	0:0:2	0:0:1	2	1
4	PC	CSE265	Operating System Laboratory	0:0:2	0:0:1	2	1
5	PT	PT201/PT203/PT205	Physical Training-III(NSO/NCC/NSS)	0:0:2	NC	2	NC

Total Contact Hours= 26  
Total Credits Hours= 20

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## SEMESTER IV

### I. Theory subjects:

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	BS	MAT212	Discrete Mathematics	4:0:0	4:0:0	4	4
2	PC	CSE252	Object Oriented Programming using C++	4:0:0	4:0:0	4	4
3	PC	CSE254	Database Management System	4:0:0	4:0:0	4	4
4	PC	CSE256	Design and Analysis of Algorithms	4:0:0	4:0:0	4	4
5	MDC	MDC019	Universal Human Values	3:0:0	3:0:0	3	3
6	AEC	AEC0015	Effective Technical Communication Skills	2:0:0	2:0:0	2	2

### II. Practical Subjects

S. No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE260	Database Management System Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE262	Design and Analysis of Algorithms Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE264	Object Oriented Programming using C++ Laboratory	0:0:2	0:0:1	2	1
4	MC	PT202/PT204 /PT206	Physical Training-IV (NSO/NCC/NSS)	0:0:2	NC	2	NC

**Note: 4 weeks industrial/ institutional training after 2<sup>nd</sup> year/4<sup>th</sup> semester**

Total Contact Hours= 29

Total Credits Hours= 24



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## SEMESTER V

### I. Theory Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE353	Theory of Computation	4:0:0	4:0:0	4	4
2	PC	CSE355	Computer Graphics	4:0:0	4:0:0	4	4
3	PC	CSE357	Data Communication and Networks	4:0:0	4:0:0	4	4
4	PC	CSE359	Artificial Intelligence	2:0:0	2:0:0	2	2
5	PE		Professional Elective-I	3:0:0	3:0:0	3	3

### II. Practical Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours(L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE361	Computer Graphics Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE363	Data Communication and Networks Laboratory	0:0:4	0:0:2	4	2
3	PC	CSE365	Artificial Intelligence Laboratory	0:0:2	0:0:1	2	1
4	SEC-II	CSE367	Four weeks industrial/institutional training evaluation (undertaken after 4 <sup>th</sup> sem)	-	0:0:3	-	3
3	MC	PT301/PT303 /PT305	Physical Training-V (NSO/NCC/NSS)	0:0:2	NC	2	NC

### III. Professional Elective-I

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE369	Mobile Application Development	3:0:0	3:0:0	3	3
2	PE	CSE371	Introduction to Internet of Things	3:0:0	3:0:0	3	3
3	PE	CSE373	Cloud computing	3:0:0	3:0:0	3	3
4	PE	CSE375	Neural Networks and Deep Learning	3:0:0	3:0:0	3	3

Total Contact Hours= 27

Total Credits Hours = 24

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## SEMESTER VI

### I. Theory Subjects

S.No.	Type	Subject Code	Subject Name	Contact hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE352	Internet web Programming	4:0:0	4:0:0	4	4
2	PC	CSE354	Software Engineering	4:0:0	4:0:0	4	4
3	PC	CSE357	Programming in Java	4:0:0	4:0:0	4	4
3	PE		Professional Elective-II	3:0:0	3:0:0	3	3
4	PE		Professional Elective-III	3:0:0	3:0:0	3	3
5	MDC	MDC018	Gender, Culture & Development	3:0:0	3:0:0	3	3

### II. Practical Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PC	CSE380	Software Engineering Laboratory	0:0:2	0:0:1	2	1
2	PC	CSE382	Internet web Programming Laboratory	0:0:2	0:0:1	2	1
3	PC	CSE384	Programming in Java Laboratory	0:0:2	0:0:1	2	1

### III. Professional Elective-II

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE366	Digital Image Processing	3:0:0	3:0:0	3	3
2	PE	CSE314	Computer Vision	3:0:0	3:0:0	3	3
3	PE	CSE362	Compiler Construction	3:0:0	3:0:0	3	3
4	PE	CSE348	Digital Marketing	3:0:0	3:0:0	3	3
5	PE	CSE378	Advanced Parallel Computing	3:0:0	3:0:0	3	3

### IV. Professional Elective-III

S.No.	Type	Subject Code	Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE320	Optimization Techniques in Machine Learning	3:0:0	3:0:0	3	3
2	PE	CSE322	Distributed Systems	3:0:0	3:0:0	3	3
3	PE	CSE324	Wireless Communications	3:0:0	3:0:0	3	3
4	PE	CSE326	BlockChain	3:0:0	3:0:0	3	3
5	PE	CSE376	Advanced DataBase Management System	3:0:0	3:0:0	3	3

**Note: 4 weeks industrial training after 3<sup>rd</sup> year/6<sup>th</sup> semester**

Total Contact Hours = 27  
Total Credits Hours = 24

# Programme Code: UG056

## SEMESTER VII

### I. Theory Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE		Professional Elective-IV	3:0:0	3:0:0	3	3
2	PC	CSE401	Data Visualization	3:0:0	3:0:0	3	3
3	PC	CSE403	Cyber security	4:0:0	4:0:0	4	4
4	PC	CSE405	Big Data Analytics	4:0:0	4:0:0	4	4
5	OE		Open Elective-III	3:0:0	3:0:0	3	3
6	MDC	MDC007	Managing Innovation and Entrepreneurship	3:0:0	3:0:0	3	3
7	PC	CSE 407	Pattern Recognition	3:0:0	3:0:0	3	3

### II. Practical Subjects

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	SEC	*CSE481	Major Project	0:0:6	0:0:3	6	3
3	SEC-III	CSE485	Six weeks industrial training evaluation (undertaken after 6 <sup>th</sup> sem)		Six Weeks		4

### III. Professional Elective-IV

S.No.	Type	Subject Code	Subject Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	PE	CSE451	Cryptography	3:0:0	3:0:0	3	3
2	PE	CSE453	Multimedia and Animation	3:0:0	3:0:0	3	3
3	PE	CSE455	Natural Language Processing	3:0:0	3:0:0	3	3
4	PE	CSE477	Data Mining in Business Intelligence	3:0:0	3:0:0	3	3

Total Contact Hours= 29

Total Credits Hours= 30

# Programme Code: UG056

## SEMESTER VIII

### I. Practical Subjects

S.No.	Type	Subject Code	Subject Name	Total Credit Hours
1	SEC-IV	CSE466	Six Months Industrial Training	20

Total Credits Hours= 20



# Programme Code: UG056

## **Open-Elective-I**

- 1. Basic concepts of Database Management System**
- 2. Introduction to Cloud Computing**

## **Open Elective-II**

- 1. Introduction to Operating System**
- 2. Basics of Networking**

## **Open Elective-III**

- 1. Introduction to Digital Marketing**
- 2. Basic Concepts of IOT**

## **Open Elective-IV**

- 1. E-commerce**
- 2. Introduction to Cybersecurity**



# Programme Code: UG056

<b>Course Code</b>	<b>CSE111</b>
<b>Course Title</b>	Introduction to programming in C
<b>Type of Course</b>	ES
<b>L T P</b>	4:0:0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic Knowledge about Computers
<b>Course Objective(s)</b>	To gain experience about structured programming. To help students to understand the implementation of Programming language. To understand various features in Programming Language.
<b>Course Outcome (CO)</b>	The students will be able to: 1. Illustrate the flowchart and to develop C programs. 2. Develop conditional and iterative statements to write C programs and exercise user defined functions to solve real time problems 3. Inscribe C programs that use Pointers to access arrays, strings and functions. 4. Exercise user defined data types including structures and unions to solve problems.

## SYLLABUS

### UNIT I

**Fundamentals of computer:** Computer generations, History of languages, high- level, Low level, Assembly languages etc. Definition and properties, Principles of flowcharts. Flowcharting symbols, Algorithms.

**Introduction To Programming Language:** Character Set, Constants, Types of constants, Variables and Keywords, data types. Instructions: Type Declaration Instruction, Arithmetic Instructions.

### UNIT II

**Control structures:** Decision making structures: If, If-else, Nested If –else, Switch.  
Loop Control structures: While, Do-while, for, Nested for loop. Other statements: Break, Continue, goto, Exit

**Arrays and Pointers:** Arrays Initialization, Types of Array. Initializing Two Dimensional and Multidimensional Arrays, Introduction to Pointers. Pointers and Functions.

### UNIT III

**Storage Classes and Character Strings:** Automatic, Register, Static, External (Local and Global), Strings, Standard library String Functions: strlen(), strcpy(), strcat(), strcmp() **Functions:** Definition, Passing values between functions, call by value, call by reference, Recursion

### UNIT IV

**Structures and Unions:** Declaring structure and its variables, Arrays of structures. Introduction to Unions.

**Input/Output:** Getchar (), putchar (), printf (), scanf (), puts (), gets () Introduction to files and its operations.

## Programme Code: UG056

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1.	Programming in C	Byron Gottfried, Jitender Chhabra	Schuam out line series
2.	Let us C	Yaswant Kanetkar	BPB Publication
3.	A structured Programming approach using C	Behrouz Forouzan	Thomas learning



<b>Course Code</b>	<b>AEC0010</b>
<b>Course Title</b>	<b>Communication Skills-I</b>
<b>Type of course</b>	<b>AEC-1</b>
<b>L T P</b>	<b>2:0:0</b>

## Programme Code: UG056

Credits	2
Course prerequisite	+2 in any stream
Course Objective (CO)	Objectives of the course is to: 1. Equip the learner with proficiency in reading comprehension.. 2. Enable the learner with improved writing skills and command over official/ corporate communication. 3. Enhance the learners' range of vocabulary and knowledge of the essentials of grammar.
Course Outcomes	At the conclusion of the course the learner will be able to: 1. Have fairly good proficiency in reading comprehension. 2. Have enhanced writing skills and command in official/ corporate communication. 3. Develop confidence in making presentation: oral or documentary. 4. Develop speaking skills.

### SYLLABUS

#### UNIT-I

**Basics of Communication Skills:** Communication, Process of Communication, Types of Communication- Verbal and Non verbal communication, Channels of Communication- Upward, Downward, Horizontal, Barriers to Communication, Role of Communication in society.

#### UNIT-II

**Listening Skills:** Listening Process, Hearing and Listening, Types of Listening, Effective Listening, Barriers of Effective Listening, Note Taking

**Reading Skills:** Purpose of reading, Process of reading, reading skills Models and strategies, scanning, skimming, SQ3R, Approaches of Reading, Comprehension passages for practice.

#### UNIT III

**Writing Skills:** Purpose of writing, Effective writing, Types of writing, Business Correspondence, Precise writing, Memo writing, minutes of meeting.

#### UNIT-IV

**Speaking Skills:** Speech process, Skills of effective speaking, Role of audience, Feedback Skill, Oral Presentation.

Recommended Books:

Sr No	Author(s)	Title	Publisher
1.	Bhupender Kour	Effectual Communication Skills	S.K. Kataria and Sons
2.	R. Datta Roy and K.K. Dheer	Communications Skills	Vishal Publishing Company
3	The Essence of Effective Communication	Ludlow and Panton	Prentice Hall of India

## Programme Code: UG056

Course Code	CE101
Course Title	Basics of Civil Engineering
L T P	4 :0: 0
Credits	4
Course Prerequisite	Introduction to Civil Engineering
Course Outcomes	The student will be able to recognize the significance of civil engineering in routine life, importance of surveying, importance and requirements of building planning and will learn about construction material, role of transportation as well as of water and its conservation.
Course Objective (CO)	1. Identifying the various areas available to pursue and specialize within the overall field of Civil Engineering. 2. Highlighting the depth of engagement possible within each of these areas. 3. Understanding the vast interfaces this field has with the society at large. 4. Providing inspiration for doing creative and innovative work.

### *Syllabus*

#### **UNIT- 1**

**Introduction and Scope of Civil Engineering:** Understanding the importance of Civil Engineering in shaping and impacting the world, Scope of work involved in various branches of Civil Engineering and future vision, Infrastructure development and growth of the Nation; its effects on the GDP, employment, living standards of the people.

#### **UNIT-2**

**Construction Materials:** Materials; Stone, Bricks, Cement, Timber, Sand, Concrete, steel, Requirement & its uses, Properties and importance of civil engineering materials used in construction.

#### **UNIT-3**

**Construction Equipment's:** Introduction to Construction Equipment, Classification of Equipment; Excavating Equipment: Power Shovels, Draglines, Hoes, Clam Shells and trenching machines, Tractors and related equipment: Bulldozers, Rippers, Scrapers & overview of other Equipment Hauling equipment: Trucks and wagons, operation and guideline for selection and deployment. Belt conveyor system.

#### **UNIT – 4**

**Infrastructure Development:** Introduction and overview to Futuristic systems: Megacities, Smart Cities, Stadia; Roads, Railways, Metros, Hyper Loop, Airports, Seaports, River ways, Sea canals, Tunnels, bridges.

#### **Text Books: -**

1. S. K. Duggal, "Building Materials", New Age International Publishers.
2. Sushil Kumar "Building Materials and construction", Standard Publishers, 20th edition, reprint, 2015.
3. Concrete Technology by M. S. Shetty, S Chand, New Delhi-110055.



# Programme Code: UG056

CourseCode	PHY115
Course Title	Engineering Physics
Type of course	BS
LTP	4 0 0
Credits	4
Course prerequisite	10+2 with physics as core subject.
Course Objective	The aim of the subject is to enhance the knowledge of engineering students about Semiconductor Physics and apply the knowledge to engineered semi conductor materials.
Course Outcome(CO)	<b>Students will able to:</b> CO1: Gain the knowledge to explain the concept of electronics materials. CO2: Understand the physics of semiconductors and light semi conductor interaction. CO3: illustrate the measurements of carrier density, resistivity and hall mobility using different techniques. CO4: Analyze engineered semiconductor materials and its applications.

## Syllabus-

### UNIT-I

**Semiconductors & Engineered semi-conductor materials:** Intrinsic and extrinsic semiconductors, p-type, and n-type semiconductors; Fermi level in semiconductors; Current conduction in semiconductors, I-V characteristics of p-n junction diode, some special p-n diodes: Zener diode, Tunnel diode, Photo diode, and Light emitting diode. Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques.

### UNIT-II

**Magnetic Materials, Nano Materials & Superconductivity:** Basic ideas of Dia, Para, Ferro & Ferrimagnetic materials, Ferrites, Hysteresis loop, Magnetic Anisotropy, Superconductivity, Meissner Effect, Type I & Type II superconductors, London Equations, Nanoscale, Classifications of nanomaterials (3D, 2D, 1D and 0D), electron confinement, Nanocomposites, Carbon nanotubes (CNTs), Properties of nanomaterials, synthesis of nanomaterials, Applications of nanomaterials.

### UNIT-III

**EM waves, Dielectrics & Quantum Theory:** Physical significance of Gradient, Divergence & Curl, Relationship between Electric Field & Potential, Dielectric polarization, Displacement current, Maxwell's Equations, Need and origin of quantum concept, Wave - particle duality, Matter waves, Group & Phase velocities; Wave function, Uncertainty Principle; Schrodinger wave equations (time independent & dependent); Application to particle in a box.

### UNIT-IV

**Lasers & Fibre Optics:** Concepts of laser, Spontaneous & Stimulated emissions, Einstein's Coefficients, Population

## Programme Code: UG056

Inversion, Pumping Mechanisms, Components of a laser System, Three & four level laser systems; Ruby, He -Ne, and semiconductor Lasers, Introduction to Holography, Introduction of fibre optics, Acceptance Angle, Numerical Aperture, Modes of propagation in fibre optics, material dispersion & pulse broadening in optical fibres, fibre connectors, splices and couplers, Applications of optical fibres.

### Text and Reference Books

S.No	Name	Author(S)	Publisher
1	Physics for Scientists & Engineers (Vol. I & II)	Serway & Jewett	6th Edition, Cengage Learning
2	Engineering Physics	HK Malik and AK Singh	Tata McGraw Hill
3	Materials Science and Engineering	V. Raghvan	Prentice Hall of India
4.	University Physics with Modern Physics	Young Hugh D. and Freedman Roger A	Pearson
5.	Concepts of Modern Physics	A.Beiser, S.Mahajan and SR Choudhary	Tata McGraw Hill



# Programme Code: UG056

<b>Course Code</b>	VAC022
<b>Course Title</b>	Environmental Education
<b>Type of Course</b>	VAC
<b>L T P</b>	0:0:3
<b>Credits</b>	3
<b>Course Prerequisites</b>	NA
<b>Course Objective(s)</b>	To connect and sensitize the students towards the environment and prevailing environmental issues (natural, physical, social and cultural).
<b>Course Outcome (CO)</b>	The students will be able to: 1. To understand the importance of environment in their life Develop conditional and iterative statements to write C programs and exercise user defined functions to solve real time problems 2. To learn about the concept of Ecosystem Exercise user defined data types including structures and unions to solve problems. 3. To understand the relation between social issues and environment 4. To learn about the new technology in harmony with environment.

## SYLLABUS

### UNIT I

**Introduction:** Definition, scope and role of Environmental studies in Engineering. Visareness of basic concept of environment.

**Types of Natural Resources and its management:** Renewable and non-renewable resources case studies and there over-exploitation: Forest resources, Water resources, Mineral resources, Food resources, Land resources

**Ecosystems.** Types of Ecosystem. Energy Flow. Biodiversity, Biogeographical classification of India. Mega diversity centers, Hotspot, Threats to biodiversity: habitat loss, Conservation. Endangered and endemic species of India.

### UNIT II

**Environmental Pollution and Engineering Disaster:** Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution. Marine pollution, Noise pollution Natural disaster (Avalanche. Landslide, floods, cyclones, earth quakes and volcano eruption of catchment area for human purpose and man-made disaster (chernobyl explosion, Electronic Graveyard China, The Exxon Valdez Oil Spill. Bhopal

## Programme Code: UG056

gas tragedy). Environmental ethics: Issues and possible solutions. Wasteland reclamation. Consumerism and waste products. Salient features of various environment, forest, wildlife and pollution acts. Manufacturing green technology, The National Green Tribunal Act 2010, scheme and labeling of environment friendly products, Ecomarks

**Environment and Social Issues:** Sustainable development, urban problems related to energy, energy over-consumption and its impact on the environment, economy, and global change, Climate change, global warming, acid rain, ozone layer depletion. Solid waste management. Liquid waste management, Waste water recycling, rain water harvesting. wannershest management, Environment economics

### UNIT IV

Definition and concepts: green technology, green energy, green economy. Alternative source as green (bio fuels, wind energy, geothermal energy, ocean energy: nuclear energy ); need for energy efficiency ;energy conservation and sustainability. Sustainable development; case studies of environment movements ( Appiko Movement, Chipko Movement, Narmada Bachao Andolan).

Text and reference Books:

S. No.	Name	Author(S)	Publisher
1	Text Book for Environmental Studies	Erach Bharucha	UGC and Bharti Vidyapeeth Institute of Environment Education and Research, Pune
2	Environmental Biology	Agarwal, K.C. 2001	Nidi Publ. Ltd. Bikaner
3	Environmental Science	Miller TG. jr	Wadsworth
4	Perspectives in Environmental Studies	Kaushik, A and Gaurav Garg	New Age International Publishers

# Programme Code: UG056

<b>Course Code</b>	<b>CSE113</b>
<b>Course Title</b>	<b>Programming in C practical</b>
<b>Type of Course</b>	ES
<b>L T P</b>	0:0:2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Basic Knowledge about Computers
<b>Course Objective(s)</b>	To help students to understand the implementation of language. This Programming language helps in solving a problem.
<b>Course Outcome (CO)</b>	The students will be able to: <ol style="list-style-type: none"><li>1. Illustrate the flowchart and to develop C programs.</li><li>2. Develop conditional and iterative statements to write C programs and exercise user defined functions to solve real time problems</li><li>3. Inscribe C programs that use Pointers to access arrays, strings and functions.</li><li>4. Exercise user defined data types including structures and unions to solve problems.</li></ol>

## SYLLABUS

### *Programming using C*

1. Write and execute program to show the working of input/output statements.
2. Write and execute programs to show the use of different types of operators (arithmetic, relational, logical, and conditional).
3. Write and execute programs based on conditional control statements (if, if-else)
4. Write and execute programs based on switch-case statements.
5. Write and execute programs based on for loops
6. Write and execute programs based on while loops.
7. Write and execute programs based on jumping control statements (break, continue).
8. Write and execute programs to implement one dimensional arrays.

## Programme Code: UG056

<b>Course Code</b>	ME105
<b>Course Title</b>	<b>Workshop/Manufacturing Practices</b>
<b>Programme</b>	ES
<b>L T P</b>	1 0 4
<b>Credits</b>	3
<b>Course Prerequisites</b>	+2 Physics and Mathematics
<b>Course Objectives</b>	Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using Different materials.
<b>Course Outcome(CO)</b>	CO1: Understanding different manufacturing techniques and their relative advantages/ disadvantages with respect to different applications with selection of a suitable technique for meeting a specific fabrication need. CO2: Acquire a minimum practical skill with respect to the different manufacturing methods and develop the confidence to design and fabricate small components for their project work. CO3: Introduction to different manufacturing methods in different fields of engineering. CO4: Practical exposure to different fabrication techniques and Creation of simple components using different materials.

### SYLLABUS

### LECTURES

1. Manufacturing Methods-casting, forming, machining, joining, advanced manufacturing methods
2. Fitting operations and power tools
3. Electrical and Electronics
4. Carpentry
5. Metal casting
6. Welding (arc welding and gas welding), brazing

# Programme Code: UG056

## WORKSHOP PRACTICE

1. Machine shop
2. Fitting shop
3. Carpentry
4. Electrical and Electronics
5. Welding shop
6. Casting
7. Smithy

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

## RECOMMENDED BOOKS

Sr.no.	Name	AUTHOR(S)	PUBLISHER
1.	Workshop Technology	HSBawa	McGraw-Hill Publishing Company Limited
2.	Workshop Technology I,II,III	S K Hajra, Choudhary and AKChoudhary	Media Promoters and Publishers Pvt. Ltd., Bombay
3.	Manual on Workshop Practice	K Venkata Reddy	New Delhi
4.	Basic Workshop Practice Manual	T Jeyapoovan	Vikas Publishing House (P)Ltd., New Delhi

## Programme Code: UG056

<b>Course Code</b>	<b>PHY107</b>
<b>Course Title</b>	<b>Engineering Physics Practical</b>
<b>Type of course</b>	Practical
<b>L TP</b>	0:0:2
<b>Credits</b>	1
<b>Course prerequisite</b>	10+2 with physics as core subject.
<b>Course Objectives</b>	The aim of the subject is to enhance the Practical knowledge of students about various aspects of fundamental of physics including mechanics, optics, wave optics, quantum mechanics; solid-state physics and its applications.
<b>Course Outcome(CO)</b>	<p><b>Students will be able to:</b></p> <p>CO1: Measure the Magnetic effects along axis of circular coil, magnetic dipole moment of a bar magnet.</p> <p>CO2: Infer the characteristics, wavelength &amp; diffraction of laser beam using Michels on interferometer, grating elements.</p> <p>CO3: determine numerical aperture, attenuation and propagation losses in optical fiber, various crystal structures, polarizability of a dielectric substance.</p> <p>CO4: Determine the resistivity, band gap of semiconductor materials.</p> <p>.</p>

**\*Note:** Perform at least 12-14 experiments from list of experiment given below.

1. To study the variation of magnetic field with distance along the axis of a circular coil carrying current.
2. To determine the magnetic dipole moment of a bar magnet and horizontal intensity of earth's magnetic field using a deflection galvanometer.
3. To study B-H curve using CRO.
4. To study the laser beam characteristics like divergence using diffraction grating aperture.
5. To determine the wavelength of a laser using Michelson interferometer.
6. To study diffraction using laser beam and thus to determine the grating element.
7. To find the refractive index of a material using spectrometer.
8. To find the refractive index of a liquid using a hollow prism and spectrometer.
9. To determine numerical aperture of an optical fiber.
10. To determine attenuation and propagation losses in optical fibers.
11. To study various crystal structures.
12. To find out polarizability of a dielectric substance.
13. To set up and observe Newton's rings.
14. To Determine Energy Band Gap of Semiconductor.
15. To determine the number of lines per millimeter of the grating using the green line of the mercury spectrum.
16. To calculate the wavelength of the other prominent lines of mercury by normal incidence method.
17. To find the acceleration of the cart in the simulator(Newton 2<sup>nd</sup> law)
18. To determine the resistivity of semiconductors by four probe Method.



