

# ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES (Autonomous)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
B TECH COURSE PROPOSED SCHEME UNDER AUTONOMOUS SYSTEM 2015-16

## 1<sup>st</sup> Year Semester I

BS: Basic Sciences; ES : Engineering Sciences; HS : Humanities and Social Sciences; PC : Professional Core;  
PE:Professional Elective; OE:Open Elective; PW: Project Work; IT: Industrial Training; AC: Audit Course

CODE NO	SUBJECT NAME	Instruction Periods per week					Max Marks		Credits
		Category	Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	
CSE111	ENGLISH	HS	3	1	-	4	40	60	3
CSE112	ENGINEERING MATHEMATICS-I	HS	3	1	-	4	40	60	3
CSE113	ENGINEERING CHEMISTRY	BS	3	1	-	4	40	60	3
CSE114	PROFESSIONAL ETHICS & HUMAN VALUES	HS	2	1	-	3	100	-	2
CSE115	BASIC ELECTRONICS ENGINEERING	ES	3	1	-	4	40	60	3
CSE116	ENGINEERING CHEMISTRY LAB	BS	-	-	3	3	50	50	2
CSE117	PROGRAMMING WITH C-LAB	PC	-	2	3	5	50	50	3
CSEAC1	NCC/NSS/SPORTS	AC	-	-	3	3	-	-	0
<b>Total</b>			<b>14</b>	<b>7</b>	<b>9</b>	<b>30</b>	<b>360</b>	<b>340</b>	<b>19</b>

## 1<sup>st</sup> Year Semester II

CODE NO	SUBJECT NAME	Instruction Periods per week					Max Marks		Credits
		Category	Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	
CSE121	ENGINEERING MATHEMATICS-II	HS	3	1	-	4	40	60	3
CSE122	ENGINEERING PHYSICS	BS	3	1	-	4	40	60	3
CSE123	ENVIRONMENTAL SCIENCES	HS	3	1	-	4	40	60	3
CSE124	ENGINEERING DRAWING	ES	1	-	3	4	40	60	3
CSE125	ELEMENTS OF ELECTRICAL ENGINEERING	ES	3	1	-	4	40	60	3
CSE126	ENGINEERING PHYSICS LAB	BS	-	-	3	3	50	50	2
CSE127	LANGUAGE LAB	HS	-	-	3	3	50	50	2
CSE128	OBJECT ORIENTED PROGRAMMING WITH C++ --LAB	PC	-	2	3	5	50	50	3
CSE129	WORKSHOP	ES	-	-	3	3	50	50	2
CSEAC2	NCC/NSS/SPORTS	AC	-	-	3	3	-	-	0
<b>Total</b>			<b>13</b>	<b>6</b>	<b>18</b>	<b>37</b>	<b>400</b>	<b>500</b>	<b>24</b>

## 2<sup>nd</sup> Year Semester I

CODE NO	SUBJECT NAME	Instruction Periods per week					Max Marks		Credits
		Category	Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	
CSE211	DATA STRUCTURES & ALGORITHMS	PC	4	1	-	5	40	60	4
CSE212	DIGITAL LOGIC DESIGN	ES	3	1	-	4	40	60	3
CSE213	DISCRETE MATHEMATICAL STRUCTURES	HS	4	1	-	5	40	60	4
CSE214	OBJECT ORIENTED PROGRAMMING WITH JAVA	PC	3	1	-	4	40	60	3
CSE215	PROBABILITY, STATISTICS & QUEUING THEORY	HS	4	1	-	5	40	60	4
CSE216	DATA STRUCTURES LAB	PC	-	-	3	3	50	50	2
CSE217	DIGITAL ELECTRONICS LAB	ES	-	-	3	3	50	50	2
CSE218	JAVA LAB	PC	-	-	3	3	50	50	2
<b>Total</b>			<b>18</b>	<b>5</b>	<b>9</b>	<b>32</b>	<b>350</b>	<b>450</b>	<b>24</b>

## 2<sup>nd</sup> Year Semester II

CODE NO	SUBJECT NAME	Instruction Periods per week					Max Marks		Credits
		Category	Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	
CSE221	DATA COMMUNICATIONS	PC	4	1	-	5	40	60	4
CSE222	MICROPROCESSORS AND INTERFACING	PC	3	1	-	4	40	60	3
CSE223	OPERATING SYSTEMS	PC	4	1	-	5	40	60	4
CSE224	COMPUTER ORGANIZATION	PC	4	1	-	5	40	60	4
CSE225	FORMAL LANGUAGES AND AUTOMETA THEORY	PC	4	1	-	5	40	60	4
CSE226	MICROPROCESSOR & INTERFACING LAB	PC	-	-	3	3	50	50	2
CSE227	OPERATING SYSTEMS LAB	PC	-	-	3	3	50	50	2
CSE228	HARDWARE LAB	PC	-	-	3	3	50	50	2
<b>Total</b>			<b>19</b>	<b>5</b>	<b>9</b>	<b>33</b>	<b>350</b>	<b>450</b>	<b>25</b>