## Programme Code: UG056

### Text and Reference Books

S. No	Name	Author(S)	Publisher
1	Advanced Practical Physics for students	B.L. Flint & H.T. Worsnop	Asia Publishing House.
2	Advanced level Physics Practical's	Michael Nelson and Jon M. Ogborn	Heinemann Educational Publishers
3	A Text Book of Practical Physics	Indu Prakash and Ramakrishna	Kitab Mahal, New Delhi



Programme Code: UG056



**2<sup>nd</sup> semester**

# Programme Code: UG056

Course Code	CHM105
Course Title	Engineering Chemistry
Type of course	BS
L T P	4:0:0
Credits	4
Course prerequisite	NA
Course Objective (CO)	The objectives of the engineering chemistry are to relate the students with basic concepts of chemistry. Some new topics have been introduced to the syllabus for the development of the right attitudes by the engineering students to cope with new technology
Course Outcomes	<b>The course will enable the student to:</b> CO1: Analyze microscopic chemistry in terms of atomic and molecular orbital's and intermolecular forces. Rationalize bulk properties and processes using thermodynamic considerations. CO2: Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques CO3: Rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. CO4: List major chemical reactions that are used in the synthesis of molecules.

## SYLLABUS

### UNIT-I

**Atomic and molecular structure** Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multi center orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

### UNIT-II

#### Spectroscopic techniques and applications

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques. Diffraction and scattering.

#### *Intermolecular forces and potential energy surfaces*

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of  $H_3$ ,  $H_2F$  and HCN and trajectories on these surfaces.

# Programme Code: UG056

## UNIT-III

**Use of free energy in chemical equilibria:** Thermodynamic functions: energy, entropy and free energy

Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

**Periodic properties:** Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

## UNIT-IV

**Stereochemistry Representations of 3 dimensional structures,** structural isomers and stereo isomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds

**Organic reactions and synthesis of a drug molecule:** Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings.

Synthesis of a commonly used drug molecule.

### RECOMMENDED BOOKS

S.No	Name	Author(S)	Publisher
1.	Engineering chemistry	J.C. Curiacose and J.Raja Ram	Tata Mcgraw-Hill Co. New Delhi.
2	Inorganic Chemistry	Gary L. Miessler, Paul J. Fischer and Donald A. Tarr, (2013).	Pearson
3	Introduction to spectroscopy (2008).	Pavia, D. L., Lampman, G. M., Kriz, G. S., and Vyvyan, J. A.	Cengage Learning.
4	Principles of Organic Synthesis	Norman and Coxon	CRC Press
5	Inorganic Chemistry 4 <sup>th</sup> edition	D. F. Shriver and P. W. Atkins,	Oxford University, Oxford(2006)
6	Stereochemistry conformation and Mechanism	P. S. Kalsi	New Age International
7	Thermodynamics for Chemists	S. Glasstone	East West Press, New Delhi (1950).



## Programme Code: UG056

<b>Course Code</b>	<b>MAT154</b>
Course Title	<b>Engineering Mathematics</b>
Type of course	BS
LTP	4 0 0
Credits	4
Course prerequisite	+2 with Non-Medical
Course Objective	The objective of the course is to familiarize the students with basic concepts of probability and statistical techniques, applications of matrices and important concepts of vectors calculus.
Course Outcome(CO)	<b>At the end of this course, students will be able to:</b>  CO1: understand the notion of probability and random variables and various discrete and continuous probability distributions and their properties. CO2: to model the engineering problem mathematically using the theory of matrices. CO3: to understand the important concepts of vectors for solving various applications of engineering.

### *SYLLABUS*

#### **UNIT I**

Probability spaces, conditional probability, independent events, discrete and continuous random variables, measures of central tendency, binomial, Poisson, and normal distributions.

#### **UNIT-II**

Correlation and regression, rank correlation, curve fitting by method of least square, fitting by a straight-line, second-degree parabolas and more general curve.

#### **UNIT-III**

Matrix algebra, rank of a matrix, Echelon form of a matrix, homogeneous and non-homogeneous system of linear equations, consistency, and inconsistency of system of equations, Gauss-elimination method, eigen values and eigen vectors.

#### **UNIT-IV**

Scalar and vector point functions, gradient, directional derivatives, divergence, curl and their identities, line, surface and volume integrals and its applications, solenoidal and irrotational fields with examples.

## Programme Code: UG056

### Recommended books:

<b>Sr. No.</b>	<b>Name</b>	<b>Authors</b>	<b>Publishers</b>
1	Statistical Methods	S.P. Gupta	Sultan Chand & Sons
2	Fundamentals of Mathematical Statistics	S.C. Gupta and V.K. Kapoor	Sultan Chand & Sons
3	A textbook of Engineering Mathematics	N.P. Bali and Mukesh Goyal	Laxmi Publications



# Programme Code: UG056

<b>Course Code</b>	<b>ME101</b>
<b>Course Title</b>	<b>Engineering Graphics and Design</b>
<b>Type Of Course</b>	ES
<b>L T P</b>	4:0:0
<b>Credits</b>	4
<b>Course Pre-requisites</b>	Basics of Electrical Engineering
<b>Course objectives</b>	To familiarize with various AC, DC circuits, Transformer, Electrical Machine and Measuring Instruments
<b>Course outcome (CO)</b>	<b>By the end of the course, students will be able to:</b> CO1: Get an exposure to common electrical components and their ratings. CO2: Make electrical connections by wires of appropriate ratings. CO3: Understand the usage of common electrical measuring instruments. CO4: Understand the basic characteristics of transformers and electrical machines. CO5: Get an exposure to the working of power electronic converters.

## Syllabus

### UNIT-I

#### **Introduction to Engineering Drawing**

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

#### **Orthographic Projections**

Principles of Orthographic Projections-Conventions – Projections of Points and lines inclined to both planes; Projections of planes inclined Planes – Auxiliary Planes;

### UNIT-II

#### **Projections of Regular Solids**

Inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

#### **Sections and Sectional Views of Right Angular Solids Covering**

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids,

# Programme Code: UG056

objects from industry and dwellings (foundation to slab only)

## **UNIT-III**

### **Isometric Projections**

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

### **Overview of Computer Graphics**

listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

## **UNIT-IV**

### **Customization & CAD Drawing**

consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

### **Annotations, layering & other Functions**

applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;

### **Demonstration of a Simple Team Design Project that Illustrates**

Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

## Programme Code: UG056

### Recommended books:

S. No	Name	Author(s)	Publisher
1.	Engineering Drawing	Bhatt N.D., Panchal V.M. & Ingle P.R., (2014)	Charotar Publishing House
2.	Engineering Drawing and Computer Graphics	Shah, M.B. & Rana B.C. (2008)	Pearson Education
3.	Engineering Graphics	Agrawal B. & Agrawal C. M. (2012)	TMH Publication
4.	Text book on Engineering Drawing	Narayana, K.L. & P Kannaiah (2008)	Scitech Publishers





# Programme Code: UG056

<b>Course Code</b>	<b>EE102</b>
<b>Course Title</b>	<b>Basic Electrical Engineering</b>
<b>Type Of Course</b>	ES
<b>L T P</b>	4:0:0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Physics & Mathematics
<b>Course objectives</b>	To familiarize with AC, DC circuits & their fundamentals, Magnetic circuits & Transformer, Electrical Machines and Measuring Instruments
<b>Course Outcome (CO)</b>	<b>By the end of the course, students will be able to:</b> <ol style="list-style-type: none"><li>1. Understand and analyze basic electric and magnetic circuits</li><li>2. Study the working principles of electrical machines and power converters.</li><li>3. Introduce the components of low voltage electrical installations.</li></ol>

## Syllabus

### UNIT-I DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

### UNIT-II AC Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

### UNIT-III Transformers

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

### UNIT-IV Electrical Machines

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

# Programme Code: UG056

## Power Converters

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

## Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

### Recommended books:

S. No	Name	Author(s)	Publisher
1.	Basic Electrical Engineering	D.P. Kothari and I. J. Nagrath	Tata McGraw Hill, 2010
2.	Basic Electrical Engineering	D.C. Kulshreshtha	McGraw Hill, 2009
3.	Fundamentals of Electrical Engineering	L.S. Bobrow	Oxford University Press, 2011
4.	Electrical and Electronics Technology	E. Hughes	Pearson, 2010
5.	Prentice Hall India, 1989	Electrical Engineering Fundamentals	V.D. Toro

# ProgrammeCode: UG056

<b>Course Code</b>	<b>MDC023</b>
<b>Course Title</b>	<b>Indian Knowledge System</b>
<b>Type of Course</b>	MDC-1
<b>L T P</b>	3:0:0
<b>Credits</b>	3
<b>Course Prerequisites</b>	NA
<b>Course Objective(s)</b>	<ol style="list-style-type: none"><li>1. Comprehend the core principles of the Indian knowledge system, including health, spirituality, and cultural preservation.</li><li>2. Explore the contributions of ancient Indian mathematicians to number systems, geometry, and astronomy..</li></ol>
<b>Course Outcome (CO)</b>	The students will be able to: <ol style="list-style-type: none"><li>1. Students will grasp the essence of the Indian knowledge system, encompassing health, mathematics, and cultural heritage.</li><li>2. Upon completion, students will appreciate the influence of ancient Indian texts, mathematicians, and cultural practices on contemporary society.</li></ol>

## SYLLABUS

### UNIT 1:

**Overview of Indian Knowledge System:** Introduction to Indian knowledge system, its uniqueness; Vedic literature: Rigveda, Samaveda, Yajurveda, Atharvaveda; Ayurveda: holistic health principles, natural remedies; Yoga, meditation: physical, mental well-being; Art, architecture: monuments, preservation of cultural heritage.

### UNIT 2:

**Scientific and Mathematical Contributions:** Introduction to science and math; Ancient Indian mathematicians: Aryabhata, Brahmagupta, Bhaskara; Number systems, invention of zero, basic arithmetic; Geometry, trigonometry: shapes, angles, trigonometric ratios; Astronomy, calendar systems, ancient Indian discoveries.

### UNIT 3:

**Simple Philosophical Ideas:** Importance of Kindness, Power of Imagination, Respect for Nature, Golden Rule, Mindfulness and Self-awareness, Curiosity and Asking Questions, Journey of Learning, Gratitude and Appreciation, Value of Friendship, Power of Positive Thinking, Existence of Truth, Ethics and Morality, Importance of Justice, and Nature of Reality

### UNIT 4:

**Art, Culture, and Society Made Simple:** Traditional Indian Festivals, Indian Folk Dances, Indian Classical Music, Indian Clothing Styles, Indian Cuisine, Indian Mythology, Traditional Indian Art Forms, and Historical Monuments, Languages of India, and Indian Wildlife and Nature, Family Structure in India, Caste System, Education System, Indian Weddings, Role of Women in Indian Society, Religious Diversity, Rural vs. Urban Life, Social Issues, Traditional Occupations, and Community Celebrations.



## ProgrammeCode: UG056

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1.	The Story of Numbers	David M. Burton	<b>McGraw Hill Educatio</b>
2.	Introduction to Indian Philosophy	Satischandra Chatterjee	<b>Rupa &amp; Co</b>
3.	Ayurveda Simplified	Prof. Dr. P. H. Kulkarni	<b>Deerghayu International</b>

## ProgrammeCode: UG056

<b>Course Code</b>	VAC015
<b>Course Title</b>	YOGA
<b>Type of Course</b>	VAC
<b>L T P</b>	3:0:0
<b>Credits</b>	3
<b>Course Prerequisites</b>	None
<b>Course Outcome (CO)</b>	<ol style="list-style-type: none"><li>1. Understand the various theories of Yoga</li><li>2. Able to explain the Yoga and its types.</li><li>3. Understand the various asanas.</li><li>4. Gain knowledge about pranayama and sudhi kiryas.</li><li>5. Understand the various researches in Yoga</li></ol>

### UNIT-I

Historical Background of Yoga, Definition of Yoga and its Objectives, Importance of Yoga Yoga in in the Modern Society, Yogic diet, Suitable place for Yoga

### UNIT-II

Astang Yoga: Meaning & Importance of Astang Yoga

Pranayam: Meaning, types and techniques of Pranayama Benefits of Pranayam, Shitali, Sheetkari, Kumbak and KapalBhatti. Types of Yoga \_ Hath Yog, KaramYog, Bhakti Yog, Raj Yog and Mantra Yog

### UNIT-III

Effect of Yogic Exercises: Digestive System, Respiratory System and Circulatory System. Asanas: Types of Asanas and their benefits (How Asana are useful) prevention of diseases through Asana.

### UNIT-IV

Mudra & Bandha: Jalandhar Bandh,, Mula Bandh and Uddyuan Bandh, their benefits and techniques. Yoga and Treatment: Therapeutic and Corrective Values of Yoga Practices special reference to disease like: Diabetes, Asthma, Constipation, Obesity, Cervical, Gastric and Acidity.

## ProgrammeCode: UG056

Course Code	<b>AEC0011</b>
Course Title	<b>Communication Skills in English-II</b>
Type of Course	<b>Theory</b>
L T P	<b>2 0 0</b>
Credits	<b>2</b>
Course pre-requisite	<b>NA</b>
Course Objectives	<b>To enhance employability skills of the learners by enabling them to write an effective resume and face the interview with confidence.</b>

### UNIT I

**PUBLIC SPEAKING:** Introduction to Public Speaking, Business Conversation, Effective Public Speaking Art of Persuasion

### UNIT II

**INTERVIEW SKILLS:** Types of Interview, Styles of Interview, Facing Interviews-Fundamentals and Practice Session ,Conducting Interviews- Fundamentals and Practice Session, Mock interview sessions

### UNIT III

**Writing Skills:** Resume Writing, Covering Letters, Interview Follow Up Letters, Email, Fax, Assessment through employability score card

### UNIT IV

**ETIQUETTES:** Business Etiquette, Dressing up Sense, Exchanging Business card, Shaking hands, Dining etiquette

## Recommended Books:

Sr No	Author(s)	Title	Publisher
1.	Jeremy Comfort	Speaking Effectively	CUP
2.	N.Krishnaswamy	Creative English for Communication	Macmillan
3	Raman Prakash	Business Communication	CUP
4	Anjaneesethi&BhavanaAdhikari	Business Communication	Tata McGraw Hill

## ProgrammeCode: UG056

Course Code	CHM107
Course Title	Engineering Chemistry Practical
Type of course	BS
L T P	0 0 2
Credits	1
Course Objectives	The chemistry laboratory course will consist of experiments illustrating the principle soft chemistry relevant to the study of science and engineering.
Course Outcome (CO)	The students will learn to: 1. Estimate rate constants of reactions from concentration of reactants/products as a function of time 2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc 3. Synthesize a small drug molecule and analyze a salt sample.

### SYLLABUS

**List of Experiment** (Choice of 10-12 experiments from the following)

1. Determination of surface tension and viscosity of liquids.
2. Determination of viscosity of oil by means of Red Wood Viscometer.
3. Thin layer chromatography: Determination of R<sub>f</sub> value of a mixture by TLC.
4. Separation of methyl orange and phenolphthalein from given mixture by paper chromatography
5. Ion exchange column for removal of hardness of water/Determination of total hardness of water by EDTA method.
6. Determination of Total Residual Chlorine in water sample.
7. Colligative properties using freezing point depression
8. Determination of the rate constant of a reaction
9. Determination of cell constant and conductance of solutions
10. Potentiometry-determination of redox potentials and emfs:
11. Determine the strength of a solution pH metrically.
12. Synthesis of a polymer/drug: Preparation of Urea Formaldehyde Resin;
13. Synthesis of paracetamol
14. To bring catalysed condensation or to prepare a pure sample of dibenzal propane
15. Saponification/acid value of an oil
16. Chemical analysis of a salt
17. Lattice structures and packing of spheres
18. Models of potential energy surfaces
19. Chemical oscillations-Iodine clock reaction
20. Determination of the partition coefficient to of a substance between two immiscible liquids
21. Adsorption of acetic acid by charcoal
22. Use of the capillary viscosity meters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

## ProgrammeCode: UG056

<b>Course Code</b>	<b>EE104</b>
<b>Course Title</b>	<b>Basic Electrical Engineering Laboratory</b>
<b>Type Of Course</b>	ES
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Pre-requisites</b>	Basics of Electrical Engineering
<b>Course objectives</b>	To familiarize with various AC, DC circuits, Transformer, Electrical Machine and Measuring Instruments
<b>Course outcome (CO)</b>	<p><b>By the end of the course, students will be able to:</b></p> <p>CO1: Get an exposure to common electrical components and their ratings.</p> <p>CO2: Make electrical connections by wires of appropriate ratings.</p> <p>CO3: Understand the usage of common electrical measuring instruments.</p> <p>CO4: Understand the basic characteristics of transformers and electrical machines.</p> <p>CO5: Get an exposure to the working of power electronic converters.</p>

### List of experiments/demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments–voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady-state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
3. Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
4. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
5. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winding – slip ring arrangement) and single-phase induction machine.
6. Torque Speed Characteristic of separately excited dc motor.
7. Synchronous speed of two and four-pole, three-phase induction motors. Direction



## ProgrammeCode: UG056

reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super-synchronous speed.

8. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
9. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.



ProgrammeCode: UG056



3<sup>rd</sup> semester

# ProgrammeCode: UG056

<b>Course Code</b>	CSE251
<b>Course Title</b>	<b>Computer Organization and Architecture</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic knowledge of computer and its components
<b>Course Objectives</b>	To expose the students to the following: <ol style="list-style-type: none"><li>1. Understand Number system and its representation</li><li>2. Understand Instruction Level Architecture and Instruction Execution</li><li>3. How I/O devices are accessed and its principles.</li><li>4. Understand concepts of register transfer logic and arithmetic operations.</li><li>5. To study the different types of addressing modes and memory organization.</li><li>6. The current state of art in memory system design</li><li>7. To provide the knowledge on Instruction Level Parallelism</li><li>8. To impart the knowledge on multiprocessors</li></ol>
<b>Course Outcome (CO)</b>	<b>The learner will be able to-</b> <ol style="list-style-type: none"><li>1. Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.</li><li>2. Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.</li><li>3. Understand the architecture and functionality of central processing unit.</li><li>4. Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.</li><li>5. Analyze the performance of commercially available computers by analyzing some of the design issues in terms of speed, technology, cost, performance.</li><li>6. Exemplify in a better way the I/O and memory organization</li></ol>

## Syllabus

### UNIT-I

Number System, Binary & Decimal and Vice- versa, octal and Hexadecimal number, decimal representation, 1's complement, Gray Code etc.

Logic Gates, K-map Simplification, Product of Sum, Sum of Product, Don't care condition.

### UNIT-II

# ProgrammeCode: UG056

Half Adder, Full adder, Flip Flops, SR Flip Flops, D Flip Flops, J Flip Flops, T Flip Flops, Decoder, Encoder, Multiplexers, shift Register, Binary counter, Read only Memory(ROM), Types of ROM, RAM, Register Transfer Language, Arithmetic Micro-operation. Binary Adder, Binary Adder-Subtraction, Binary incrementer, Arithmetic Circuit, Logic Micro-operation, Hardware Implementation, Shift Micro-operations.

## UNIT-III

Instruction codes, Direct Indirect Address, System Instruction cycle- Fetch & decodes, types of Instructions, Register- Reference Instructions. Memory Reference Instructions, Input- Output and Interrupt. General Register organization, Stack organization, RPN, Three Addresses Instructions, Two addresses instructions, One addresses instructions, Zero addresses instructions, Addressing modes, RISC V/s CISC.

## UNIT-IV

Parallel processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, DMA, Memory Hierarchy, Associative memory, Cache memory, Virtual Memory, Page Replacement, Multiprocessors.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1	Computer System Architecture	M. Morris Mano	Pearson Education
2	Computer Organization and Design: The Hardware/ Software Interface	David A. Patterson and John L. Hennessy	Elsevier
3	Computer Organization and Embedded Systems	Carl Hamacher	Mc Graw Hill Higher Education
4	Computer Architecture and Organization, 3 <sup>rd</sup> Edition	John P.Hayes	WCB/ McGraw-Hill
5	Computer Organization and Architecture: Designing for Performance	William Stallings	Pearson Education



## ProgrammeCode: UG056

<b>Course Code</b>	CSE253
<b>Course Title</b>	Data Structure and Algorithms
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic knowledge of C language and C++ language
<b>Course Objectives</b>	This course work provides the thorough understanding of the Linear and Non-Linear Data Structures in solving problems and to give the idea of the efficiency of various algorithms.
<b>Course Outcome (CO)</b>	The learner will be able to – <ol style="list-style-type: none"><li>1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.</li><li>2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.</li><li>3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.</li><li>4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.</li><li>5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.</li></ol>

### *Syllabus*

#### *UNIT-I*

**Introduction:** Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. **Searching:** Linear Search and Binary Search Techniques and their complexity analysis.

#### *UNIT-II*

**Stacks and Queues:** ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.



# ProgrammeCode: UG056

## UNIT-III

**Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; CircularLinked Lists: all operations their algorithms and the complexity analysis.

**Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

## UNIT-IV

**Sorting and Hashing:** Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

**Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

### RECOMMENDED BOOKS

Sr No	Author(s)	Title	Publisher
1.	Fundamentals of Data Structures	Illustrated Edition by Ellis Horowitz, Sartaj Sahni	Computer Science Press
2.	Algorithms, Data Structures, and Problem Solving with C++	Illustrated Edition by Mark Allen Weiss	Addison-Wesley Publishing Company
3.	How to Solve it by Computer	2 <sup>nd</sup> Impression by R.G. Dromey	Pearson Education

# ProgrammeCode: UG056

<b>Course Code</b>	<b>CSE255</b>
<b>Course Title</b>	<b>Operating Systems</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4:0:0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Overview of Computer Architecture
<b>Course Objectives</b>	To learn the fundamentals of Operating Systems. <ol style="list-style-type: none"><li>1. To learn the mechanisms of OS to handle processes and threads and their communication</li><li>2. To learn the mechanisms involved in memory management in contemporary OS</li><li>3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols</li><li>4. To know the components and management aspects of concurrency management</li><li>5. To learn to implement simple OS mechanisms</li></ol>
<b>Course Outcome (CO)</b>	<b>The learner will be able to-</b> <ol style="list-style-type: none"><li>1. Create processes and threads.</li><li>2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.</li><li>3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.</li><li>4. Design and implement file management system.</li><li>5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.</li></ol>

## SYLLABUS

### UNIT-I

**Introduction:** Operating Systems functions, Types of operating systems, Multiprogramming systems, Batch systems, Time-sharing systems, Operating system operations, Special purpose operating systems, distributed systems, Different computing environments.

### UNIT-II

# ProgrammeCode: UG056

**Operating System Organization:** Processor and user modes, user operating system interface, Kernels, System calls and its types, System programs, Operating system structures, Virtual machines.

**Process Management:** Process states, Process Scheduling, Process hierarchy, Threads, Threading issues, Multi-threading models, Non-pre-emptive and pre-emptive scheduling algorithms, Concurrent processes, Critical section, Semaphores, methods for inter-process communication, Deadlocks.

## UNIT-III

**Memory Management:** Physical and virtual address space, Memory allocation strategies, Paging, Segmentation, Virtual memory and Demand paging, Page replacement algorithms.

**File and I/O Management:** Directory structure, File operations, Files system mounting, File allocation methods, Device management, Disk scheduling algorithms.

## UNIT-IV

**OS and Security:** Security breaches, types of attacks, attack prevention methods, security policy and access control, OS design considerations for security, access control lists and OS support, internet and general network security, Policy mechanism, Program, network and system threats, Authentication.

**Case Study :** UNIX and LINUX operating systems

# ProgrammeCode: UG056

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1	Operating System Concepts Essentials	9 <sup>th</sup> Edition by Avi Silberschatz, Peter Galvin, Greg Gagne	Wiley Asia Student Edition.
2	Operating Systems: Internals and Design Principles	5 <sup>th</sup> Edition, William Stallings	Prentice Hall of India
3	Operating System: A Design-oriented Approach	1st Edition by Charles Crowley	Irwin Publishing
4	Operating Systems: A Modern Perspective	2 <sup>nd</sup> Edition by Gary J. Nutt	Addison-Wesley
5	Design of the Unix Operating Systems	8 <sup>th</sup> Edition by Maurice Bach	Prentice-Hall of India
6	Understanding the Linux Kernel	3rd Edition, Daniel P. Bovet, Marco Cesati	O'Reilly and Associates



# ProgrammeCode: UG018

Course Code	AEC0014
Course Title	Creative Writing (English)
Type Course	AEC
L T P	2:0: 0
Credits	2
Course Pre-requisite	NA
Course Objectives (CO)	<ol style="list-style-type: none"><li>i. To acquaint the learners with ideas related to creative writing including the art, the craft and the basic skills required for a creative writer</li><li>ii. To help learners to understand the principles of creative writing and the distinction between the literary genres</li><li>iii. To explain the differences in writing for various literary and social media</li><li>iv. To hone the creative and critical faculties of learners.</li><li>v. To enable learners to put into practice the various forms of creative writing that they have studied through the course</li></ol>
Course Outcomes	<p>On Completion of This Course the Students are able to:</p> <ol style="list-style-type: none"><li>i. Distinguish between the literary genres.</li><li>ii. Write for various literary and social media.</li><li>iii. Critically appreciate various forms of literature.</li><li>iv. Make innovative use of their creative and critical faculties</li><li>v. Seek employment in various creative fields.</li></ol>

## SYLLABUS

### Unit I

Fundamentals of Creative Writing: Meaning and Significance of Creative Writing, Genres of Creative Writing: poetry, fiction, non-fiction, drama and other forms, Research for Creative Writing

### Unit II

Elements of Creative Writing: Plot, Setting, Character, Dialogue, Point of View, Literary Devices and Figurative Language, Elements of Style, Grammar and the Structure of Language, Proof Reading and Editing

### Unit III

Traditional Forms of Creative Writing: Fiction: short story, novella and novel, Poetry, Drama, Essay, Fable, Travelogues,

### Unit IV

New Trends in Creative Writing: Web Content Writing and Blog Writing, Script Writing, Journalistic Writing.



**Reference books:**

S. No.	Author(S)	Title	Publishers	Years
1	Anjana Neira Dev. Anuradha Marwah, Swati Pal	Creative Writing: A Beginner's Manual	Pearson Longman, Delhi	2009
2	Robert Scholes, Nancy R. Comley, Carl H. Klaus, Michael Silverman	Elements of Literature: Essay, Fiction, Poetry, Drama, Film. 4 <sup>th</sup> edition	OUP, Delhi	2007
3	Sylvan Bamet, William E.Cain,	A Guide to Writing about Literature	Pearson, New Delhi	2006.
4	Hal Zina Bennet	Write from the Heart: Unleashing the power of Your Creativity	California, New World Library	2001.

**Cyber Resources:**

[http://www.chillibreeze.com/articles\\_various/creativewriter.asp](http://www.chillibreeze.com/articles_various/creativewriter.asp)

<http://www.contentwriter.in/articles/writing/>

<http://www.cbse.nic.in/cw-xii/creative-writing-xii-unit-1.pdf>.

Course Code	CSE259
Course Title	Computer Programming using python
Type Course	PC
L T P	2:0: 0
Credits	2
Course Pre-requisite	NA
Course Objectives (CO)	<ol style="list-style-type: none"> <li>1. To understand syntax and data types used in python.</li> <li>2. To write and perform programs using control structures in python</li> <li>3. To implement programs using functions and to handle exceptions in python.</li> <li>4. To create and use classes in python programming</li> </ol>
Course Outcomes	<p>The learner will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand basic syntax and data types used in python.</li> <li>2. Write and perform programs using control structures</li> <li>3. Implement programs with functions and handle Exceptions.</li> <li>4. Create and use classes in python</li> </ol>

## SYLLABUS

### UNIT-I

Introduction : Introduction, History, Versions, Installation, Environment Variables, Command Line Execution, IDLE, Script mode and Batch mode, Editing Files, Documentation, Help, Dynamic Types, Reserved Words, Naming Conventions, Typing, id(), isinstance(), Indentation, Basic Syntax, Comments, Datatype, String Values, String Methods, String formatting Method (f string,% method, and format method), String Operators, Data typecasting, Simple Output, Simple Input, print Function.

### UNIT-II

Control Structures: Indenting Requirements, Code Formatting Standards, Whitespace and Code Readability, Coding Style Guidelines, Nested if Statements, Ternary Operator, Truthy and Falsy Values, Operator Precedence and Associativity, Bitwise Shift Operators, Bitwise Operations, Masking and Bitwise Flags, Infinite Loops, Loop Termination Conditions, Do-While Loop, Loop Control Statements, break and continue, Exiting Nested Loops, Use Cases, Best Practices, Iterating Over Collections, Range-Based for Loops, Loop Indexing and Iteration Patterns

### UNIT-III

Functions and Modules: Introduction, Defining Your Own Functions, Pass, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, map, filter, Mapping Functions in a Dictionary, Lambda, Modules and Importing, Creating Modules, Using Standard Library Modules, Module Search Path, Importing from Packages, Namespace and Module Attributes.

Exception: Errors, Runtime Errors, The Exception Model Exception Hierarchy, Handling Multiple Exceptions, Raise, assert

### UNIT-IV

Classes in Python: Classes in Python, Principles of Object Orientation, Creating Classes, Constructor, Constructor Overloading, Instance Methods, Static Method, Self Keyword, File Organization, Special Methods, Class

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1			
2			
3			

<b>Course Code</b>	<b>CSE259</b>
<b>Course Title</b>	<b>Computer Organization and Architecture Laboratory</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Basic knowledge of computer and its components
<b>Course Objectives</b>	To expose the students to the components of the computer and implementation of various assembly language programs.
<b>Course Outcome (CO)</b>	<b>The learner will be able to-</b> <ol style="list-style-type: none"> <li>1. Assemble personal computer;</li> <li>2. Implement the various assembly language programs for basic arithmetic and logical operations; &amp;</li> <li>3. Demonstrate the functioning of microprocessor/microcontroller-based systems with I/O interface</li> </ol>

*SYLLABUS*

**List of Experiment:**

1. Computer Anatomy- Memory, Ports, Motherboard and add-on cards.
2. Dismantling and assembling PC.
3. Introduction to 8085 kit.
4. Addition of two 8 bit numbers, sum 8 bit.
5. Subtraction of two 8 bit numbers.
6. Find 1's complement of 8-bit number.
7. Find 2's complement of 8-bit number.
8. Shift an 8-bit no. by one bit.
9. Find Largest of two 8 bit numbers.
10. Find Largest among an array of ten numbers (8 bit).
11. Sum of series of 8 bit numbers.
12. Introduction to 8086 kit.
13. Addition and subtraction of two 16 bit numbers, sum 16 bit.
14. Implement of Booth's algorithm for arithmetic operations.
15. Find 1's and 2's complement of 16-bit number.
16. Implement simple programs using I/O based interface

<b>Course Code</b>	<b>CSE 261</b>
<b>Course Title</b>	<b>Data Structure and Algorithms Laboratory</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of C++ Programming Language
<b>Course Objectives</b>	Allows the students to understand the implementation of data structures.
<b>Course Outcome (CO)</b>	The learner will be able to- <ul style="list-style-type: none"> <li>1. Design and analyze the time and space efficiency of the data structure</li> <li>2. Identify the appropriate data structure for given problem .</li> <li>3. Gain practical knowledge on the applications of data structures</li> </ul>

*SYLLABUS*

**Laboratory Experiments-**

**1: Sequential Arrays**

1.1 : Insert a new element at end as well as at a given position

1.2 : Delete an element from a given whose value is given or whose position is given

1.3 : To find the location of a given element

1.4: To display the elements of the linear array

**2: Linear Linked Lists**

2.1 : Insert a new element

2.2 : Delete an existing element

2.3 Search an element

2.4: Display all the elements

**3: Stacks and Queues**

3.1 : Program to demonstrate the use of stack.

3.2 : Program to demonstration the implementation of various operations on a linear queue represented using a linear array.



3.3 : Program to demonstration the implementation of various operations on a circular queue represented using a linear array.

3.4 : Program to demonstration the implementation of various operations on a queue represented using a linear linked list (linked queue).

#### **4: Sorting and Searching**

4.1: Program to sort an array of integers in ascending order using bubble sort.

4.2: Program to sort an array of integers in ascending order using selection sort.

4.3 : Program to sort an array of integers in ascending order using insertion sort.

4.4.: Program to demonstrate the use of linear search to search a given element in an array.

4.5: Program to demonstrate the use of binary search to search a given element in a sorted array in ascending order.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Practical Data Structures Using C :: Beginner's Easy	Harry H. Chaudhary	Createspace LLC USA
2	Object Oriented Programming with C++	Balaguruswamy	Tata McGraw-Hill Education
3	Data Structures through C++	Yashavant P. Kanetkar	BPB Publications

<b>Course Code</b>	<b>CSE263</b>
<b>Course Title</b>	<b>Computer Programming using python laboratory</b>
<b>Type of Course</b>	PC
<b>L:T:P</b>	0:0:2
<b>Credits</b>	1
<b>Course Prerequisites</b>	NA
<b>Course Objective(s)</b>	<ol style="list-style-type: none"> <li>1. To understand and perform python installation.</li> <li>2. To create python scripts using variable, data types and operators.</li> <li>3. To write programs on string manipulation, control structures and data structures.</li> <li>4. To implement programs in python using functions, modules and object oriented programming concepts</li> <li>5. To handle programs using file and exceptions</li> </ol>
<b>Course Outcome (CO)</b>	<p>The learner will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand and perform python installation.</li> <li>2. Create python scripts using variable, data types and operators.</li> <li>3. Write programs on string manipulation, control structures and data structures.</li> <li>4. Implement programs in python using functions, modules and object oriented programming concepts</li> <li>5. Handle programs using file and exceptions</li> </ol>

### **LIST OF EXPERIMENTS**

1. **Installation and Environment Setup:** Install Python on your system and set up environment variables. Write a simple Python script and execute it using command line.
2. **Basic Syntax and Datatypes:** Create Python scripts to demonstrate basic syntax, including variables, data types, and operators. Experiment with different data types such as integers, floats, strings, lists, tuples, sets, and dictionaries.
3. **String Manipulation:** Write Python programs to demonstrate various string manipulation techniques, including string methods, formatting methods, and string operators.
4. **Control Structures:** Implement Python programs to practice control structures like if-else statements, nested if statements, loops (for, while), loop control statements (break, continue), and loop termination conditions.
5. **Data Structures:** Write Python programs to understand and utilize different data structures such as lists, tuples, sets, dictionaries, and demonstrate their access methods and built-in functions.
6. **Functions and Parameters:** Create Python functions with different parameter types (positional, keyword, default, variable-length) and demonstrate their usage.
7. **Lambda Functions and Functional Programming:** Practice using lambda functions, map, and filter functions for functional programming tasks like applying transformations and filtering elements.

8. **Modules and Importing:** Develop Python modules with functions and import them into other scripts. Experiment with importing standard library modules and modules from packages.
9. **Exception Handling:** Write Python programs to handle exceptions gracefully using try-except blocks, raise statements, and assert statements.
10. **Object-Oriented Programming (OOP):** Implement Python classes with attributes, methods, constructors, and demonstrate concepts like inheritance, polymorphism, and class variables.
11. **Static Methods and Class Methods:** Create Python classes with static methods and class methods and demonstrate their usage.
12. **File Handling:** Write Python programs to read from and write to files, handle file objects, and practice different file handling techniques.
13. **Exception Handling in Classes:** Develop Python classes that raise and handle exceptions internally, demonstrating error handling within class methods.

<b>CourseCode</b>	<b>CSE265</b>
<b>Course Title</b>	<b>Operating System Laboratory</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 4
<b>Credits</b>	2
<b>Course Prerequisites</b>	Knowledge of Operating System, DOS Commands
<b>Course Objectives</b>	To provide the understanding of the operating system operation and inter-process communication.
<b>Course Outcome- (CO)</b>	The learner will be able to- <ul style="list-style-type: none"> <li>1. Understand and execute basic commands of shell script.</li> <li>2. Apply basic operations in shell scripts which are required for different applications.</li> <li>3. Identify and understand concept of file systems in shell script</li> <li>4. Apply concept of creating new process from parent process.</li> </ul>

## SYLLABUS

### LIST OF PRACTICAL'S

1. Simulation of the CPU scheduling algorithms:
  - a) Round Robin
  - b) SJF
  - c) FCFS
  - d) Priority
2. Simulation of continuous memory management allocation techniques :
  - a) First Fit
  - b) Best Fit
  - c) Worst Fit
3. Simulation of page Replacement Algorithms:
  - a) FIFO
  - b) LRU
  - c) OPT
4. Simulation of file allocation Strategies:
  - a) Sequential
  - b) Indexed
  - c) Linked
5. Simulation of file organization techniques:
  - a) Single Level Directory

# Programme Code: UG018

b) Two Level

6: Unix Commands

7: Reading from a file, Writing into a file , File Creation

## RECOMMENDED BOOKS

Sr. no.	Name	Author(S)	Publisher
1	Practical Linux Programming: Device Drivers, Embedded Systems	Ashfaq A. Khan	Firewall Media
2	A Practical Guide to Linux Commands, Editors, and Shell Programming	Mark G. Sobell	Pearson Education
3	A Practical Guide to UNIX System V Release 4	M. G. Sobell	Benjamin/Cummings Publishing Company
4	100 Shell Programs in Unix	Sarika Jain	Pinnacle Technology





ProgrammeCode: UG056

# 4<sup>th</sup> SEMESTER



# ProgrammeCode: UG056

<b>Course Code</b>	<b>MAT212</b>
<b>Course Title</b>	<b>Discrete Mathematics</b>
<b>Type of Course</b>	BS
<b>L T P</b>	4:0:0
<b>Credits</b>	4
<b>Course Prerequisites</b>	+2 in any stream
<b>Course objective(s)</b>	To provide students with an overview of discrete mathematics. Students will learn about topics such as logic and proofs, sets and functions, probability, recursion, graph theory, matrices, Boolean algebra and other important discrete math concepts.
<b>Course Outcome (CO)</b>	The students will be able to: 1. Use logical notation. 2. Perform logical proofs. 3. Apply recursive functions and solve recurrence relations. 4. Determine equivalent logic expressions.

## SYLLABUS

### UNIT I:

**Sets and Sequences:** Finite Sets, Power Set, Cardinality of finite sets, Cartesian Product, Properties of Sets, Vector Implementations of Sets.

**Describing Sets:** Introduction to Logic. Propositional Logic, Truth tables, Deduction, Resolution, Predicates and Quantifiers, Mathematical Proofs. Infinite sets, well-ordering. Countable and Uncountable sets, Cantor's diagonalization. Mathematical Induction - weak and strong induction.

### UNIT II:

**Relational Structures on Sets:** Relations, Equivalence Relations. Functions, Bijections. Binary relations and Graphs. Trees (Basics). Posets and Lattices, Hasse Diagrams. Boolean Algebra.

### UNIT III:

**Sizes of Sets:** Counting, Sum and product rule, Principle of Inclusion Exclusion. Pigeon Hole Principle, Counting by Bijections. Double Counting. Linear Recurrence relations - methods of solutions. Generating Functions. Permutations and counting.

### UNIT IV:

**Structured Sets:** Structured sets with respect to binary operations. Groups, Semigroups, Monoids. Rings, and Fields. Vector Spaces, Basis.

## RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1.	Discrete Mathematics and its Applications	Kenneth H.	7th Edition -Tata McGraw Hill Publishers - 2007
2.	Elements of Discrete Mathematics	C.L. Liu	McGraw-Hill Inc, 1985
3	Essentials of Business Communication	Pal and Korlahalli	S. Chand and Sons. NewDelhi

# ProgrammeCode: UG056

<b>Course Code</b>	<b>CSE252</b>
<b>Course Title</b>	<b>Object Oriented Programming with C++</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4:0:0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic Knowledge about Computers
<b>Course Objective(s)</b>	To gain experience about structured programming. To help students to understand the implementation of Programming language. To understand various features in Programming Language.
<b>Course Outcome (CO)</b>	The students will be able to: <ol style="list-style-type: none"><li>1. Understand how C++ improves C with object-oriented features.</li><li>2. Learn how to write inline functions for efficiency and performance.</li><li>3. Learn the syntax and semantics of the C++ programming language.</li><li>4. Learn how to design C++ classes for code reuse.</li></ol>

## SYLLABUS

### UNIT-I :

**Basics:** Introduction to C++, Tokens, Identifiers, data types, control statements, functions, array, structure, union, pointers.

**Classes and Objects:** Classes, Structures and Classes, Unions and Classes are Related, Friend Functions, Friend Classes, Inline Functions, Constructors and its types, Static Class Members, When Constructors and Destructors are Executed, Scope Resolution Operator, Nested Classes, Local Classes, Passing and Returning Objects, Object Assignment

**Arrays, Pointers, References and the Dynamic Allocation:** Arrays of Objects, Pointers, References, Dynamic Allocation Operators, The Placement Forms of new and delete.

### UNIT-II :

**Function Overloading and Default Arguments:** Function Overloading, Overloading Constructor Functions, Finding the Address of an Overloaded Function, Overload Anachronism, Default Arguments, Function Overloading and Ambiguity.

**Operator Overloading:** Creating Member Operator Function, Overloading Using a Friend Function, Overloading new delete, Overloading Special Operators & Comma Operator

### UNIT-III :

**Inheritance:** Base-Class Access Control, Inheritance and protected members, Inheriting Multiple Base Classes, Constructors, Destructors and Inheritance, Granting Access, Virtual Base Classes.

**Virtual Functions & Polymorphism:** Virtual Functions, The Virtual Attribute is inherited, Virtual Functions are Hierarchical, Pure Virtual Functions, Using Virtual Functions, Early VsLate Binding.

**Templates:** Generic Functions, Applying Generic Functions, Generic Classes, Typename and export Keywords, Power of Templates.

# ProgrammeCode: UG056

## UNIT – IV :

**Exception Handling:** Fundamentals, Derived-Class Exceptions, Options, Terminate() and unexpected(), uncaught\_exception(), exception and bad\_exception Classes, Applying Exception Handling.

**The C++ I/O System Basics:** Old Vs. Modern C++ I/O, Streams, Stream Classes, Formatted I/O, Overloading << and >>, Creating Manipulators.

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1.	Object Oriented Programming with C++	E. Balaguruswamy	Tata Mc. Graw Hill
2.	Object Oriented Programming using C++	R.Lafore	Galgotia Publications
3.	Mastering C++	A.R.Venugopal, Rajkumar, T. Ravishanker	TMH

# Programme Code: UG056

<b>Course Code</b>	<b>CSE254</b>
<b>Course Title</b>	<b>Database Management Systems</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Elementary knowledge about computers including some experience using Windows. Basic knowledge about programming in some common programming language.
<b>Course Objectives</b>	<ul style="list-style-type: none"><li>• To understand the different issues involved in the design and implementation of a database system.</li><li>• To study the physical and logical database designs, databasemodeling, relational, hierarchical, and network models</li><li>• To understand and use data manipulation language to query,update, and manage a database</li><li>• To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.</li><li>• To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.</li></ul>
<b>Course Outcome (CO)</b>	The learner will be able to- <ol style="list-style-type: none"><li>1. For a given query write relational algebra expressions for thatquery and optimize the developed expressions</li><li>2. For a given specification of the requirement design thedatabases using ER method and normalization.</li><li>3. For a given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.</li><li>4. For a given query optimize its execution using Query optimization algorithms</li><li>5. For a given transaction-processing system, determine thetransaction atomicity, consistency, isolation, and durability.</li><li>6. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability ofscheduling.</li></ol>

## SYLLABUS

### UNIT-I

**Introduction to Databases and Transactions:** database system, purpose of database system, File based system, view of data, database architecture.



**Data Models:** The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

**Database Design ER-Diagram:** Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas.

## UNIT-II

**Relational Algebra and Calculus:** Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra

**Relational database Model:** Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization.

## UNIT-III

**Constraints, Views and SQL:** Database Languages, Constraints and its types, Integrity constraints, Views: Introduction to views, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values.

## UNIT-IV

**Transaction management and Concurrency control:** Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management

**Database Security and Authorization:** Introduction to Database Security Issues, Discretionary Access Control Based on Granting/Revoking of Privileges.

**Advance Topic:** OLAP, data mining, data warehouse, multimedia database, geographical database, spatial database.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(S)	Publisher
1	Database System Concepts	6th Edition by Abraham Silberschatz, Henry F.Korth, S. Sudarshan,	McGraw-Hill.
2	Principles of Database and Knowledge – Base Systems	Vol 1, J. D. Ullman	Computer SciencePress
3	Foundations of Databases	Reprint by Serge Abiteboul, Richard Hull, Victor Vianu	Addison-Wesley

# Programme Code: UG056

<b>Course Code</b>	<b>CSE256</b>
<b>Course Title</b>	<b>Design and Analysis of Algorithms</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Data Structures, C, C++ Programming language
<b>Course Objectives</b>	<ol style="list-style-type: none"><li>1. Analyze the asymptotic performance of algorithms.</li><li>2. Write rigorous correctness proofs for algorithms.</li><li>3. Demonstrate a familiarity with major algorithms and data structures.</li><li>4. Apply important algorithmic design paradigms and methods of analysis.</li><li>5. Synthesize efficient algorithms in common engineering design situations.</li></ol>
<b>Course Outcome (CO)</b>	The learner will be able to- <ol style="list-style-type: none"><li>1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms .</li><li>2. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.</li><li>3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.</li><li>4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.</li></ol>

## SYLLABUS

### UNIT-I

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters’ theorem.

### UNIT-II

Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch- and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

# Programme Code: UG056

## UNIT-III

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

## UNIT-IV

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP-P SPACE

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Introduction to Algorithms	4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein	MIT Press/McGraw-Hill
2	Fundamentals of Algorithms	E. Horowitz et al.	Pearson Education
3	Algorithm Design, 1ST Edition	Jon Kleinberg and Éva Tardos	Pearson
4	Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition	Michael T Goodrich and Roberto Tamassia	Wiley
5	Algorithms—A Creative Approach, 3RD Edition	Udi Manber	Addison-Wesley, Reading, MA

# Programme Code: UG056

<b>Course Type</b>	<b>MDC</b>
Course Code	MDC019
Course Title	Universal Human Values
Type of course	Theory
L T P	3 0 0
Credits	3
Course Objective(s)	<b>The main objective of this course is to:</b> <ol style="list-style-type: none"><li>1. Develop a universal perspective based on self- exploration about themselves (human being), family, society and nature.</li><li>2. Understand the harmony in human relations.</li><li>3. Strengthen the Self-Reflection.</li><li>4. Develop commitment and courage.</li></ol>
Course Outcomes (CO)	<b>After the completion of the course, students will be able:</b> CO1: To become more aware of themselves, and their surroundings (family, society, nature). CO2: To become more responsible in life and in handling problems with sustainable solutions. CO3: To develop a sense of commitment and courage to act.

## UNIT-I

### Need, Basic Guidelines, Content and Process for Value Education

1. Concept of Value Education including its needs, basic guidelines, content & process.
2. Concept of Self-Exploration, Natural Acceptance & Experiential Validation as the process for Self-Exploration.
3. Happiness & Prosperity.

## UNIT-II

### Understanding Harmony in Human Beings

1. Understanding Human Being as a Co-existence of Self (I) & Body.
2. Understanding the needs of Self (I) & Body.
3. Understanding harmony of Self (I) with Body: Sanyam & Swasthya.

## UNIT-III

### Understanding Harmony in Human Relationships

1. Need and Importance of Values in Human Relationships.
2. Human Values to be practiced in a family.
3. Visualizing a Universal Human Order in Society.

## UNIT-IV

### Understanding Harmony in Nature & Existence

1. Need & Importance of Harmony in Nature.
2. Understanding the Interconnectedness among Four Orders of Nature.
3. Holistic Perception of Harmony at all levels of Existence.

### Sessional work:

- Organize a group discussion regarding the ways and measures to inculcate values among individuals.

# Programme Code: UG056

## Recommended Books:

<b>Sr. No.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1.	Human Values and Professional Ethics	Varinder Kumar	Kalyani Publishers
2.	A Foundation Course in Value Education	R.R. Gaur & R. Sangal	Excel Books Publishers
3.	Human Values and Professional Ethics	Rishabh Anand	Satya Prakashan, New Delhi



# Programme Code: UG056

<b>Course Code</b>	<b>AEC0015</b>
<b>Course Title</b>	<b>Effective Technical Communication Skills</b>
<b>Type of Course</b>	AEC
<b>L T P</b>	2 0 0
<b>Credits</b>	2
<b>Course Prerequisites</b>	General English
<b>Course Objectives</b>	Aims to teach oral and written skills in English with illustrations and examples drawn from project reports, paper presentations and published papers in scientific journals. The grammar exercises are not taught in a rule-based manner but through observation and use in specific contexts. Newspaper and popular scientific reports are also included as course material. Presentation skills will be taught through practice sessions. During the course, all participants make presentations and also critique the presentations by others. Emphasis is placed on teaching how to present the same findings orally and in writing.
<b>Course Outcome (CO)</b>	The learner will be able to- <ol style="list-style-type: none"><li>1. Understand Language skills.</li><li>2. Use their technical writing and presentation skills effectively to draft business letters, email messages, fax, acceptance and rejection letters.</li><li>3. Analyze importance of LSRW skills in communication.</li><li>4. Enhance self-esteem and personality development.</li></ol>

## SYLLABUS

### UNIT-I

Information Design and Development- Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

### UNIT-II

Technical Writing, Grammar and Editing- Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Human factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

### UNIT-III

Self Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking

# Programme Code: UG056

notes; Complex problem solving; Creativity

## UNIT-IV

Communication and Technical Writing- Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

## UNIT-V

Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

<b>RECOMMENDED BOOKS</b>			
<b>Sr No</b>	<b>Author(s)</b>	<b>Title</b>	<b>Publisher</b>
1	David F. Beer and David McMurrey	Guide to writing as an Engineer	John Willey. New York
2	Diane Hacker	Pocket Style Manual	Bedford Publication, New York
3	Shiv Khera	You Can Win	Macmillan Books
4	Raman Sharma	Technical Communications	Oxford Publication, London
5	Dale Jungk	Applied Writing for Technicians	McGraw Hill, New York

# Programme Code: UG056

<b>Course Code</b>	<b>CSE260</b>
<b>Course Title</b>	<b>Database Management System Laboratory</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of Program Development Constructs
<b>Course Objectives</b>	This practical course work allows the students to efficiently design a working software model.
<b>Course Outcome (CO)</b>	The learner will be able to- <ol style="list-style-type: none"><li>1. Understand, appreciate and effectively explain the underlying concepts of database technologies</li><li>2. Design and implement a database schema for a given problem-domain</li><li>3. Normalize a database</li><li>4. Populate and query a database using SQL DML/DDL commands.</li><li>5. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS</li></ol>

## SYLLABUS

### List of Practical's

#### 1: Introduction To DBMS And Its Applications

1.1: Introduction to DBMS and its applications.

#### .2: Study of SQL Statements

2.1 : Data types, creating tables, retrieval of rows using select statement, conditional retrieval of rows, alter and drop statements.

2.2 : working with null values, matching a pattern from a table, ordering the result of a query, aggregate functions, grouping the result of a query, update and delete statements.

#### 3: Operators

3.1: arithmetic operators- add, subtract,

multiply, divide

3.2: rename field

3.3: logical operations- and, or, not

#### 4: Other Operations

4.1: aggregate function- average, minimum, maximum, sum, count, count(\*)

4.2: numeric functions- absolute, power, sqrt, round

4.3: string functions: lower, upper, initcap, length, ltrim, rtrim, substring, lpad, rpad

# Programme Code: UG056

## **5: T-SQL: Transact Structured Query Language**

5.1 : Implement grants and revoke commands, commit and rollback commands.

## **6: Joins And Views**

6.1 : program to illustrate use of join.

6.2 : create a view.

## **7: Introduction To PL/SQL**

7.1 : introduction to PL/SQL, basic code structure, difference b/w SQL and PL/SQL

7.2 : study PL/SQL control structure

7.2.1 Conditional control-if and case statements

7.2.2 Iterative control-loop and exit statements

7.2.3 Sequential control-goto and null statements programs

7.3 : Program to find greatest of two numbers

7.4 : Program to find greatest of three numbers

7.5 : Program to perform addition, subtraction, multiplication, division according to user's choice

7.6 : Program to print first n natural numbers.

# Programme Code: UG056

<b>Course Code</b>	CSE262
<b>Course Title</b>	<b>Design and Analysis of Algorithms Laboratory</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of C++ Programming Language Concepts
<b>Course Objectives</b>	Makes the students proficient in implementing algorithms using the algorithm design techniques.
<b>Course outcome</b>	The learner will be able to- 1. Analyze the complexities of various problems in different domains. 2. Understand methods for analyzing the efficiency and correctness of algorithms (such as exchange arguments, recurrence, induction, and average case analysis). 3. Compare, contrast, and choose appropriate algorithmic design techniques to present an algorithm that solves a given problem. 4. Develop the efficient algorithms for the new problem with suitable designing techniques.

## 1. Array

1.1: WAP. Two code and analyze to compute greatest common divisor of two numbers.

1.2: WAP two code and analyze to find the mid element in an array.

1.3 : WAP. To code to analyze to find maximum and minimum element (without MAXMIN algorithm) in array.

1.4 : WAP. To code and analyze to find the largest element in an array.

1.5: WAP. To code to analyze to enter elements in an array.

## 2. Searching

2.1: WAP. To find maximum and minimum element choosing MAXMIN algorithm.

2.2: WAP to code and analyze to find an element using binary search and find its time complexity.

## 3. Sorting

3.1: WAP. To code and analyze to short an array of integer using HEAP Sort.

3.2: WAP. To code and analyze to short an array of integer using Merge Sort.



# Programme Code: UG056

## 4: Pattern Matching

4.1: WAP. To code and array analyze to find all occurrence of pattern in a given string.

## 5: Shortest Path Algorithm

5.1: WAP. To code and analyze to find minimum path using Kruskal's Algorithm.

## 6: Dynamic Programming

6.1: WAP. To code and analyze to find the distance between two characters strings using Dynamic programming.

## 7: Divide and Conquer

7.1: WAP to code and analyze to find an element using linear search by applying divide and conquer technique and find its time complexity

### RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1	The Algorithm Design Manual	Steven S Skiena	Springer Science & Business Media
2	Object Oriented Programming with C++	Balagurusamy	Tata McGraw-Hill Education
3	Object Oriented Programming Using C++	Jaspreet Singh, Mrs. Pinki Parampreet Kaur	Technical Publications

## Programme Code: UG056

<b>Course Code</b>	CSE264
<b>Course Title</b>	<b>Object Oriented Programming using C++ Laboratory</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of C++ Programming Language Concepts
<b>Course Objectives</b>	This course is to help the students to give the practical implementation of the C++ programs
<b>Course outcome</b>	The learner will be able to- <ol style="list-style-type: none"><li>1. Design a program using member function in and out of the class.</li><li>2. Write a program to demonstrate use of Constructors and Destructors.</li><li>3. Implement operator overloading through C++ programming</li><li>4. Demonstrate Inheritance and polymorphism in real world problems using C++</li></ol>

### List of Practical's

#### 1: Classes and Objects

- 1.1: Write a program that uses a class where the member functions are defined inside a class
- 1.2: Write a program that uses a class where the member functions are defined outside a class.
- 1.3: Write a program to demonstrate the use of static data members.
- 1.4: Write a program to demonstrate the use of const data members.

#### 2: Constructors and Destructors

- 2.1: Write a program to demonstrate the use of zero argument and parameterized constructors.
- 2.2: Write a program to demonstrate the use of dynamic constructor.
- 2.3: Write a program to demonstrate the use of explicit constructor.

#### 3: Operator Overloading

- 3.1: Write a program to demonstrate the overloading of increment and decrement operators.
- 3.2: Write a program to demonstrate the overloading of binary arithmetic operators.
- 3.3: Write a program to demonstrate the overloading of memory management operators.

## 4: Typecasting

- 4.1: Write a program to demonstrate the typecasting of basic type to class type.
- 4.2: Write a program to demonstrate the typecasting of class type to basic type.
- 4.3: Write a program to demonstrate the typecasting of class type to class type.

## 5: Inheritance

- 5.1: Write a program to demonstrate the multilevel inheritance.
- 5.2: Write a program to demonstrate the multiple inheritances.
- 5.3: Write a program to demonstrate the virtual derivation of a class.

## 6: Polymorphism

- 6.1: Write a program to demonstrate the runtime polymorphism.

## 7: Exception Handling

- 7.1: Write a program to demonstrate the exception handling.

## 8: File Handling

- 8.1: Write a program to demonstrate the reading and writing of mixed type of data.
- 8.2: Write a program to demonstrate the reading and writing of objects.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(S)</b>	<b>Publisher</b>
1	Object Oriented Programming in C++	Lafore R.	Waite Group
2	Object Oriented Programming with C++	E. Balaguruswamy	Tata McGraw Hill
3	Mastering Object-Oriented Programming with C++	R. S. Salaria	Salaria Publishing House





# Programme Code: UG056

<b>Course Code</b>	<b>CSE353</b>
<b>Course Title</b>	<b>Theory of Automata and Computation</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic knowledge of Discrete mathematics and System programming,
<b>Course Objectives</b>	<ul style="list-style-type: none"><li>• Develop a formal notation for strings, languages and machines.</li><li>• Design finite automata to accept a set of strings of a language.</li><li>• Prove that a given language is regular and apply the closure properties of languages.</li><li>• Distinguish between computability and non-computability and decidability and undecidability.</li></ul>
<b>Course Outcome (CO)</b>	<p><b>The student will be able to-</b></p> <ul style="list-style-type: none"><li>• Write a formal notation for strings, languages and machines.</li><li>• Design finite automata to accept a set of strings of a language.</li><li>• For a given language determine whether the given language is regular or not.</li><li>• Distinguish between computability and non-computability and Decidability and undecidability.</li></ul>

## SYLLABUS

### UNIT-I

**Basic Theory of Automata:** Sets, Relation, Functions, Alphabet, String, Languages Finite Automata: Formal Languages, Deterministic and Non-Deterministic Finite Automata, Finite Automata with  $\epsilon$ -moves, Equivalence of NFA and DFA, Minimization of finite automata, Two- way finite automata, Moore and Mealy machines, Applications of finite automata b) Regular Expression: Definition, Algebraic Laws, Conversion of R.E to F.A, F.A to R.E , Applications, Regular grammar for F.A.

### UNIT-II

**Regular Sets and Context Free Grammars:** Properties of regular sets, Context-Free Grammars – Derivation trees, Chomsky Normal Forms and Greibach Normal Forms, Ambiguous and unambiguous grammars.

**Pushdown Automata and Parsing Algorithms:** Pushdown Automata and Context-Free Languages;



# Programme Code: UG056

Top-down parsing and Bottom-up parsing, Properties of CFL, Applications of Pumping Lemma, Closure properties of CFL and decision algorithms, Chomsky hierarchy.

## UNIT-III

**Turing Machines:** Turing machines (TM) – computable languages and functions – Turing Machine constructions – Storage in finite control.

**Variations of TMs:** Variations of TMs – Recursive and Recursive enumerable languages, Recursive Function, Partial and Total Recursive Function, Primitive Recursive Function.

## UNIT-IV

**Introduction to Computational Complexity:** Time and Space complexity of TMs – Complexity classes – Introduction to NP-Hardness and NP-Completeness, PCP Problem, Concept of decidability & undecidability. Undecidability: Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice's theorem, undecidable problems about languages.

### RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1	Introduction to Automata Theory, Languages and Computation	John E. Hopcroft and Jeffrey D. Ullman	Narosa Publishers
2	Theory of Computer Science (Automata, Languages & Computation)	K.L.P. Mishra & N. Chandershekar	PHI
3	Elements of the Theory of Computation	Harry R. Lewis and Christos H. Papadimitriou	Pearson Education Asia
4	Automata and Computability	Dexter C. Kozen	Undergraduate Texts in Computer Science, Springer
5	Introduction to the Theory of Computation	Michael Sipser	PWS Publishing
6	Introduction to Languages and The Theory of Computation	John Martin	Tata McGrawHill.

# Programme Code: UG056

<b>Course Code</b>	<b>CSE355</b>
<b>Course Title</b>	<b>Computer Graphics</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Computer graphics (basics), linear algebra, programming
<b>Course Objectives</b>	The main objective of this course is to give the student a comprehensive understanding of computer graphics and visualization and their applications. In particular participants will have the ability to understand the process of generating virtual images from virtual scenes, typically identified as a pipeline of generate, compute and store/display.
<b>Course Outcome (CO)</b>	The learner will be able to- <ol style="list-style-type: none"><li>1. Understand the fundamental graphical operations and the implementation on computer.</li><li>2. Get a glimpse of recent advances in computer graphics.</li><li>3. Describe user interface issues that make the computer easy for the novice to use.</li><li>4. Discuss interface issues that make the computer easy for the novice to use.</li></ol>

## SYLLABUS

### UNIT-I

**Introduction** - History of computer graphics, applications, graphics pipeline, physical and synthetic images, synthetic camera, modeling, animation, rendering, relation to computer vision and image processing, review of basic mathematical objects (points, vectors, matrix methods)

**Introduction to OpenGL** - OpenGL architecture, primitives and attributes, simple modeling and rendering of two- and three-dimensional geometric objects, indexed and RGB color models, frame buffer, double buffering, GLUT, interaction, events and callbacks, picking.

### UNIT-II

**Geometric transformations**- Homogeneous coordinates, affine transformations (translation, rotation, scaling, shear), concatenation, matrix stacks and use of model view matrix in OpenGL for these operations.

**Viewing** - Classical three dimensional viewing, computer viewing, specifying views, parallel and perspective projective transformations; Visibility- z-Buffer, BSP trees, Open-GL culling, hidden-surface algorithms.

### UNIT-III

**Shading** - Light sources, illumination model, Gouraud and Phong shading for polygons. Rasterization- Line segment and polygon clipping, 3D clipping, scan conversion, polygonal fill, Bresenham's algorithm.

# Programme Code: UG056

## UNIT-IV

**Discrete Techniques-** Texture mapping, compositing, textures in OpenGL; Ray Tracing- Recursive ray tracer, ray-sphere intersection.

**Representation and Visualization-** Bezier curves and surfaces, B-splines, visualization, interpolation, marching squares algorithm.

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### RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1	Interactive Computer Graphics. A Top-Down Approach Using OpenGL	Edward Angel	Pearson Education
2	Computer Graphics with OpenGL	Donald Hearn and Pauline Baker	Prentice Hall
3	Computer Graphics using OpenGL	F. S. Hill Jr. and S. M. Kelley	Prentice Hall
4	Computer Graphics (first edition)	Peter Shirley and Steve Marschner	A. K. Peters

# Programme Code: UG056

<b>Course Code</b>	<b>CSE357</b>
<b>Course Title</b>	<b>Data Communication and Networks</b>
<b>Type of Course</b>	<b>PC</b>
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic knowledge of computer and its components.
<b>Course Objectives</b>	This subject gives the basic knowledge to analyse architectures and computational designs and synthesize new and better architectures.
<b>Course Outcome(CO)</b>	The learner will be able to- <ol style="list-style-type: none"><li>1. Understand basics of computer network</li><li>2. Describe ISO-OSI reference model</li><li>3. Explain various layers of OSI model</li><li>4. Implement and demonstrate networking</li></ol>

## SYLLABUS

### UNIT-I

**Introduction to Computer Networks:** Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

### UNIT-II

**Physical Layer:** Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits : Nyquist formula, Shannon Formula, Multiplexing : Frequency Division, Time Division, Wavelength Division, Introduction to Transmission Media : Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching ,Packet Switching & their comparisons.

**Data Link Layer:** Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP.

**Medium Access Sub-Layer:** Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.

# Programme Code: UG056

## UNIT-III

**Network Layer:** Design issues, IPv4 classful and classless addressing, subnetting, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms.

**Transport Layer:** Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison.

## UNIT-IV

**Application Layer:** World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security.

### Session & Presentation Layer

### RECOMMENDED BOOKS

S.No.	Author(S)	Author	Publisher
1	Communication Networks: Fundamentals and Concepts and Key Architectures	Leon Garcia and IndraWidjaja	TMH
2.	Computer Networks.	A.S. Tanenbaum	PHI



# Programme Code: UG056

<b>Course Code</b>	<b>CSE359</b>
<b>Course Title</b>	<b>Artificial Intelligence</b>
<b>Type of Course</b>	PC
<b>L:T:P</b>	2:0:0
<b>Credits</b>	2
<b>Course Prerequisites</b>	Nil
<b>Course Objective(s)</b>	<ol style="list-style-type: none"><li>1. To get introduced to the basic knowledge representation, problem solving, and learning methods of Artificial Intelligence.</li><li>2. To solve problems in Artificial Intelligence using Python.</li><li>3. To familiarize with knowledge processing in expert systems.</li></ol>
<b>Course Outcome (CO)</b>	CO1 Understand the informed and uninformed problem types and apply search strategies to solve them. CO2 Apply difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing. CO3 Design and evaluate intelligent expert models for perception and prediction from intelligent environment.

## SYLLABUS

### Unit 1: Foundations of Artificial Intelligence

Introduction to AI: Definition and brief history of Artificial Intelligence, AI applications across different domains, Overview of AI subfields: symbolic AI, machine learning, and deep learning.

Search Algorithms and Knowledge Representation: Problem-solving agents, Uninformed search algorithms: Breadth-first search, Depth-first search, Informed search algorithms: A\* search, Heuristic search, Propositional logic and first-order logic (Syntax and semantics, Resolution and inference), Semantic networks and frames (Representation and inference).

### Unit 2: Machine Learning Basics

Introduction to Machine Learning: Basics of machine learning, Supervised, unsupervised, and reinforcement learning, Evaluation metrics in machine learning.

Classical Machine Learning Algorithms: Linear regression (Simple and multiple linear regression, Gradient descent optimization), Logistic regression (Binary and multinomial logistic regression, Sigmoid function and probability estimation), Decision trees and ensemble methods (Decision tree construction, Bagging, boosting, and random forests).

## Unit 3: Deep Learning and Neural Networks

Neural Networks: Introduction to artificial neural networks (Perceptrons and activation functions, Feed forward and back propagation), Multi-layer perceptrons (Hidden layers and network architecture, Activation functions), Training neural networks (Gradient descent and stochastic gradient descent, Regularization techniques).

## Unit 4: Applications and Ethical Considerations

Natural Language Processing: Basics of natural language processing (NLP), Text preprocessing and tokenization, NLP applications (Sentiment analysis, Named entity recognition, Part-of-speech tagging, Word embeddings and semantic similarity).

Reinforcement Learning and Ethical Implications: Introduction to reinforcement learning (Markov decision processes, Policy iteration and value iteration), Q-learning and deep Q-networks (DQN) (Experience replay and target networks, Deep reinforcement learning algorithms), Privacy concerns and data ethics (Data anonymization and de-identification techniques, Case studies of AI regulation worldwide).

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1	Artificial Intelligence	E. Rich	McGrawHill
2	Introduction to Artificial Intelligence	E. Charniak and D. McDermott	Addison Wesley

# Programme Code: UG056

<b>Course Code</b>	<b>CSE361</b>
<b>Course Title</b>	<b>Computer Graphics Laboratory</b>
<b>SEC</b>	PC
<b>L:T:P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of Program Development Constructs
<b>Course Objective(s)</b>	This practical course work allows the students to efficiently design a working software model.
<b>Course Outcome (CO)</b>	The learner will be able to- <ol style="list-style-type: none"><li>1. Implement algorithms for drawing 2D primitives</li><li>2. Implement transformations and clippings</li><li>3. Implement 3D projections</li></ol>

## SYLLABUS

1. Implementation of Algorithms for drawing 2D Primitives – Line (DDA, Bresenham) – all slopes Circle (Midpoint)
2. 2D Geometric transformations –
  - Translation
  - Rotation Scaling
  - Reflection Shear
  - Window-Viewport
4. Composite 2D Transformations
  4. Line Clipping
  5. 3D Transformations – Translation, Rotation, Scaling.
  6. 3D Projections – Parallel, Perspective.
  7. Creating 3D Scenes.
  8. Image Editing and Manipulation – Basic Operations on image using any image editing software, Creating gif animated images, Image optimization.
  9. 2D Animation – To create Interactive animation using any authoring tool.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Interactive Computer Graphics. A Top-Down Approach Using OpenGL	Edward Angel	Pearson Education

<b>Course Code</b>	<b>CSE363</b>
<b>Course Title</b>	<b>Data Communication &amp; Networks Laboratory</b>
<b>SEC</b>	PC
<b>L:T:P</b>	0 0 4
<b>Credits</b>	2
<b>Course Prerequisites</b>	Basic Knowledge of infrastructure components, design infrastructure including devices, topologies and protocols.
<b>Course Objective(s)</b>	This practical course work allows the students to efficiently design a working software model.
<b>Course Outcome (CO)</b>	To make students proficient in understanding Network components, Topologies and implementing Network protocols.

## SYLLABUS

### **1: Specification, Familiarization of Networking Components & devices.**

- 1.1: Specification of laptop & computers.
- 1.2: Familiarization of Networking Components & devices: LAN adapter, Hub, Switches, Routers.

### **2: Familiarization with transmission media & tools, Preparing cables.**

- 2.1: Coaxial cable, UTP Cable, Coaxial cable, UTP Cable.
- 2.2: Preparing straight cable & cross cable.

### **3: Study of topology, Study of TCP/IP Protocol.**

- 3.1: Study of LAN topology & their creation using N/W devices, cables & computers.
- 3.2: Configuration of TCP/IP protocol in windows & LINUX.

### **4: Addressing, File & Printer sharing.**

- 4.1: Implementation of file & printer sharing.
- 4.2: Designing & implementing class A, B,C network.

### **5: Subnet planning, FTP Server, TCP/UDP**

- 5.1: Subnet planning & implementation.
- 5.2: Installation of FTP server & client.
- 5.3: Study of TCP/UDP performance.

<b>Recommended Books</b>			
1	A+ Guide to PC Hardware Maintenance and Repair, Volume 1	Michael W. Graves	Cengage Learning
2	Practical TCP/IP and Ethernet Networking	Deon Reynders, Edwin Wright	Newnes

# Programme Code: UG056

<b>Course Code</b>	<b>CSE365</b>
<b>Course Title</b>	<b>Artificial Intelligence Laboratory</b>
<b>SEC</b>	PC
<b>L:T:P</b>	0:0:2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of Artificial Intelligence with python Programming Language Concepts
<b>Course Objective(s)</b>	This course is to help the students to give the practical implementation of the Artificial Intelligence
<b>Course Outcome (CO)</b>	<ol style="list-style-type: none"><li>1. Create and interpret charts in Python for trend analysis in large datasets.</li><li>2. Develop predictive models in Python for sales and market forecasting.</li><li>3. Enhance medical images and detect objects using Python image processing.</li><li>4. Analyze customer feedback using Python for sentiment detection.</li></ol>

## LIST OF PRACTICAL'S

1. Visualizing Data: Write a program in Python to create informative charts and graphs for analyzing trends in large datasets.
2. Prediction: Write a program in Python to forecast sales or market trends using predictive modeling techniques.
3. Image Processing: Write a program in Python to enhance medical images for diagnostic purposes or detect objects in surveillance footage.
4. Convolution Operator: Write a program in Python to apply convolution filters for feature extraction in image recognition tasks.
5. CNN Testing: Write a program in Python to evaluate the performance and robustness of convolution neural networks in image classification.
6. Data Processing: Write a program in Python to clean and preprocess raw data for analysis.
7. Sentiment Analysis: Write a program in Python to analyze customer feedback and gauge sentiment towards products or services.
8. Confusion Matrix: Write a program in Python to generate and visualize a confusion matrix for evaluating classification model performance.



## Programme Code: UG056

<b>Course Code</b>	<b>CSE367</b>
<b>Course Title</b>	<b>Four Weeks Industrial Training Evaluation (Undertaken after 4<sup>th</sup> semester)</b>
<b>Type of Course</b>	SEC
<b>L T P</b>	
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basics of programming and software development
<b>Course Objectives</b>	To enhance programming skills of a learner, so that the learner finds solutions to problems. He also gets industrial experience of software development
<b>Course Outcomes- (CO)</b>	The learner will be able to- 1. implement software using proper software life cycle models 2. works with latest IT tools 3. Develop team leadership

The four weeks industrial training will give exposure to the practical aspects of the discipline, in real time working scenario. In addition, the student may also work on a specified task or project which may be assigned to him/her, by the industry person. The student will maintain the daily diary which will have signature of industry expert, assigned to him/ her. This daily diary will be produced by the student during practical examinations, as and when scheduled by the institute. The department will evaluate student performance based on his/her project report, running software code, CD containing code and daily diary.

<b>Course Code</b>	<b>CSE369</b>
<b>Course Title</b>	<b>Mobile Application Development</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Students are expected to have basic knowledge of JAVA, HTML, Javascript and CSS
<b>Course Objectives</b>	Students will learn the basics of the programming language, designing mobile interfaces, using libraries to build applications, user input and other aspects.
<b>Course Outcome (CO)</b>	The learner will be able to- <ol style="list-style-type: none"> <li>1. Define multimedia to potential clients.</li> <li>2. Identify and describe the function of the general skill sets in the multimedia industry.</li> <li>3. Identify the basic components of a multimedia project.</li> <li>4. Identify the basic hardware and software requirements for multimedia development and playback.</li> </ol>

## SYLLABUS

### UNIT-I

#### **Introduction To Mobile Devices**

Mobile devices vs. desktop devices, ARM and intel architectures, Power Management, Screen resolution, Touch interfaces, Application deployment, App Store, Google Play, Windows Store, Development environments ,Xcode, Eclipse, VS2012, PhoneGAP, Native vs. web applications

#### *Mobile Applications*

Introduction to mobile computing, mobile applications , Embedded systems, Market and business drivers for mobile applications , Publishing and delivery of mobile applications , Requirements gathering and validation for mobile applications

### UNIT-II

#### **Mobile OS Architectures**

Comparing and Contrasting architectures of all three – Android, iOS and Windows , Underlying OS (Darwin vs. Linux vs. Win 8) , Kernel structure and native level programming , Runtime (Objective-C vs. Dalvik vs. WinRT), Approaches to power management , Security

#### **Basic Design**

Introduction , Basics of embedded systems design , Embedded OS Design constraints for mobile applications, both hardware and software related , Architecting mobile applications , user interfaces for mobile applications , touch events and gestures , Achieving quality constraints , performance, usability, security, availability and modifiability.

## UNIT-III

### Advanced Design

Designing applications with multimedia and web access capabilities, Integration with GPS and social media networking applications, Accessing applications hosted in a cloud computing environment, Design patterns for mobile applications.

#### *Technology I - Android*

Introduction , Establishing the development environment , Android architecture , Activities and views , Interacting with UI , Persisting data using SQLite , Packaging and deployment , Interaction with server side applications , Using Google Maps, GPS and Wifi, Integration with \_social media applications.

## UNIT-IV

### Technology II - iOS

Introduction to Objective C , iOS features , UI implementation , Touch frameworks , Data persistence using Core Data and SQLite , Location aware applications using Core Location and Map Kit , Integrating calendar and address book with social media application , Using Wifi iPhone marketplace.

### Mobile Device Security

Mobile malware, Device protections, iOS “Jailbreaking”, Android “rooting” and Windows’ “defenestration”.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Professional Mobile Application Development	Jeff McWherter and Scott Gowell	Wrox
2	Android in Practice	Charlie Collins, Michael Galpin and Matthias Kappler	DreamTech
3	Beginning iOS 6 Development: Exploring the iOS SDK	David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson	Apress

# Programme Code: UG056

<b>Course Code</b>	CSE371
<b>Course Title</b>	Introduction to Internet of Things
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	NIL
<b>Course Objectives</b>	The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied.
<b>Course Outcome(CO)</b>	At the end of the course the learner will be able to- <ol style="list-style-type: none"><li>1. Understand and describe Functional blocks of IOT</li><li>2. Explain MAC protocol and various routing protocols</li><li>3. Describe data aggregation and data dissemination</li><li>4. Evaluate and explain challenges in IoT design</li><li>5. Demonstrate the ability to develop applications through IoT tools</li></ol>

## UNIT-I

Introduction to IoT Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models and APIs

## UNIT-II

IoT & M2M Machine to Machine, Difference between IoT and M2M, Software define Network, Network and Communication aspects Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment and Node discovery, Data aggregation and dissemination

## UNIT-III

Challenges in IoT Design challenges, Development challenges, Security challenges, Other challenges Domain specific applications of IoT Home automation, Industry applications, Surveillance applications, Other IoT applications

## UNIT-IV

Developing IoTs Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor-based application through embedded system platform, Implementing IoT concepts with python

### RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	The Internet of Things in the Cloud:A Middleware Perspective	Honbo Zhou	CRC Press,2012

# Programme Code: UG056

<b>Course Code</b>	<b>CSE473</b>
<b>Course Title</b>	<b>Cloud Computing</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Distributed System, Operating Systems and Networking
<b>Course Objectives (CO)</b>	This Course work provides the complete understanding of Cloud system, its implementation techniques and its various applications in the field of computer Science.
<b>Course Outcome</b>	The learner will be able to- <ol style="list-style-type: none"><li>1. Understand characteristics and types of cloud computing</li><li>2. Describe architecture of cloud computing</li><li>3. Explain applications of cloud</li><li>4. Demonstrate their knowledge of cloud computing to real world examples</li></ol>

## SYLLABUS

### UNIT-I

Cloud Computing Basics, History of Cloud Computing, Importance, Characteristics of Cloud Computing, Benefits and challenges to Cloud architecture.

### UNIT-II

Types of Cloud: Public Cloud, Private Cloud, Hybrid and Community Cloud. Differences between public and private cloud, Status of Cloud Computing in India, Cloud Service Models, Role of virtualization in enabling the cloud; Differences between Grid computing and cloud computing, differences between grid computing and utility computing, Cloud Computing security concerns and proposed security model for future cloud computing.

### UNIT-III

Cloud Computing- Logical architecture, Developing Holistics Cloud Computing Reference Models- Seven step model of migrating to cloud.



Virtualization types, Virtual Machine Life Cycle, Virtualization applications, Pitfalls of Virtualization, CPU Virtualization.

## UNIT-IV

Case Study of Cloud Computing, Cloud Computing Risks. Cloud Tools, Cloud Applications, Future Trends, Mobile cloud, Jungle Computing, Big Data –Features and applications



### RECOMMENDED BOOKS

Sr. no.	Name	Author(s)	Publisher
1	Cloud Computing – A Practical Approach	Anthony T.Velte, Toby J.Velte and Robert E	TMH
2	Cloud Computing – Web based Applications	Michael Miller	Pearson Publishing

# Programme Code: UG056

<b>Course Code</b>	<b>CSE375</b>
<b>Course Title</b>	<b>Neural Network and Deep Learning</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Overview of Structure and Software Analysis and Design
<b>Course Objectives (CO)</b>	1. Make students familiar with basic concepts and tool used in neural networks 2. Teach students structure of a neuron including biological and artificial 3. Teach learning in network (Supervised and Unsupervised) 4. Teach concepts of learning rules.
<b>Course Outcomes</b>	The learner will be able to 1. Design single and multi-layer feed-forward neural networks 2. Understand supervised and unsupervised learning concepts & understand unsupervised learning using Kohonen networks 3. Understand training of recurrent Hopfield networks and associative memory concepts.

## SYLLABUS

### Unit I: Introduction

Structure of biological neurons relevant to ANNs., Models of ANNs; Feedforward & feedback networks; learning rules; Hebbian learning rule, perception learning rule, delta learning rule, Widrow-Hoff learning rule, correction learning rule, Winner-take-all learning rule, etc.

### Unit II: Single layer Perception Classifier and Multi-layer Feed forward Networks

Classification model, Features & Decision regions; training & classification using discrete perceptron, algorithm, single layer continuous perceptron networks for linearly separable classifications, linearly non-separable pattern classification, Delta learning rule for multi-perceptron layer, Generalized delta learning rule, Error back-propagation training, learning factors, Examples.

### Unit III: Single layer feedback Networks

Basic Concepts, Hopfield networks, Training & Examples. Associative memories: Linear Association, Basic Concepts of recurrent.

### Unit IV: Auto associative memory

Retrieval algorithm, storage algorithm; Bidirectional associative memory, Architecture, Association encoding & decoding, Stability.

### RECOMMENDED BOOKS

Sr.no.	Name	Author(s)	Publisher
1	Introduction to Artificial Neural systems	Jacek M. Zurada, 1994	Jaico Publ. house
2	Neural Network Fundamentals	N.K. Bose, P. Liang, 2002	M.H

# Programme Code: UG056

<b>Course Code</b>	<b>CSE377</b>
<b>Course Title</b>	<b>Expert System</b>
<b>Type of Course</b>	<b>PE</b>
<b>L T P</b>	<b>3 0 0</b>
<b>Credits</b>	<b>3</b>
<b>Course Prerequisites</b>	<b>Nil</b>
<b>Course Objectives</b>	<b>The capturing of expertise allows exposition of other possibilities:</b> <ul style="list-style-type: none"><li>▪ <b>Understanding of general principles of expertise</b></li><li>▪ <b>Categorization of domain specific principles of expertise</b></li><li>▪ <b>Possible improvement of performance by refinement of these principles</b></li></ul>
<b>Course Outcomes (CO)</b>	<b>The learner will be able to:</b> <b>CO1: Understand general principles of expert system</b> <b>CO2: Categorize domain specific principles of expertise</b> <b>CO3: Suggest possible improvement of performance by refinement of these principles</b>

## SYLLABUS

### UNIT-I

**Overview;** introduction to rule-based expert systems, Background, general introduction, Forward and backward chaining, conflict resolution

Uses: structured selection, con\_guration, diagnosis, and business rules.

### UNIT-II

#### **Rule-based expert systems**

Uncertainty, fuzzy logic and belief nets, Expert System Shells

#### **Other expert system paradigms**

Case-based reasoning and help desks, Recommender systems (CD Now Case Study), Scheduling (Steelmaking example: Dorn and Slany)

### UNIT-III

#### **Machine learning and data-base mining**

Data Mining, Decision Trees, Neural Networks, Text Mining, Web mining

### UNIT-IV

#### **Current trends, projects**

Current trends in AI, Presentation and discussion of projects

## RECOMMENDED BOOKS

<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	An Overview Of Expert System	Patterson	Pearson



# 6<sup>th</sup> SEMESTER

<b>Course Code</b>	<b>CSE352</b>
<b>Course Title</b>	<b>Internet Web Programming</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic knowledge of Program Development and Programming Language Constructs
<b>Course Objectives</b>	This course introduces advanced programming skills for website design. Dynamic content development will be explored through state of the art programming languages for the creation of interactive websites. Students will create web pages that utilize the most current advances in web development.
<b>Course Outcomes (CO)</b>	The students will be able to : CO1: Understand concepts of Internet, WWW, Email, and HTML. CO2: Perform programs related to forms, table, and CSS using HTML tags. CO3: Implement the concepts of Javascript, and DOM. CO4: Implement PHP programs, and MySQL commands using PHPMyAdmin..

## SYLLABUS

### UNIT-I

**Internet and WWW:** Introduction to internet and its applications, Email, telnet, FTP, ecommerce, video conferencing, e-business. Internet service providers, domain name server, internet address World Wide Web (WWW) : World Wide Web and its evolution, uniform resource locator (URL), browsers - internet explorer, netscape navigator, opera, firefox, chrome, mozilla. Search engine, web saver - apache, IIS, proxy server, HTTP protocol.

**HTML and Graphics:** HTML Tag Reference, Global Attributes, Event Handlers, Document Structure Tags, Formatting Tags, Text Level formatting, Block Level formatting, List Tags, Hyperlink tags, Image and Image maps, Table tags, Form Tags, Frame Tags, Executable content tags.

**Image maps:** Client-side Image maps, Server-side Image maps, Using Server-side and Client-side Image maps together, alternative text for Image maps,

**Tables:** Introduction to HTML tables and their structure, The table tags, Alignment, Aligning Entire Table, Alignment within a row, Alignment within a cell, Attributes, Content Summary, Background color, Adding a Caption, Setting the width, Adding a border, Spacing within a cell, Spacing between the cells, spanning multiple rows or columns, Elements that can be placed in a table, Table Sections and column properties, Tables as a design tool

### UNIT-II

**Frames :** Introduction to Frames, Applications, Frames document, The <FRAMESET> tag, Nesting <FRAMESET> tag, Placing content in frames with the <FRAME> tag, Targeting named frames, Creating floating frames, Using Hidden frames,

**Forms :** Creating Forms, The <FORM> tag, Named Input fields, The <INPUT> tag, Multiple lines text windows, Drop down and list boxes, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms and Scripting, Action Buttons, 105

Labelling input files, Grouping related fields, Disabled and read-only fields, Form field event



# Programme Code: UG056

handlers, Passing form data

**Style Sheets:** What are style sheets? Why are style sheets valuable? Different approaches to style sheets, Using Multiple approaches, Linking to style information in separate file, Setting up style information, Using the <LINK> tag, embedded style information, Using <STYLE> tag, Inline style information.

## UNIT-III

**Java Script:** Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ? (Conditional operator),(Comma operator), delete, new, this, void.

**Statements:** Break, comment, continue, delete, do ... while, export, for, for...in, function, if...else, import, labelled, return, switch, var, while, with,

Core JavaScript (Properties and Methods of Each) : Array, Boolean, Date, Function, Math, Number, Object, String, regExp

**Document and its associated objects:** document, Link, Area, Anchor, Image, Applet, Layer

Events and Event Handlers: General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDbClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload

## UNIT-IV

**XML:** Introduction to XML, Anatomy of an XML, document, Creating XML Documents, Creating XML DTDs, XML Schemas, XSL

**PHP:** Why PHP and MySQL?, Server-side web scripting, Installing PHP, Adding PHP to HTML, Syntax and Variables, Passing information between pages, Strings, Arrays and Array Functions, Numbers, Basic PHP errors / problems.

**Advanced PHP and MySQL:** PHP/MySQL Functions, Displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, Type and Type Conversions, E-Mail.

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	HTML 5 in simple steps Kogent Learning	Dreamtech press Solutions Inc.	Dreamtech Press
2	HTML :Beginner's guide Wendy Willard Mc Graw Hill	Wendy Willard	Osborne/McGraw-Hill
3	Managing software process	Watts Humphrey	Pearson education
4	Software Engineering – An Engineering Approach	James F. Peters and Witold Pedrycz	Wiley

# Programme Code: UG056

<b>Course Code</b>	<b>CSE354</b>
<b>Course Title</b>	<b>Software Engineering</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Overview of Structure and Software Analysis and Design
<b>Course Objectives</b>	This Course Work provides the thorough understanding of the software engineering concepts and it also gives the ideas of handling the projects in the organizations and in institutes
<b>Course Outcome (CO)</b>	The learner will be able to- 1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics 2. Communicate effectively with a range of audiences 3. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors 4. Analyze, design, verify, validate, implement, apply, and maintain software systems

## SYLLABUS

### UNIT-I

**Introduction:** Software Engineering definition, history, evolution of software, software components, applications, software myths, software crisis.

**Software Development Life-cycle:** Requirements analysis, software design, coding, testing, maintenance

**Software Process Models:** Waterfall model, prototyping, interactive enhancement, spiral model. Role of Management in software development. Role of metrics and measurement.

### UNIT-II

**Software Requirement Specification:** Problem analysis, requirement specification, validation, metrics, monitoring and control, SRS

**System Design:** Problem partitioning, abstraction, top-down and bottom-up design, Structured approach. Functional versus object-oriented approach, design specification and verification metrics, monitoring and control, UML

## UNIT-III

**Coding:** Top-down and bottom-up, structured programming, information hiding, programming style, and internal documentation. Verification, Metrics, monitoring and control.

**Testing:** Levels of testing functional testing, structural testing, test plane, test cases specification, and reliability assessment.

## UNIT-IV

**Software Project Management:** Cost estimation, Project scheduling, Staffing, Software configuration management, Quality assurance, SIX SIGMA, Project Monitoring, Risk management, reverse engineering

### CASE Tools

RECOMMENDED BOOKS			
Sr. no.	Name	Author(s)	Publisher
1	Engineering: A Practitioners Approach	Roger Pressman	McGraw Hill
2	Software Engineering	Sommerville	Adison Wesley
3	Managing software process	Watts Humphrey	Pearson education
4	Software Engineering – An Engineering Approach	James F. Peters and Witold Pedrycz	Wiley

# Programme Code: UG056

<b>Course Code</b>	CSE357
<b>Course Title</b>	Programming in Java
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Knowledge of OOPs
<b>Course Objectives (CO)</b>	<ol style="list-style-type: none"><li>1. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.</li><li>2. Be aware of the important topics and principles of software development.</li><li>3. Be able to use the Java SDK environment to create, debug and run simple Java programs.</li><li>4. Understand the principles of inheritance, packages and interfaces</li></ol>
<b>Course Outcome</b>	<p>The learner will be able to-</p> <ol style="list-style-type: none"><li>1. Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.</li><li>2. Read and make elementary modifications to Java programs that solve real-world problems.</li><li>3. Validate input in a Java program.</li><li>4. Identify and fix defects and common security issues in code.</li></ol>

## SYLLABUS

### UNIT-I

Object oriented programming concepts, objects, classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism, Objects and classes in Java, defining classes, methods, access specifiers, static members, constructors, finalize method

### UNIT-II

Arrays, Strings, Packages, Java-Doc comments, Inheritance, class hierarchy, polymorphism, dynamic binding, final keyword, abstract classes

### UNIT-III

The Object class, Reflection, interfaces, object cloning, inner classes, proxies, I/O Streams, Graphics programming, Frame, Components, working with 2D shapes.

### UNIT-IV

Basics of event handling, event handlers, adapter classes, actions, mouse events – AWT event hierarchy, introduction to Swing, Model-View-Controller design pattern – buttons, layout management, Swing Components, exception handling, exception hierarchy, throwing and catching exceptions.

## Programme Code: UG056

### RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Core Java: Volume I – Fundamentals	Cay S. Horstmann and Gary Cornell.	Sun Microsystems Press





# Programme Code: UG056

<b>Course Code</b>	<b>CSE366</b>
<b>Course Title</b>	<b>Digital Image Processing</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	This course has no prerequisite other than knowledge of probability and statistics, and Computer graphics.
<b>Course Objectives</b>	The objective of this course is to teach students the architecture of image processing. By taking this course, the students are expected to understand the basic algorithms, and be able to apply these techniques.
<b>Course Outcome (CO)</b>	The learner will be able to- 1. Understand the digital image processing 2. Understand the image enhancement.

## SYLLABUS

### Unit-I

Introduction to the DIP areas and applications; Components of Digital Image Processing; Elements of Visual Perception; Image Sensing and Acquisition; Image Sampling and Quantization; Relationships between pixels; color models.

### Unit-II

Image Enhancement Spatial Domain: Gray level transformations; Histogram processing; Basics of Spatial Filtering; Smoothing and Sharpening Spatial Filtering Frequency Domain: Introduction to Fourier Transform; Smoothing and Sharpening frequency domain filters; Ideal, Butterworth and Gaussian filters

### Unit-III

Image Restoration Course Code: Noise models; Mean Filters; Order Statistics; Adaptive filters; Band reject Filters; Band pass Filters; Notch Filters; Optimum Notch Filtering; Inverse Filtering; Wiener filtering

### Unit-IV

Feature Extraction and Image Segmentation Feature Extraction: Contour and shape dependent feature extraction, Extraction of textural features

Segmentation: Detection of Discontinuities; Edge Linking and Boundary detection; Region based segmentation; Morphological processing- erosion and dilation.

Image Compression and Encoding Entropy-based schemes, Transform-based encoding, Predictive encoding and DPCM, Vector quantization, Huffman coding.

# Programme Code: UG056

<b>Course Code</b>	<b>CSE314</b>
<b>Course Title</b>	<b>Computer Vision</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Computer Graphics
<b>Course Objectives (CO)</b>	To familiarize the student with specific, well known computer vision methods, algorithms and results. To understand the roles of image transformations and their in variances in pattern recognition and classification.
<b>Course Outcomes</b>	<b>The learner will be able to-</b> <ol style="list-style-type: none"><li>1. Identify basic concepts, terminology, theories, models and methods in the field of computer vision</li><li>2. Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition.</li><li>3. Assess which methods to use for solving a given roblem.</li><li>4. Analyze the accuracy of the methods</li></ol>

## SYLLABUS

### UNIT-I

Digital Image Formation and low-level processing: Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.

Depth estimation and Multi-camera views: Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration.

### UNIT-II

Feature Extraction: Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.

Image Segmentation: Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection.

Pattern Analysis: Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods.

### UNIT-III

Motion Analysis: Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation.

Shape from X: Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; Photometric

## Programme Code: UG056

Stereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges. Perceptual organization and cognition: Vision as model-building and graphics in the brain, Learning to see. Lessons from neurological trauma and visual deficits, Visual agnosias and illusions, and what they may imply about how vision works.

### UNIT-IV

Model estimation: Machine learning and statistical methods in vision. Applications of machine learning in computer vision. Discriminative and generative methods. Content based image retrieval.

Miscellaneous Applications: CBIR, CBVR, Activity Recognition, computational photography, Biometrics, stitching and document processing; Modern trends - super-resolution; GPU, Augmented Reality; cognitive models, fusion and SR&CS.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Computer Vision: Algorithms and Applications	Richard Szeliski	Springer
2	Computer Vision: A Modern Approach	D. A. Forsyth, J. Ponce	Prentice Hall
3	Introductory Techniques for 3D Computer Vision	Trucco and Verri	Prentice Hall
4	Computer vision	Shapiro, L. & Stockman, G	Prentice Hall
5	Three dimensional Computer Vision: A geometric approach	Olivier Faugeras	Olivier Faugeras

# Programme Code: UG056

<b>Course Code</b>	<b>CSE362</b>
<b>Course Title</b>	<b>Compiler Construction</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basic understanding of Programming Languages, Data structures and machine architecture
<b>Course Objectives (CO)</b>	<ol style="list-style-type: none"><li>1. To understand and list the different stages in the process of compilation.</li><li>2. Identify different methods of lexical analysis</li><li>3. Design top-down and bottom-up parsers</li><li>4. Identify synthesized and inherited attributes</li><li>5. Develop syntax directed translation schemes</li><li>6. Develop algorithms to generate code for a target machine</li></ol>
<b>Course Outcome (CO)</b>	The learner will be able to <ol style="list-style-type: none"><li>1. For a given grammar specification develop the lexical analyser</li><li>2. For a given parser specification design top-down and bottom-up parsers</li><li>3. Develop syntax directed translation schemes</li><li>4. Develop algorithms to generate code for a target machine</li></ol>

## SYLLABUS

### UNIT-I

Introduction: Phases of compilation and overview. Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (lex, flex).

Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) grammars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison)

### UNIT-II

Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.

Symbol Table: Its structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope.



# Programme Code: UG056

## UNIT-III

Intermediate Code Generation: Translation of different language features, different types of intermediate forms. Code Improvement (optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc.

## UNIT-IV

Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation

Advanced topics: Type systems, data abstraction, compilation of Object Oriented features and non-imperative programming languages.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Compilers Principles, Techniques, & Tools	A.V.Aho, R.Sethi&J.D.Ullman	Pearson Education
2	Engineering a Compiler	Keith Cooper and Linda Torczon,	Morgan-Kaufman Publishers
3	Crafting a compiler	C. Fischer and R. LeBlanc	Benjamin Cummings
4	Modern Compiler Implementation in Java	Andrew W. Appel	Cambridge University Press
5	Compiler Construction Principles and Practice	Kenneth C. Louden	Kenneth C. Louden





## Programme Code: UG056

<b>Course Code</b>	<b>CSE348</b>
<b>Course Title</b>	<b>Digital Marketing</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Nil
<b>Course Objective</b>	The main objective of this course is to provide learners with the knowledge of business advantages of the digital marketing and its importance for marketing success; to develop a digital marketing plan; to make SWOT analysis; to define a target group; to get introduced to various digital channels, their advantages and ways of integration;
<b>Course Outcomes</b>	The learner will be able to- <ol style="list-style-type: none"><li>1. Identify the importance of the digital marketing for marketing success,</li><li>1. Manage customer relationships across all digital channels and build better customer relationships,</li><li>2. Create a digital marketing plan, starting from the SWOT analysis and defining a target group, then identifying digital channels, their advantages and limitations.</li><li>3. Perceiving ways of their integration taking into consideration the available budget.</li></ol>

### SYLLABUS

#### UNIT I

Introduction: Marketing and its definition, Digital Marketing, How we do Marketing, Benefits of Digital marketing, Digital marketing platforms and Strategies, Defining Marketing Goals, Latest Digital marketing trends, introduction to traditional and new methods of marketing Requirement: Requirements for digital marketing, its uses.

#### UNIT II

Search Engine Optimization: Introduction to Search Engines, How the search engine works, Components of Search Engines. Keyword Research and Competition: Introduction to Keyword Research, Types of Keywords, Keyword Research Methodology, Business Analysis & Categorization, Google Keyword Planner, Market Research and Analysis, New Keyword Ideas, Competition Analysis, Finalizing the Keywords List.

#### UNIT III

Onpage Optimization: Introduction to Onpage ,What is Webmaster Tools, Selecting Target Location, Onpage Analysis Methodology, Fundamental On-page Factors , Website Speed , Domain name in SEO, URL Optimization , Title Tag Optimization , Meta Tags Optimization , Content Optimization , Sitemaps Generation , Using Robot.txt in Site URL , Redirecting Techniques , Canonical Links , Rich Snippets.

## Programme Code: UG056

### UNIT IV

Offpage Optimization : What is Link Building , Types of Linking Methods , DoFollow Vs. NoFollow Link building Guidelines , Linking Building Methodology , Links Analysis Tools , Directory Submissions , Local Business Directories , Social Bookmarking , Using Classifieds for Inbound traffic , Question and Answers , Blogging & Commenting , Guest Blogging Local SEO: What is Local SEO, Importance of Local SEO , Submission to Google My Business , Completing the Profile , Local SEO Ranking Signals , Local SEO Negative Signals , Citations and Local Submissions

<b>RECOMMENDED BOOKS</b>			
<b>S.No</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Digital Marketing For Dummies	Ryan Deiss & Russ Henneberry	John Wiley & Sons, Inc.,
2	<b>Social Media Marketing All-in-one Dummies</b>	Jan Zimmerman, Deborah Ng	John Wiley & Sons Inc, 4 <sup>th</sup> edition



## Programme Code: UG056

Course Code	CSE378
Course Title	Advanced Parallel Computing
Type of Course	PE
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Computer System Architecture
Course Objectives	Students become familiar with parallel computer architecture and algorithms.
Course Outcome (CO)	The learner will be able to- <ol style="list-style-type: none"><li>1. Understand basic terms used in parallel computing</li><li>2. Classify parallel computers</li><li>3. Describe parallel computer architecture</li><li>4. Analyze parallel algorithms</li></ol>

### SYLLABUS

#### UNIT-I

**Introduction to Parallel Computing:** Basic concepts about program/process/ thread, Concurrent Execution, Parallel Execution, granularity, Potential of Parallelism; Need of Parallel Computation; Levels of parallel processing; Parallel processing Vs. Parallel computing; Dataflow Computing concept; Applications of parallel processing-Scientific Applications / Image processing, Engineering Application, Database query / Answering applications, AI Applications, Mathematical simulations and modeling

**Classification of Parallel Computers:** Types of Classification; Flynn's/ Handler classification; UMA / NUMA /COMA; Loosely coupled / tightly coupled; Classification based grain size and Instruction level parallelism.

#### UNIT-II

**Interconnection Network:** Need of Interconnection Network; Concept Bandwidth Nod degree diameter bisection bandwidth, In degree and Out degree; Static and Dynamic Interconnection network; Omega, Parallel Shifter, Bens, permutation, hypercube, butterfly; Shuffle exchange Network

**Parallel Computer Architecture:** Introduction to various computer architecture; Pipeline processing; Vector / Array processing; VLIW and Super scalar architecture; Associative architecture -Multithreaded architecture.

#### UNIT-III

##### Parallel Algorithm & Parallel Programming

**Parallel Algorithm:** Introduction to Parallel Algorithms; Analysis of Parallel Algorithms; Different models of computation- Combinational circuit, Permutation Circuit, Sorting circuit, Matrix computation.

**PRAM Algorithms:** Message passage programming -Shared memory, Message passing libraries, Data Parallel programming; Data Structures for parallel algorithms-Link list, Arrays pointers, Hypercube network.

**Parallel Programming:** Introduction to Parallel Programming; Types of parallel programming - Programming based on message passing, data parallelism, Programming for shared memory systems,



# Programme Code: UG056

Example programs for parallel systems.

## UNIT- IV

### Advanced Topics

**Operating System for Parallel Computers:** Basic issues of Operating Systems for Parallel Computers; Process Management; Resource Management; Memory management; I/O Management; Inter-Processor Communication; Vectorisation Compiler

**Performance Evaluation:** Introduction to performance evaluation; Metric of Parallel overhead; Law Speedup; Measurement Tools

**Recent Trends:** Multi-component CPU; Apex architecture IA 64; Hyper threading

RECOMMENDED BOOKS			
Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Advanced Computer Architecture: Parallelism, Scalability, Programmability	Hwang, K	Tata McGraw Hills
2	Introduction to Parallel Processing	Sasikumar M., Shikhare, D., Ravi Prakash	Prentice Hall of India pvt.ltd. New Delhi
3	Computer Architecture and Parallel Processing	Hwang, K., Briggs, F. A.	McGraw Hill

# Programme Code: UG056

<b>Course Code</b>	<b>CSE320</b>
<b>Course Title</b>	<b>Optimization Techniques in Machine Learning</b>
<b>Type of Course</b>	<b>PE</b>
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Discrete mathematics
<b>Course Objectives</b>	To understand learning models and learning algorithms
<b>Course Outcomes (CO)</b>	The learner will be able to- 1. Recognize the characteristics of machine learning that make it useful to real-world problems. 2. Characterize and differentiate between supervised and unsupervised learning techniques. 3. Explain Reinforcement learning and its control 4. Represent concepts of Decision trees.

## SYLLABUS

### UNIT I

Introduction- Basic concepts, machine learning problems, types of learning, designing a learning system, Goals and applications of machine learning

**Learning Theory-** Bias/variance tradeoff. Union and Chernoff/Hoeffding bounds. VC dimension, Worst case (online) learning, learning algorithms.

### UNIT II

**Supervised learning-** Supervised learning setup, LMS, Logistic regression, Perceptron, Exponential family, Generative learning algorithms, Gaussian discriminant analysis, Naive Bayes, Support vector machines, Model selection and feature selection.

**Unsupervised learning-** Clustering. K-means, EM, Mixture of Gaussians, Factor analysis, PCA (Principal components analysis), ICA (Independent components analysis).

### UNIT III

**Reinforcement learning and control-** MDPs, Bellman equations, Value iteration and policy iteration, Linear quadratic regulation (LQR), LQG, Q-learning. Value function approximation, Policy search, Reinforce, POM.

### UNIT IV

#### Decision Tree Learning

Representing concepts as decision trees, Recursive induction of decision trees, Picking the best splitting attribute: entropy and information gain, Searching for simple trees and computational complexity, Occam's razor, Overfitting, noisy data.



# Programme Code: UG056

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1	Pattern Recognition and Machine Learning	Bishop, C.	Berlin: Springer-Verlag.
2	Elements of Statistical Learning	Hastie, Tibshirani, and Friedman	Springer
3	Machine Learning	Tom Mitchell	Mc-Graw Hill

# Programme Code: UG056

<b>Course Code</b>	<b>CSE322</b>
<b>Course Title</b>	<b>Distributed System</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basic knowledge of object oriented programming, data structures, threads, operating system concepts.
<b>Course Objectives</b>	This Course provides the complete understanding of distributed system and its various applications in the field of computer Science.
<b>Course Outcome (CO)</b>	The learner will be able to- 1. Identify characteristics of distributed system. 2. Explain the system models of distributed processing and communication. 3. Explain distributed deadlock detection. 4. Explain distributed transaction and its types.

## SYLLABUS

### UNIT-I

**Characterization of Distributed Systems:** Introduction, Examples of distributed Systems, Issues in Distributed Operating Systems, Resource sharing and the Web Challenges.

**System Models:** Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, and termination detection.

### UNIT-II

**Distributed Mutual Exclusion:** Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

**Distributed Deadlock Detection:** system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

### UNIT-III

**Agreement Protocols:** Introduction, System models, classification of Agreement Problem- Interactive consistency Problem, Applications of Agreement algorithms.

**Distributed Objects and Remote Invocation:** Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.

**Transactions and Concurrency Control:** Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control

### UNIT-IV

**Distributed Transactions:** Introduction, Flat and nested distributed transactions, Atomic commit protocols, concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Distributed shared memory – Design and Implementation issues, consistency models, CORBA Case Study: CORBA RMI, CORBA services.

**File System:** File service components, design issues, interfaces, implementation techniques, Sun Network File System – architecture and implementation, other distributed file systems – AFS, CODA.

Name services – SNS name service model.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Advanced Concepts in Operating Systems	Mukesh Singhal & Niranjan G Shivaratri	Tata McGraw Hill
2	Distributed System: Concepts and Design	Coulouris, Dollimore, Kindberg	Pearson Education
3	Distributed Operating Systems	S. Tanenbaum	Pearson Education
4	Distributed System: Concepts and Design	P K Sinha	PHI



<b>Course Code</b>	<b>CSE324</b>
<b>Course Title</b>	<b>Wireless Communications</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Nil
<b>Course Objective</b>	To gain an understanding of the principles behind the design of wireless communication systems and technologies.
<b>Course Outcomes</b>	<p><b>The learner will be able to-</b></p> <ol style="list-style-type: none"> <li>1. Understand and explain the Classification of mobile communications systems.</li> <li>2. Examine state-of-the-art distributed systems, such as Google File System.</li> <li>3. Learn the principles, architectures, algorithms and programming models used in distributed systems</li> </ol>

#### **UNIT-I**

Introduction: A basic cellular system, performance criteria, operation of cellular systems, planning a cellular system, analog & digital cellular systems. Examples of Wireless Communication Systems: Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems.

GSM system : Architecture and features ; GSM Services ; Authentication ; Incoming & outgoing call flow ; Handover in GSM.

#### **UNIT-II**

Digital Communication through fading multipath channels: Fading types and their characteristics. Concept of diversity branches and signal paths- Combining methods- Selective diversity combining-pre-detection and post-detection combining- Switched combining- maximal ratio combining- Equal gain combining. Different type of channels: Control & Traffic channels.

BTS hardware: Introduction of BTS 3900 series ; Baseband unit (BBU); Radio Frequency unit (RFU ); Description of Cards; Login to BTS 3900

#### **UNIT-III**

Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access(FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access,CDMA (code division multiple access),Space Division Multiple Access. WCDMA (wideband CDMA) features and architecture, handoff and its types.

#### **UNIT-IV**

Wireless Systems & Standards: GPRS/EDGE specification features and architecture, 3G systems: Application of 3G & UMTS & CDMA 2000 standards, specifications and architecture of UMTS , Forward CDMA Channel, Reverse CDMA Channel. BSC Hardware: Introduction to 6900 series ;MPR & EPR; Description of Cards ; Login to BSC 6900. Future trends: Blue Tooth technology, 4G mobile techniques, Wi-Fi Technology advance system, zigbee.

**RECOMMENDED BOOKS**

<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Wireless Communications	T.S.Rappaport,	Principles Edition, and Practice, 2 <sup>nd</sup> Pearson Education Asia, 2010.
2	Mobile Cellular Telecommunications	William C Y Lee	2nd Edition, MGH.
3	Mobile and Personal Communication systems and services	Raj Pandya	Prentice Hall of India.
4	Wireless and Digital Communications	Dr. Kamilo Feher	TMH



<b>Course Code</b>	<b>CSE326</b>
<b>Course Title</b>	<b>Block Chain</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	This course has no prerequisite other than knowledge of probability and statistics, and programming skills.
<b>Course Objectives</b>	The objective of this course is to teach students the architecture of blockchain. By taking this course, the students are expected to understand the basic algorithms, and be able to apply these techniques to financial service, supply chain.
<b>Course Outcome (CO)</b>	The learner will be able to- <ol style="list-style-type: none"> <li>1. Understand the basic architecture of blockchain.</li> <li>2. Understand theory of bitcoin.</li> <li>3. Describe components of blockchain.</li> <li>4. Explain applications of blockchain in financial service, supply chain.</li> </ol>

## SYLLABUS

### Unit-I

Introduction to Blockchain – I : Basics, History, Architecture, Conceptualization, Bitcoin basics.

### Unit-II

Consensus in Bitcoin – I (The Basics, PoW and Beyond, The Miners), Permissioned Blockchain (Basics, Consensus)

### Unit-III

Blockchain for Enterprise – Overview, Blockchain Components and Concepts, Hyperledger Fabric Transaction Flow, Hyperledger Fabric Details. Fabric – Membership and Identity Management

### Unit-IV

Blockchain Use Cases. Blockchain in Financial Service (Payments and Secure Trading, Compliance and Mortgage, Financial Trade). Blockchain in Supply Chain

Blockchain in Other Industries. Blockchain in Government (Advantages, Use Cases, Digital Identity)

<b>Course Code</b>	<b>CSE376</b>
<b>Course Title</b>	<b>ADVANCED DATABASE MANAGEMENT SYSTEM</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basic knowledge of Database and relational database management system
<b>Course Objectives</b>	This course is intended to provide an understanding of the current theory and practice of database management systems, a solid technical overview of database management systems. In addition to technical concerns, more general issues are emphasized. These include data independence, integrity, security, recovery, performance, database design principles and database administration.
<b>Course Outcome (CO)</b>	The learner will be able to- CO1: Explain the features of database management systems and Relational database. CO2: Analyze the existing design of a database schema using ER diagrams and apply concepts of normalization to design an optimal database. CO3: Identify the need of Concurrent transactions and locking and explain their types, advantages and disadvantages CO4: Formulate query, using SQL, solutions to a broad range of query and data update problems. CO5: Explain Spatial and Multimedia databases

### Syllabus

#### UNIT I

**Introduction :** Introduction to DBMS, RDBMS, Types of DBMS and their advantages and disadvantages, Types of relational query language, E-R Diagram, Keys, Normalization, Query optimization

**Transaction Processing and Concurrency Control:** Transaction Management, Concurrency Control and Serializability; Recoverability and Strictness; Two-phase locking, Multiple Granularity, Timestamp based Protocol.

**Database protection in RDBMS** –Integrity, Availability

#### UNITII

**Distributed Databases:** Basic concepts, structure, trade-offs Methods of data distribution – fragmentation, replication, design & advance concepts of DDBMS like Two-phase commit protocol, distributed transaction, distributed concurrency control, distributed deadlock handling.

**Introduction to object oriented databases:** Object Oriented Data model, Object Oriented Database Management System, Object Query Language, Object Oriented Relational Database Management System and its concepts.

#### UNIT III

**Data warehousing Concepts:** Architecture, Dataflows, Tools & Technologies, Data Marts, Data Mining and Online Analytical Processing.

**UNIT IV**

**Emerging Database Technologies:** Spatial & Multimedia databases, Mobile Computing & Mobile Databases

**New Topics and Applications:** (a) Information Retrieval (b) Bioinformatics (c) Incomplete and Uncertain Databases (d) Non-relational Databases, (e) Data Stream Management

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1	Advanced database management system	Rini Chakrabarti, Shilbhadra Das gupta	Wiley India Pvt. Ltd.
2	Distributed Databases	Ozsu and Valduriez	Pearson Education
3	Advanced Database Management System	Vaishali P.Yadav	Pearson Education India
4	Database System Concepts	Abraham Silberschatz, Henry F. Korth, S. Sudarshan	Tata McGraw-Hill
5	Database Management Systems	Raghu Ramakrishnan	Mc-Graw Hill



<b>Course Code</b>	<b>MDC018</b>
<b>Course Title</b>	<b>Gender, Culture &amp; Development</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	None
<b>Course Objectives</b>	The objective of this course is to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination
<b>Course Outcome (CO)</b>	Upon completion of this course, students will be able to 1. Understand basic gender concepts. 2. Explain gender roles and relationships matrix. 3. Identify Gender-based violence from a human rights perspective 4. Develop relationship between gender, development and violence

### Syllabus

#### UNIT I

Introduction to Gender : Definition of Gender , Basic Gender Concepts and Terminology , Exploring Attitudes towards Gender , Social Construction of Gender

#### UNIT II

Gender Roles and Relations :Types of Gender Roles , Gender Roles and Relationships Matrix , Gender-based Division and Valuation of Labour

#### UNIT III

Gender Development Issues :Identifying Gender Issues , Gender Sensitive Language , Gender, Governance and Sustainable Development , Gender and Human Rights

The concept of violence: Types of Gender-based violence, The relationship between gender, development and violence , Gender-based violence from a human rights perspective

#### UNIT IV

Gender and Culture : Gender and Film , Gender and Electronic Media , Gender and Advertisement 4, Gender and Popular Literature

<b>Course Code</b>	<b>CSE380</b>
<b>Course Title</b>	<b>Software Engineering Laboratory</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisites</b>	Knowledge of Program Development Constructs
<b>Course Objectives</b>	This practical course work allows the students to efficiently design a working software model.
<b>Course Outcome (CO)</b>	The student will be able to: CO1: Understand real time business requirements and design SRS document and Use Case model CO2: Understand notations used in UML diagrams and design UML Class Diagram, Interaction diagrams

**SYLLABUS**

Develop Use Case diagrams for selected Mini project

**1: Use Case Models**

1.1: To develop a problem statement.

1.2: Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).

1.3: Identify Use Cases and develop the Use Case model.

**2: UML Diagrams.**

2.1: Identify the conceptual classes and develop a domain model with UML Class diagram

2.2: Using the identified scenarios find the interaction between objects and represent them using Object diagrams.

2.3: Draw UML Interaction diagrams: Collaboration and sequence diagrams.

2.4: Draw the State Chart diagram.

2.5: Identify the business activities and develop an UML Activity diagram

**3: Implementations of Layers**

3.1: Draw Component diagrams.

3.2: Draw Deployment diagrams.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design	Jim Arlow, Ila Neustadt	Pearson Education
2	Practical Object-Oriented Design With UML	Priestley	Tata McGraw-Hill Education
3	Object-Oriented Software Engineering: Practical Software Development Using UML and Java	Lethbridge	Tata McGraw-Hill Education



<b>Subject Code</b>	<b>CSE382</b>
<b>Course Title</b>	<b>Internet Web Programming-Laboratory</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisite</b>	Basic knowledge of Program Development and Programming Language Constructs
<b>Course Objectives</b>	This course introduces advanced programming skills for website design. Dynamic content development will be explored through state of the art programming languages for the creation of interactive web sites. Students will create web pages that utilize the most current advances in web development.
<b>Course Outcomes (CO)</b>	The learner will be able to- 1. Implement interactive web page(s) using HTML, CSS and JavaScript. 2. Design a responsive web site using HTML5 and CSS3. 3. Describe and differentiate different Web Extensions and Web Services. 4. Build Dynamic web site using server side PHP Programming and Database connectivity.

## **SYLLABUS**

### **List of Practicals**

1. Configuration and administration Apache Web Server.
2. Develop an HTML page to demonstrate the use of basic HTML tags,
3. Develop an HTML page to demonstrate Link to different HTML page and also link within a page,  
Insertion of images.
4. Implement HTML List tags
5. Implement HTML table tags.
6. Develop a registration form by using various form elements like input box, text area, radio buttons,  
Check boxes etc.
7. Develop HTML webpage for implementation of Frames.
8. Design an HTML page by using the concept of internal, inline, external style sheets.
9. Create an HTML file to implement the styles related to text, fonts, links using cascading style sheets
10. Create an HTML file to implement the concept of document object model using JavaScript
11. Create an HTML page including JavaScript that takes a given set of integer numbers and shows  
them after sorting in descending order.
12. Create a PHP file to print any text using variable.
13. Demonstrate the use of Loops and arrays in PHP
14. Create a PHP file using GET and POST methods.

15. A simple calculator web application that takes two numbers and an operator (+, -, /, \* and %) from an HTML page and returns the result page with the operation performed on the operands.
16. Demonstrate the use of web site designing tools such as Joomla, WordPress.
17. Implement at least one minor project using different technologies mentioned in theory of the subject.

<b>Subject Code</b>	<b>CSE384</b>
<b>Course Title</b>	<b>Programming in Java Laboratory</b>
<b>Type of Course</b>	PC
<b>L T P</b>	0 0 2
<b>Credits</b>	1
<b>Course Prerequisite</b>	NA

## LIST OF PRACTICAL'S

- Implement a Java program demonstrating the difference between procedure- oriented programming and object-oriented programming paradigms.
- Create a Java class to demonstrate the concepts of classes, objects, and object references.
- Develop a Java application showcasing abstraction and encapsulation principles.
- Design a Java program illustrating inheritance, including different types like single, multilevel, hierarchical, and hybrid.
- Write a Java application demonstrating method overriding and overloading for achieving polymorphism.
- Develop a Java program to showcase the use of constructors, constructor overloading, and constructor overriding.
- Implement a Java class demonstrating the usage of access modifiers (private, public, protected, default).
- Create a Java program illustrating the use of the this keyword for referring to the current object.
- Develop a Java application showcasing the usage of the super keyword for invoking superclass constructors and methods.
- Write a Java program to demonstrate exception handling using try, catch, finally, throw, and throws keywords.
- Develop a Java application to showcase error and exception types, such as checked exceptions, unchecked exceptions, and errors.
- Implement a Java program demonstrating runtime polymorphism through method overriding.
- Write a Java application illustrating compile-time polymorphism through method overloading.
- Create a Java program demonstrating the implementation of multiple inheritance using interfaces.
- Design a Java application showcasing the usage of abstract classes and interfaces, highlighting their differences and similarities.

The logo of the University of Birmingham is a circular emblem. It features a central shield with a cross and a book, surrounded by a green wreath. The shield is set within a larger circular frame containing the text 'UNIVERSITY OF BIRMINGHAM' at the top and 'UNIVERSITY' at the bottom. Below the circle is a ribbon with the motto 'ALERE FLAMMAM SCIENTIAE'.

# *Seventh Semester*

<b>Course Code</b>	<b>CSE451</b>
<b>Course Title</b>	<b>Cryptography</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basic Knowledge of complexity theory, algorithms, game theory, machine learning
<b>Course Objectives</b>	This course work provides the thorough understanding of the network security and various cryptography techniques to obtain the security on network and a computer.
<b>Course outcome (CO)</b>	The learner will be able to- <ol style="list-style-type: none"> <li>1. Understand concepts related to security attacks, encryption, decryption techniques, substitution and transposition techniques.</li> <li>2. Describe principles of public key cryptography, RSA algorithm.</li> <li>3. Explain authentication requirements and use of hash function</li> </ol>

## SYLLABUS

### UNIT-I

**Introduction:** Attacks, Services and Mechanisms, Security attacks, security services, model for internet network security. Conventional Encryption: Conventional Encryption Model, steganography, Classical Encryption Techniques: Substitution Techniques, Transposition Techniques.

### UNIT-II

**Modern Encryption Techniques:** Simplified Data Encryption Standard, Block Cipher Principles.

**The Data Encryption Standard, Strength of DES.**

**Encryption Algorithms:** Triple DES, International Data Encryption Algorithm, Blowfish.

### UNIT-III

**Confidentiality using Conventional Encryption:** Placement of Encryption Function, Traffic Confidentiality, Key distribution, Random Number Generation.

**Public- Key Cryptography:** Principles of Public- Key Cryptosystems, RSA algorithm, Key Management, Diffie-Hellman Key.

### UNIT-IV

**Message Authentication and Hash Functions:** Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of hash Functions and MACs, Digital Signatures, Authentication Protocols, SHA-1, RC-4, RC-5.



<b>Course Code</b>	<b>CSE453</b>
<b>Course Title</b>	<b>Multimedia &amp; Animation</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basic knowledge of Computer Graphics & Image Processing.
<b>Course Objectives</b>	The main objective of the subject is to impart the knowledge about Animation execution, workflow & post-production
<b>Course Outcomes (CO)</b>	The learner will be able to- <ol style="list-style-type: none"> <li>1. Understand fundamentals of animation.</li> <li>2. Get knowledge of 3D Modeling tools</li> <li>3. Compare between Polygon Modeling and NURBS modeling</li> </ol>

**SYLLABUS**

**UNIT-I**

**Fundamentals of Animation:** Animation Drawings/Cells, Rough Drawings , Clean ups, Color reference drawings, Layout, Model Sheet, Key Drawing, Master Background, Concept Piece, Character drawing, Story Board.

**Modeling Concepts:** Introduction to Maya, Types of 3D Modeling, Advantages & Disadvantages, Difference between Polygon Modeling and NURBS modeling

**Texturing - Assigning Materials To Models:** UV texturing: Texturing of Characters and Props, Shading: Different Maya Shaders.

**UNIT-II**

**Lighting & Shadows:** Sources of light: Natural and artificial Lights, Types of lights in Maya, Types of Shadows in Maya.

**Rigging & Skinning of a Model:** Joints, Inverse Kinematics, Forward Kinematics. Types of Skinning.

**Animation Types:** Types of Animation. Stop motion vs. motion graphics.

**UNIT-III**

**Rendering Process:** Process, Types of Renderer.

**Data Management:** How to manage 3D Assets

**Compositing:** Basics of compositing, Chroma keying, Background colors, Even Lighting, Processing the video, Various Tools used.

**UNIT-IV**

**Music & Dubbing:** Process of adding music to the clip, Tools used for placing, editing the sound tracks.

**Editing Clips:** Process, Tools used for editing process.

**Output & Formats:** Types of Output formats, lossless and lossy compression techniques.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	3D Animation for the Raw Beginner Using Maya	Roger King	Chapman andHall
2	Editing Digital Video - The Complete Creativeand Technical Guide	Robert Goodman	McGraw-Hill
3	Maya Documentation	<a href="https://knowledge.autodesk.com">https://knowledge.autodesk.com</a>	Autodesk



SYLLABUS

<b>Course Code</b>	<b>CSE455</b>
<b>Course Title</b>	<b>Natural Language Processing</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Objectives</b>	The objective of this course is to provide knowledge of the fundamentals of speech and text processing
<b>Course Outcomes (CO)</b>	The learner will be able to- <ol style="list-style-type: none"> <li>1. Understand basic concepts of Natural language processing</li> <li>2. Explain Machine translation and speech recognition</li> </ol>

**UNIT-I**

**Introduction:** Natural Language Processing (NLP), Challenges of NLP, NLP applications, Processing of Indian Languages.

**UNIT-II**

**Structures:** Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on Noisy Texts in Web documents; Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.

**UNIT-III**

Understanding Part of Speech or Text Processing: Tokenization, Sentence segmentation or Splitting, Normalization

**UNIT-IV**

**Words and Word Forms:** Morphology fundamentals; Morphological Diversity of Indian Languages; Morphology Paradigms; Finite State Machine Based Morphology; Automatic Morphology Learning; Shallow Parsing; Named Entities; Maximum Entropy Models; Random Fields, Scope Ambiguity and Attachment Ambiguity resolution

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1	Natural Language Understanding	Allen, James	Second Edition, Benjamin/Cumming
2	Statistical Language Learning	Charniack, Eugene	MIT Press
3	Speech and Language Processing	Jurafsky, Dan and Martin, James	Second Edition, Prentice Hall
4	Foundations of Statistical Natural Language Processing	Manning, Christopher and Heinrich, Schutze	MIT Press.

<b>Course Code</b>	<b>CSE477</b>
<b>Course Title</b>	<b>Data mining in Business Intelligence</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basic knowledge of Computer Graphics & Image Processing.
<b>Course Objectives</b>	Students will be enabled to understand and implement classical models and algorithms in data mining.
<b>Course Outcomes (CO)</b>	The learner will be able to- <ol style="list-style-type: none"> <li>1. Understand Data mining and its scope.</li> <li>2. Understand various data mining techniques</li> <li>3. Describe supervised and unsupervised clustering techniques</li> <li>4. Illustrate applications of data mining using real life examples</li> </ol>

## SYLLABUS

### UNIT-I

Introduction to Data Mining: Introduction: Scope of Data Mining: What is Data Mining; How does Data Mining Works, Predictive Modeling: Data Mining and Data Warehousing: Architecture for Data Mining: Profitable Applications: Data Mining Tools: Data Preprocessing: Introduction, Data Preprocessing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

### UNIT-II

**Data Mining Techniques-** An Overview: Introduction, Data Mining, Data Mining Versus Database Management System, Data Mining Techniques- Association rules, Classification, Regression, Clustering, Neural networks.

### UNIT-III

**Clustering:** Introduction, Clustering, Cluster Analysis, Clustering Methods- K means, Hierarchical clustering, Agglomerative clustering, Divisive clustering, clustering and segmentation software, evaluating clusters.

### UNIT-IV

Applications of data mining: Introduction, Business applications using data mining- Risk Management and targeted marketing, Customer profiles and feature construction, Medical applications, Scientific applications using data mining

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1	Introduction to Data Mining	Pang-Ning Tan, Michael Steinbach, Vipin Kumar	Pearson Education India
2	Data Mining	Pieter Adrians, Dolf	Pearson Education

<b>Course Code</b>	<b>CSE401</b>
<b>Course Title</b>	<b>Data Visualization</b>
<b>Type of Course</b>	PC
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basic knowledge of computer system
<b>Course Objective (CO)</b>	The students will be able to represent any type of dataset in visual form. They will also be able to draw insights from the data. They will also learn about different python visualization libraries.
<b>Course Outcome (CO)</b>	The students will able to: CO1: Apply data visualizations in order to derive more meaning out of data. CO2: Understand python visualization libraries. CO3: Apply data visualization on different types of data. CO4: Perceive hidden meanings from data using data visualization.

### SYLLABUS

#### UNIT I

##### **The Computer and the Human**

Overview of Visualization, 2-D Graphics, SVG example, 2-D Drawing, 3-D Graphics, Photorealism, Non-Photorealism, the human retina: Perceiving Two Dimensions, Perceiving Perspective

#### UNIT II

##### **Visualization tools**

Line plots, area plots, histogram, bar charts, pie charts, scatter plots, bubble plots, waffle charts, word clouds

#### UNIT III

##### **Visualization of numerical data**

Introduction, Data, Mapping, Charts, Glyphs, parallel coordinates, Parallel coordinates, Stacked graphs, Tufte's Design Rules, Using Color

#### UNIT IV

##### **Visualization of non-numerical data**

Graphs and Networks, Embedding Planar Graphs, Graph Visualization, Tree Maps, Principal Component Analysis, Multidimensional Scaling

##### **Python visualization libraries**

matplotlib, pandas, seaborn, ggplot, plotly

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1.	Taming Python by Programming	Jeeva Jose	Khanna Book Publishing House
2.	Data Visualization with Python and JavaScript: Scrape, Clean, Explore & Transform Your Data	Kyran Dale	O'Reilly, 2016



<b>Course Code</b>	<b>CSE403</b>
<b>Course Title</b>	<b>Cyber security</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basic knowledge of computer system
<b>Course Objective (CO)</b>	The main aim of this course is to provide knowledge about how to secure our data on the Internet.
<b>Course Outcome (CO)</b>	The students will able to: <ol style="list-style-type: none"> <li>1. Implement cyber security best practices and risk management</li> <li>2. Integrate network monitoring and present real-time solutions</li> <li>3. Impact cyber security risk in an ethical, social, and professional manner.</li> <li>4. Learn basics of cyber laws and cyber forensic</li> </ol>

### SYLLABUS

#### **UNIT I:**

**Introduction to Cyber Security:** Overview of Cyber Security, Cyber Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage

**Cyber Security Vulnerabilities and Cyber Security Safeguards:** Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.

#### **UNIT II:**

**Securing Web Application, Services and Servers:** Introduction, Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges.

**Intrusion Detection and Prevention:** Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques, Anti-Malware software, Network based Intrusion detection Systems, Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation.

#### **UNIT III:**

**Cryptography and Network Security:** Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec.

#### **UNIT IV:**

**Cyberspace and the Law:** Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013.

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1.	Cybersecurity and Cyberwar: What Everyone Needs to Know®	Allan Friedman and P. W. Singer	Oxford University Press
2.	Cybersecurity for Beginners	Raef Meeuwisse	Cyber Simplicity Limited
3.	Cybersecurity Essentials	Charles J. Brooks, Christopher Grow, Donald Short, and Philip Craig	Sybex

<b>Course Code</b>	CSE405
<b>Course Title</b>	Big Data Analytics
<b>Type of Course</b>	PC
<b>L T P</b>	4:0:0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Nil
<b>Course Objectives</b>	Study the requirements of non-traditional large-scale data applications
<b>Course Outcomes (CO)</b>	The Learner will be able to : CO1: Understand concepts of Big Data. CO2: Analyze data used in Hadoop Architecture. CO3: Perform Text Analytics and understand JSON, NOSQL. CO4: Solve Conventional System, and limitations

### SYLLABUS

#### UNIT-I

**DBMS Overview** Introduction to big data, Handling and Processing Big Data, Methodological Challenges and Problems, Benefits and challenges of big data, Examples.

#### UNIT-II

**Analysis of data at Rest- Hadoop analytics:** Limitations of existing distributing systems, Hadoop Approach, Hadoop Architecture, Distributed file system: HDFS and GPFS, Internals of Hadoop MR engine, Need for High level language- JAQL and PIG.

#### UNIT-III

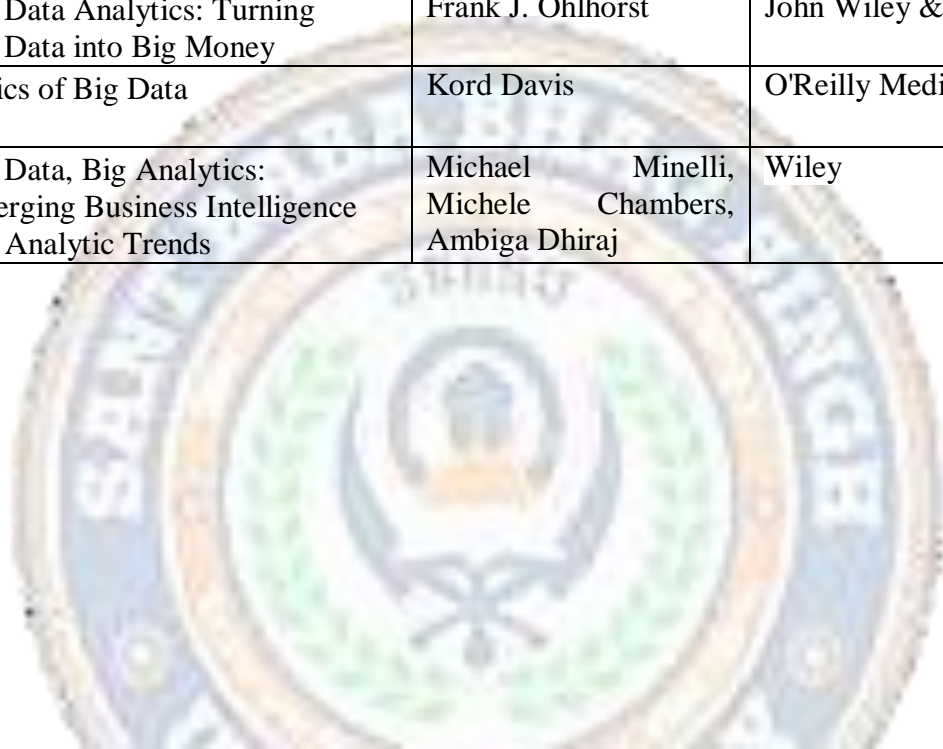
**Introduction to Text Analytics:** Using Regular expressions, Using AQL, Sentiment analysis  
**No SQL:** JSON store, MongoDB, RDF, HBASE

#### UNIT-IV

**Analytics:** Clustering, Classification, Segmentation, Linear regression, ML Search: Indexing and Indexing Techniques, Create inverted index using JAQL, Lab using Data Explorer Bundling Hadoop job: Application, Use BI tooling to create application, Publish applications. Analysis of data in motion – Real time analytics

Introduction to streams computing, Challenges/limitations of conventional Systems, Solving a real time analytics problem using conventional system, Challenges to be solved - scalability, thread pooling, etc., Understanding the challenges in handling streaming data from the real world and how to address those using stream computing, Benefits of stream computing in Big Data world, Realtime Analytics Platform(RTAP).

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data	Chris Eaton, Paul Zikopoulos	McGraw-Hill
2	Big Data Analytics: Turning Big Data into Big Money	Frank J. Ohlhorst	John Wiley & Sons
3	Ethics of Big Data	Kord Davis	O'Reilly Media
4	Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends	Michael Minelli, Michele Chambers, Ambiga Dhiraj	Wiley



<b>Course Code</b>	<b>MDC007</b>
<b>Course Title</b>	<b>Managing Innovation and Entrepreneurship</b>
<b>Type of Course</b>	MDC
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	NIL
<b>Course Objectives</b>	Foundations of Entrepreneurship Concept ,innovation management- definition and process of innovation management methods of management innovation Women entrepreneurs& Entrepreneurship Development
<b>Course Outcomes (CO)</b>	

**SYLLABUS**

**UNIT-I**

Foundations of Entrepreneurship Concept , Need, Definition& role of Entrepreneurship, Definition, characteristics& scope of Entrepreneur, Innovation, Invention, Creativity, Opportunities , Concepts of Entrepreneur, Manager, Intrapreneur / Corporate Entrepreneur comparative study, Roles& Responsibilities. Role of entrepreneur in Indian economy,

**UNIT-II**

Women entrepreneurs & Entrepreneurship Development Meaning, role, problems& reasons for less women entrepreneurs. Various institutes & Govt schemes to help & uplift women entrepreneurs. Case studies for successful women entrepreneurs. Concept, need & role of Entrepreneurship Development

**UNIT-III**

Small& Medium Enterprises: Small & Medium Industry: Meaning and importance Definition of SME –role & importance in India Economy, Steps for Starting Small Industry: Decisions to become entrepreneur -Steps to be taken-Search for a business idea, source of ideas, idea processing, selection idea, input requirements

**UNIT-IV**

Innovation management- definition and process of innovation management methods of management innovation. Entrepreneurship as a career, Sustaining Competitiveness Maintaining competitive advantage

<b>RECOMMENDED BOOKS</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
1	Renu arora, S.K sood	Fundamentals of Entrepreneurship	Kalyani Publishers
2	Richard Branson	Entrepreneurship and Business	Pearson



<b>Course Code</b>	<b>CSE407</b>
<b>Course Title</b>	<b>Pattern Recognition</b>
<b>Type of Course</b>	PC
<b>L T P</b>	4 0 0
<b>Credits</b>	4
<b>Course Prerequisites</b>	Nil
<b>Course Outcomes (CO)</b>	The learner will be able to 1. Understand the requirements of the project 2. Prepare Report 3. Present Findings before the department

### UNIT I

Principles of pattern recognition: Uses, mathematics, Classification and Bayesian rules, Clustering vs classification, Basics of linear algebra and vector spaces, Eigen values and eigen vectors, Rank of matrix and SVD

### UNIT II

Bayesian decision theory, Classifiers, Discriminant functions, Decision surfaces, Parameter estimation methods, Hidden Markov models, dimension reduction methods, Fisher discriminant analysis, Principal component analysis, non-parametric techniques for density estimation, non-metric methods for pattern classification, unsupervised learning, algorithms for clustering: K-means, Hierarchical and other methods

### UNIT III

Problem statement and uses, Branch and bound algorithm, Sequential forward and backward selection, Cauchy Schwartz inequality, Feature selection criteria function: Probabilistic separability based and Interclass distance based, Feature Extraction: principles

Human visual recognition system, Recognition methods: Low-level modelling (e.g. features), Mid-level abstraction (e.g. segmentation), High-level reasoning (e.g. scene understanding);

Detection/Segmentation methods; Context and scenes, Importance and saliency, Large-scale search and recognition, Egocentric vision, systems, Human-in-the-loop interactive systems, 3D scene understanding.

### UNIT IV

Comparison between performance of classifiers, Basics of statistics, covariance and their properties, Data condensation, feature clustering, Data visualization, Probability density estimation, Visualization and Aggregation, FCM and soft-computing techniques, Examples of real-life datasets.



<b>Course Code</b>	<b>CSE485</b>
<b>Course Title</b>	<b>Six Weeks Industrial Training Evaluation (Undertaken after 6<sup>th</sup> semester)</b>
<b>Type of Course</b>	SEC III
<b>L T P</b>	
<b>Credits</b>	4
<b>Course Prerequisites</b>	Basics of programming and software development
<b>Course Objectives</b>	To enhance programming skills of a learner, so that the learner finds solutions to problems. He also gets industrial experience of software development
<b>Course Outcomes- (CO)</b>	The learner will be able to- <ol style="list-style-type: none"> <li>1. implement software using proper software life cycle models</li> <li>2. works with latest IT tools</li> <li>3. Develop team leadership</li> </ol>

The six weeks industrial training will give exposure to the practical aspects of the discipline, in real time working scenario. In addition, the student may also work on a specified task or project which may be assigned to him/her, by the industry person. The student will maintain the daily diary which will have signature of industry expert, assigned to him/ her. This daily diary will be produced by the student during practical examinations, as and when scheduled by the institute. The department will evaluate student performance based on his/her project report, running software code, CD containing code and daily diary.



***Eighth  
Semester***

<b>Course Code</b>	<b>CSE466</b>
<b>Course Title</b>	<b>Six Months Industrial Training</b>
<b>Type of Course</b>	Training
<b>L T P</b>	
<b>Credits</b>	20
<b>Course Prerequisites</b>	Basics of programming and software development
<b>Course Objectives</b>	To enhance programming skills of a learner, so that the learner finds solutions to problems. He also gets industrial experience of software development
<b>Course Outcomes- (CO)</b>	The learner will be able to- <ol style="list-style-type: none"> <li>1. implement software using proper software life cycle models</li> <li>2. works with latest IT tools</li> <li>3. Develop team leadership</li> </ol>

The six months industrial training will give exposure to the practical aspects of the discipline, in real time working scenario. In addition, the student may also work on a specified task or project which may be assigned to him/her, by the industry person. The student will maintain the daily diary which will have signature of industry expert, assigned to him/ her. This daily diary will be produced by the student during mid semester viva voce and internal and external end semester practical examinations, as and when scheduled by the institute. The department will get the marks assigned by the industry expert, against student performance or evaluation. The outcome of the internship should be presented in the form of a project report, running software code, CD containing code and project report, daily diary.

***OPEN  
ELECTIVES***

<b>Course Code</b>	<b>CSE481</b>
<b>Course Title</b>	<b>Basics Concepts Of Database Management System</b>
<b>Type of Course</b>	<b>OE</b>
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Elementary knowledge about computers including some experience using Windows. Basic knowledge about programming in some common programming language.
<b>Course Objectives</b>	This subject assesses new developments in database technology. It Interpret and explain the impact of emerging database standards and Evaluate the contribution of database theory to practical implementations of database management systems
<b>Course Outcome(CO)</b>	The learner will be able to- <ol style="list-style-type: none"> <li>1. Understand basic concepts of database</li> <li>2. Develop and Design ER diagram</li> <li>3. Develop Relational database management system using constraints and normalization concepts</li> <li>4. Implement security issues on the developed databases</li> </ol>

*SYLLABUS*

**UNIT-I**

**Introduction to Databases and Transactions:** Basic concepts of database, Need of database system, File based system, view of data, database architecture,

**Data Models:** The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

**Database Design ER-Diagram:** Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas.

**UNIT-II**

**Relational database Model:** Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization.

**Relational Algebra and Calculus:** Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational \_Calculus, calculus vs algebra, computational capabilities.



**UNIT-III**

**Constraints, Views and SQL:** Database Languages, Constraints and its types, Integrity constraints, Views: Introduction to views, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values.

**UNIT-IV**

**Transaction management and Concurrency control:** Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management

**Database Security and Authorization:** Introduction to Database Security Issues, Discretionary Access Control Based on Granting/Revoking of Privileges.

**RECOMMENDED BOOKS**

Sr. no.	Name	Author(S)	Publisher
1	Fundamentals of Database Systems, Third Edition	Elmasri/Navathe	Addison Wesley
2	Database Concepts	Korth and Silberschatz Abraham	McGraw Hall
3	An introduction to Database Systems	C.J.Date.	Addison Wesley
4	An introduction to Database Systems	Bipin C. Desai.	West Publishing
5	SQL,PL/SQL ,The programming language of oracle	Ivan Bayross	BPB Publication

<b>Course Code</b>	<b>CSE483</b>
<b>Course Title</b>	<b>Fuzzy logic</b>
<b>Type of Course</b>	OE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basic knowledge about programming in some common programming language.
<b>Course Outcomes (CO)</b>	The learner will be able to <ol style="list-style-type: none"> <li>1. Understand concepts of Fuzzy logic and fuzzy set operations.</li> <li>2. Understand and describe operations on fuzzy relations.</li> <li>3. Explain features of the membership function</li> <li>4. Implement conversion of fuzzy to crisp using fuzzy arithmetic</li> </ol>

## SYLLABUS

### UNIT-I

*Introduction, Classical Sets and Fuzzy Sets*

Background, Uncertainty and Imprecision, Statistics and Random Processes, Uncertainty in Information, Fuzzy Sets and Membership, Chance versus Ambiguity. Classical Sets - Operations on Classical Sets, Properties of Classical (Crisp) Sets, Mapping of Classical Sets to Functions Fuzzy Sets - Fuzzy Set operations, Properties of Fuzzy Sets. Sets as Points in Hypercubes

### UNIT-II

#### **Classical Relations and Fuzzy Relations**

Cartesian Product, Crisp Relations- Cardinality of Crisp Relations, Operations on Crisp Relations, Properties of Crisp Relations, Composition. Fuzzy Relations - Cardinality of Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Product and Composition.

### UNIT-III

#### **Membership Functions**

Features of the Membership Function, Standard Forms and Boundaries, Fuzzification, Membership Value Assignments – Intuition, Inference, Rank Ordering, Angular Fuzzy Sets, Neural Networks, Genetic Algorithms, Inductive Reasoning.

## UNIT-IV

Fuzzy-to-Crisp Conversions, Fuzzy Arithmetic, Defuzzification Methods Extension Principle - Crisp Functions, Mapping and Relations, Functions of fuzzy Sets.

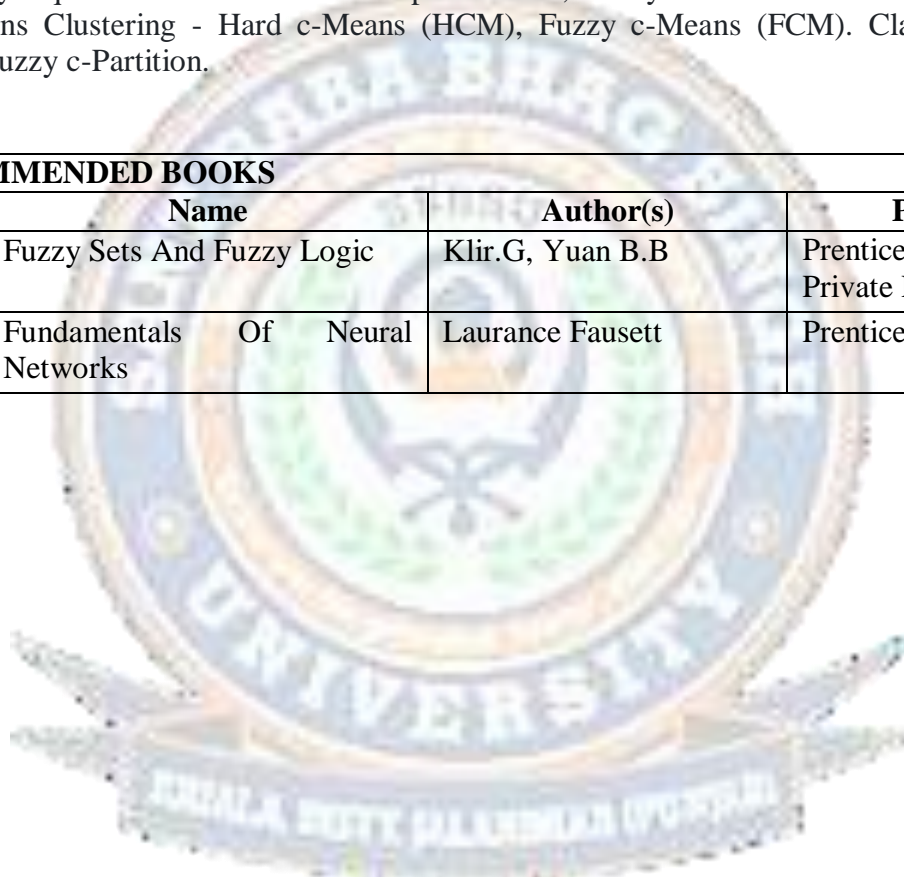
### *Fuzzy Rule- Based Systems*

Rule-Based Systems - Canonical Rule Forms, Decomposition of Compound Rules, Likelihood and Truth Qualification, Aggregation of Fuzzy Rules, Graphical Techniques of Inference

### *Fuzzy Classification*

Classification by Equivalence Relations - Crisp Relations, Fuzzy Relations. Cluster Analysis, Cluster Validity, c-Means Clustering - Hard c-Means (HCM), Fuzzy c-Means (FCM). Classification Metric, Hardening the Fuzzy c-Partition.

<b>RECOMMENDED BOOKS</b>			
<b>S.No.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
<b>1</b>	Fuzzy Sets And Fuzzy Logic	Klir.G, Yuan B.B	Prentice Hall Of India Private Limited, 1997
<b>2</b>	Fundamentals Of Neural Networks	Laurance Fausett	Prentice Hall



<b>Course Code</b>	<b>CSE482</b>
<b>Course Title</b>	<b>Software Testing and Quality Management</b>
<b>Type of Course</b>	OE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Software Engineering
<b>Course Objectives</b>	The objective of Software Quality Management (SQM) is to manage the quality of software and of its development process. A quality product is one which meets its requirements and satisfies the user.
<b>Course Outcome (CO)</b>	The student will be able to- CO1: Understand Components for Software Quality Components CO2: Evaluate and maintain project progress control CO3: Identify Need of ISO certifications CO4: Explain various software testing techniques

## SYLLABUS

### UNIT I

**Introduction:** The Software Quality Challenge, Software Quality Factors, Components of the Software Quality Assurance System. Pre-Project Software Quality Components, Contract Review, Development and Quality Plans.

**Software Quality Assurance Components In The Project Life Cycle:** Integrating Quality Activities in the Project Life Cycle – Reviews, Software Testing, Strategies, Software Testing –Implementation, Assuring the Quality of Software Maintenance, Assuring The Quality of External Participants' Parts, Case Tools and their Affect on Software Quality.

### UNIT II

**Software Quality Infrastructure Components:** Procedures and Work Instructions, Supporting Quality Devices, Staff Training, Instructing and Certification, Preventive and Corrective Actions, Configuration Management, Documentation and Quality Records Controls.

**Software Quality Management Components:** Project Progress Control, Components, Internal & External Participants, Progress control regimes, Computerized tools, Software Quality Metrics – Objective, Classification, Process & Product Metrics, Implementation & Limitation of Software Metrics, Software Quality Costs, Objective, Classification Model of cost, Extended Model and Applications.

### UNIT III

**Standards, Certification And Assessment:** SQA Standards, ISO9001 Certification, Software Process Assessment. Organizing for Quality Assurance, Management and its Role in Quality Assurance, The Software Quality Assurance Unit, SQA Trustees and Committees

### UNIT IV

**Testing:** Black Box Testing, White Box Testing, Test Case Selection And Adequacy, Test Execution: Overview; Test specification and cases; Adequacy criteria; Comparing criteria; Overview of test execution; From test case specification to test cases; Scaffolding; Generic versus specific scaffolding; Test oracles; Self-checks as oracles; Capture and replay.



**PROCESS:** Test and analysis activities within a software process: The quality process; Planning and monitoring; Quality goals; Dependability properties; Analysis; Testing; Improving the process; Organizational factors. Acceptance and Regression Testing.

**RECOMMENDED BOOKS**

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Foundations of Software Testing	Aditya P Mathur	Pearson Education
2	Software Testing and Analysis Process Principles and Techniques	Mauro Pezze	Wiley India



<b>Course Code</b>	<b>CSE484</b>
<b>Course Title</b>	<b>Data Warehouse</b>
<b>Type of Course</b>	OE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	NIL
<b>Course Objectives</b>	This course introduces advanced aspects of data warehousing and data mining, encompassing the principles, research results and commercial application of the current technologies
<b>Course Outcomes (CO)</b>	The student will be able to- CO1: Understand characteristics and functionality of data warehouse CO2: Explain architecture of Data warehouse CO3: Explain types of OLAP architectures. CO4: Explain schemas in data warehouse

## SYLLABUS

### UNIT-I

Data Warehouse Fundamentals: Introduction to Data Warehouse, OLTP Systems; Differences between OLTP Systems and Data Warehouse: Characteristics of Data Warehouse; Functionality of Data Warehouse: Advantages and Applications of Data Warehouse; Advantages, Applications: Top- Down and Bottom-Up Development Methodology: Tools for Data warehouse development: Data Warehouse Types:

### UNIT-II

Planning and Requirements: Introduction: Planning Data Warehouse and Key Issues: Planning and Project Management in constructing Datawarehouse: Data Warehouse Project; Data Warehouse development Life Cycle, Kimball Lifecycle Diagram, Requirements Gathering Approaches: Team organization, Roles, and Responsibilities:

### UNIT-III

Data Warehouse Architecture: Introductions, Components of Data warehouse Architecture: Technical Architectures; Data warehouse architectures. OLAP Architectures; MOLAP, ROLAP, HOLAP: Data Warehouse and OLAP:Hypercube & Multicubes.

### UNIT-IV

Dimensional Modeling: Introduction: E-R Modeling: Dimensional Modeling: E-R Modeling VS Dimensional Modeling: Data Warehouse Schemas; Star Schema, Inside Dimensional Table, Inside Fact Table, Fact Less Fact Table, Granularity, Star Schema Keys: Snowflake Schema: Fact and Constellation Schema



**RECOMMENDED BOOKS**

Name	AUTHOR(S)	PUBLISHER
Data Warehousing, Data Mining & OLAP	A. Berson, S.J. Smith	Tata McGraw-Hill
Data Mining – Concepts and Techniques	Jiawei Han and Micheline Kamber	Elsevier India



<b>Course Code</b>	<b>CSE486</b>
<b>Course Title</b>	<b>Image Analysis</b>
<b>Type of Course</b>	<b>OE</b>
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Computer fundamentals
<b>Course Objectives</b>	To make students familiar with the various fundamentals & and processes involved in the processing of an image.
<b>Course Outcome (CO)</b>	The learner will be able to- <ol style="list-style-type: none"> <li>1. Understand basic concepts of digital image processing</li> <li>2. Describe image enhancement techniques</li> <li>3. Explain image restoration and compression using degradation models</li> </ol>

## SYLLABUS

### UNIT -I

Digital Image Fundamentals & Transforms: Introduction, Background, Digital Image Representation, Fundamental Steps in Image Processing, Elements of a Digital Image Processing System. Elements of Visual Perception, Sampling and Quantization, Basic Relationships between Pixels, Imaging Geometry. Introduction to the Fourier Transform, The Discrete Fourier Transform, Some Properties of the Two-Dimensional Fourier Transform.

### UNIT-II

Image Enhancement: Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity Transformations, Histogram Processing, Image Subtraction, Image Averaging, Smoothing Filters, Sharpening Filters, Low pass Filtering, High pass Filtering.

### UNIT-III

Image Restoration & Compression: Degradations Model - Definitions, Degradation Model for Continuous, Restoration in the Spatial Domain, Geometric Transformation. Error free compression, Variable-Length Coding, Bit-Plane Coding, Lossless Predictive Coding. Lossy Compression – Lossy Predictive Coding, Transform Coding.

### UNIT-IV

Image Segmentation & Representation: Edge Detection, Thresholding, Region-Based Segmentation. Image Representation, Boundary and Regional Descriptors, Relational Descriptors. Object Recognition: Pattern and pattern classes, recognition based on Decision Theoretic Methods, Structural Methods.

**RECOMMENDED BOOKS**

S. No	Name	Author(S)	Publisher
1	Digital Image Processing	Rafael. C. Gonzalez & Richard E. Woods	Pearson Education
2	Digital Image Processing	W.K.Pratt.	John Wiley & sons
3	Image Processing Analysis and Machine Vision	M. Sonka	Thomson Learning



<b>Course Code</b>	<b>CSE488</b>
<b>Course Title</b>	<b>Grid Computing</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Knowledge of database management and networking
<b>Course Objectives (CO)</b>	To get an overview about system infrastructure of grid. Also to learn about the current architecture, services and instantiations of the Grid.
<b>Course Outcomes-</b>	The student will be able to 1. Understand parallel and distributed computing 2. Explain grid monitoring systems 3. Explain data management and grid security

**SYLLABUS**

**UNIT I**

**Concepts and Architecture:** Introduction, Parallel and Distributed Computing, Cluster Computing, Grid Computing, Anatomy and Physiology of Grid, Review of Web Services, OGSA, WSRF

**UNIT II**

**Grid Monitoring:** Grid Monitoring Architecture (GMA), An Overview of Grid Monitoring Systems- Grid ICE, JAMM, MDS, Network Weather Service, R-GMA, Other Monitoring Systems, Ganglia and GridMon

**UNIT III**

**Grid security and resource management:** Grid Security, Brief Security Primer, PKI, X509 Certificates, Grid Security, Grid Scheduling and Resource Management, Scheduling Paradigms, Working principles of Scheduling, A Review of Condor, SGE, PBS and LSF - Grid Scheduling with QoS.

**UNIT IV**

**Data Management and Grid portals:** Data Management, Categories and Origins of Structured Data, Data Management Challenges, Architectural Approaches, Collective Data Management Services, Federation Services, Grid Portals, First-Generation Grid Portals, Second-Generation Grid Portals

**Grid middleware:** List of globally available Middle wares, Case Studies, Recent version of Globus Toolkit and gLite - Architecture, Components and Features.

**RECOMMENDED BOOKS**

<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1	The Grid Core Technologies	Maozhen Li, Mark Baker	John Wiley & Sons
2	The Grid 2 – Blueprint for a New Computing Infrastructure	Ian Foster & Carl Kesselman	Morgan Kaufman
3	Grid Computing	Joshy Joseph & Craig Fellenstein	Pearson Education
4	Grid Computing: Making the Global Infrastructure a reality	Fran Berman, Geoffrey Fox, Anthony J.G.Hey	John Wiley and sons



# Programme Code: UG056

<b>Course Code</b>	<b>CSE490</b>
<b>Course Title</b>	<b>ECOMMERCE AND ERP</b>
<b>Type of Course</b>	PE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Basics of Internet
<b>Course Objectives (CO)</b>	This course examines the evolution of enterprise resource planning(ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project.
<b>Course Outcomes</b>	The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

## SYLLABUS

### UNIT I

**Introduction and Concepts Networks and commercial transactions** - Internet and other novelties; Networks and electronic transactions today, Model for commercial transactions; Internet environment - internet advantage, world wide web and other internet sales venues; Online commerce solutions. Security Technologies: Why is internet insecure? A brief introduction to Cryptography; Public key solution. Digital payment systems; First virtual internet payment system; cyber cash model Operational process of Digicash, Ecash Trail; Using Ecash; Smart cards; Electronic Data Interchange: Its basics; EDI versus Internet and EDI over Internet.

### UNIT II

**Introduction ERP An Overview, Enterprise-An Overview**, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT & Kanban, CAD/CAM.

### UNIT III

**ERP Implementation** - ERP Implementation Lifecycle, Implementation Methodology, Not all Packages are Created Equal!, ERP Implementation-The Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring, After ERP Implementation.

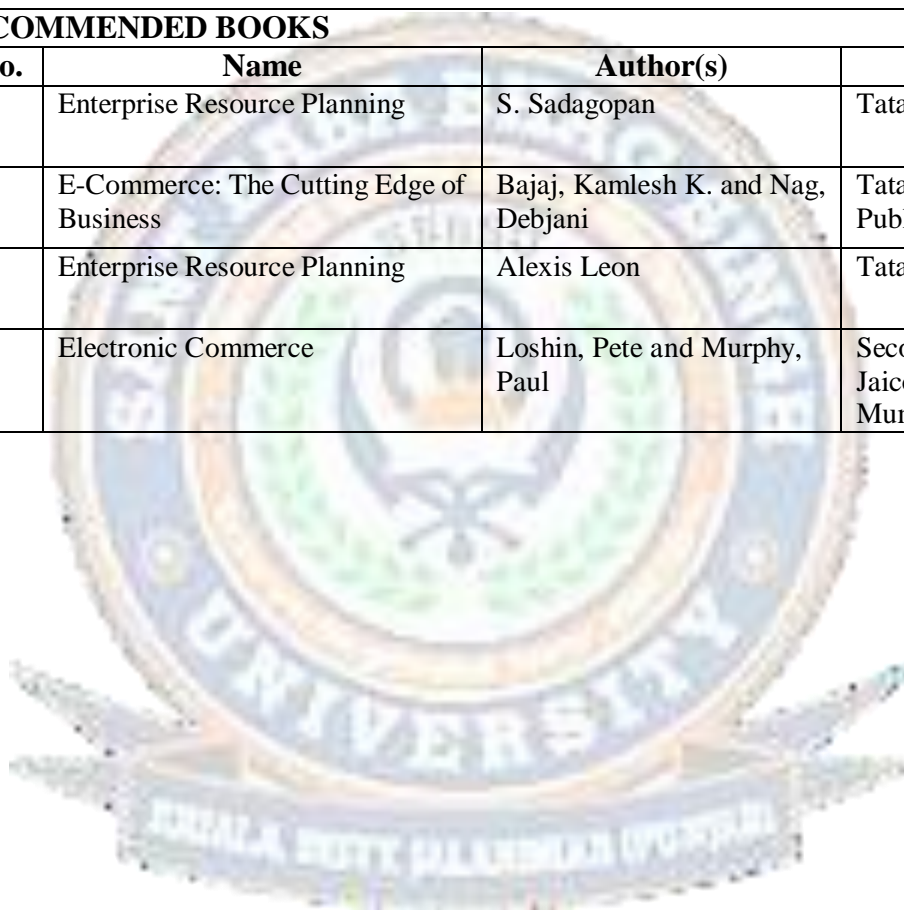
### UNIT IV

**The Business Modules**- Business Modules in an ERP Package, Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution



## Programme Code: UG056

<b>RECOMMENDED BOOKS</b>			
<b>S.No.</b>	<b>Name</b>	<b>Author(s)</b>	<b>Publisher</b>
<b>1</b>	Enterprise Resource Planning	S. Sadagopan	Tata McGraw Hill 2000
<b>2</b>	E-Commerce: The Cutting Edge of Business	Bajaj, Kamlesh K. and Nag, Debjani	Tata McGraw-Hill Publishing Company
<b>3</b>	Enterprise Resource Planning	Alexis Leon	Tata McGraw Hill 2001
<b>4</b>	Electronic Commerce	Loshin, Pete and Murphy, Paul	Second edition, 1990, Jaico Publishing House, Mumbai



## Programme Code: UG056

<b>Course Code</b>	<b>CSE492</b>
<b>Course Title</b>	<b>Network Security</b>
<b>Type of Course</b>	OE
<b>L T P</b>	3 0 0
<b>Credits</b>	3
<b>Course Prerequisites</b>	Computer Networks
<b>Course Objectives</b>	It aims to introduce students to the fundamental techniques used in implementing secure network communications, and to give them an understanding of common threats and attacks.
<b>Course Outcomes (CO)</b>	The student will be able to- CO1: Understand basic concepts and security in network technology CO2: Explain IPv6 CO3: Explain classical encryption techniques CO4: Illustrate applications of Network Security

### UNIT- I

**Introduction to Network Technology:** SLIP/PPP Dedicated lines, BOOTP, DHCP, Domain management (DNS), Transport Layer issues, TCP/IP, Gateway, Dial-up, Internet networking TCP/IP protocols, IP addressing.

### UNIT-II

**Basics of Network security-** Fundamentals of network security, Basics of IPv6, IPsec:overview of IPsec, IP and IPv6, Authentication header (AH), Encapsulating Security Payload (ESP).

**Security Trends** – Attacks and services, Classical crypto systems, Different types of ciphers, LFSR sequences, Basic Number theory, Congruences, Chinese Remainder theorem, Modular exponentiation, Fermat and Euler's theorem, Legendre and Jacobi symbols, Finite fields, continued fractions.

### UNIT-III

**Model of Network security-** Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Block Cipher and the Data Encryption Standard - Modes of operation, Triple DES, AES, RC4, RSA, Attacks, Primality test, Factoring.

**Discrete Logarithms** –Digital signatures, RSA, ElGamal, DSA, Unwanted traffic: denial of service attacks.

### UNIT-IV

**Authentication applications** – Kerberos, X.509, PKI, Electronic Mail security, PGP, S/MIME, IP security, Web Security, SSL, TLS, SET.

## Programme Code: UG056

**System Security** – Intruders, Malicious software, viruses, Firewalls and filters, Security Standards.

<b>RECOMMENDED BOOK</b>			
<b>Sr. no.</b>	<b>Name</b>	<b>AUTHOR(S)</b>	<b>PUBLISHER</b>
1	Network Security and Ethical Hacking	Rajat Khare	Luniver Press
2	Cryptography and Network Security	AtulKahate	Tata Mc-Graw Hill
3	Computer Networks	A.S Tanenbaum	Pearson

Programme Code: UG056