### 3<sup>rd</sup> Year Semester I

CODE NO	SUBJECT NAME	Instruction Periods per week					Max Marks		Credits
		Category	Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	
CSE311	OPEN ELECTIVE I	OE	3	1	-	4	40	60	3
CSE312	DATA BASE MANAGEMENT SYSTEMS	PC	4	1	-	5	40	60	4
CSE313	COMPUTER GRAPHICS	PC	4	1	-	5	40	60	4
CSE314	COMPUTER NETWORKS	PC	4	1	-	5	40	60	4
CSE315	DESIGN & ANALYSIS OF ALGORITHMS	PC	4	1	-	5	40	60	4
CSE316	DATA BASE MANAGEMENT SYSTEMS LAB	PC	-	-	3	3	50	50	2
CSE317	COMPUTER NETWORK LAB	PC	-	-	3	3	50	50	2
CSE318	SOFT SKILLS LAB	HS	-	-	3	3	100	-	2
CSE319	QUANTATIVE & VERBAL APTITUDE I	HS	4	-	0	4	100	-	2
<b>Total</b>			<b>23</b>	<b>5</b>	<b>9</b>	<b>37</b>	<b>500</b>	<b>400</b>	<b>27</b>

### 3<sup>rd</sup> Year Semester II

CODE NO	SUBJECT NAME	Instruction Periods per week					Max Marks		Credits
		Category	Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	
CSE321	COMPILER DESIGN	PC	4	1	-	5	40	60	4
CSE322	SOFTWARE ENGINEERING	PC	4	1	-	5	40	60	4
CSE323	WEB TECHNOLOGIES	PC	4	1	-	5	40	60	4
CSE324	COMPUTER ARCHITECTURE	PC	4	1	-	5	40	60	4
CSE325	PROFESSIONAL ELECTIVE I	PE	4	1	-	5	40	60	4
CSE326	OPEN SOURCE TECHNOLOGIES LAB	PC	-	-	3	3	50	50	2
CSE327	SOFTWARE ENGINEERING LAB/MINI PROJECT LAB	PC	-	-	3	3	50	50	2
CSE328	QUANTATIVE & VERBAL APTITUDE II	HS	4	-	0	4	100	-	2
<b>Total</b>			<b>24</b>	<b>5</b>	<b>6</b>	<b>35</b>	<b>400</b>	<b>400</b>	<b>26</b>

#### 4<sup>th</sup> Year Semester I (Tentative)

CODE NO	SUBJECT NAME	Instruction Periods per week					Max Marks		Credits
		Category	Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	
CSE411	OPEN ELECTIVE II	OE	3	1	-	4	40	60	3
CSE412	CRYPTOGRAPHY & NETWORK SECURITY	PC	3	1	-	4	40	60	3
CSE413	OBJECT ORIENTED ANALYSIS & DESIGN	PC	4	1	-	5	40	60	4
CSE414	PROFESSIONAL ELECTIVE II	PE	4	1	-	5	40	60	4
CSE415	PROFESSIONAL ELECTIVE III	PE	4	1	-	5	40	60	4
CSE416	CRYPTOGRAPHY & NETWORK SECURITY LAB	PC	-	-	3	3	50	50	2
CSE417	INDUSTRIAL TRAINING & SEMINAR	IT	-	-	-	0	100	-	2
CSE418	PROJECT I	PW			6	6	100	0	4
<b>Total</b>			<b>18</b>	<b>5</b>	<b>9</b>	<b>32</b>	<b>450</b>	<b>350</b>	<b>26</b>

#### 4<sup>th</sup> Year Semester II (Tentative)

CODE NO	SUBJECT NAME	Instruction Periods per week					Max Marks		Credits
		Category	Lecture	Tutorial	Lab	Total	Sessional Marks	Semester End Marks	
CSE421	PROFESSIONAL ELECTIVE- IV	PE	4	1	-	5	40	60	4
CSE422	PROFESSIONAL ELECTIVE – V	PE	4	1	-	5	40	60	4
CSE423	PROJECT II	PW	-	-	12	12	100	100	8
CSE424	MOOC	OE	-	-	-	0	-	-	2
<b>Total</b>			<b>8</b>	<b>2</b>	<b>12</b>	<b>22</b>	<b>180</b>	<b>220</b>	<b>18</b>

**Note:**

**Total Credits: 189**

- 1 **Academic activities I-** Paper Presentation, Participation in Programming/coding contests.
- 2 **Academic activities II-** Certificate of participation related to Skill Development Programs/Advanced Topics
- 3 These courses can be completed from 2nd year to 4th year. It is student choice only.
- 4 Any one departmental elective, any one Open Elective and MOOC are Optional courses.
- 5 The total no of credits required to award B Tech Degree :180  
Students having minimum 8 CGPA with no backlog till 3<sup>rd</sup>Yr 2<sup>nd</sup> semester can take advance Departmental elective (IV or/and V) in 4<sup>th</sup>Yr 1<sup>st</sup> Semester in place of OPEN ELECTIVE II having registered for OPEN ELECTIVE I in 3<sup>rd</sup>Yr 1<sup>st</sup> Semester. Department will conduct extra classes as per the requirement . This is only for students having Internship order. Students should consult the department and decision of Head of the Department is final in this regard.
- 6

<b>Semester</b>	<b>Elective Number</b>	<b>Subjects</b>
3 <sup>rd</sup> year 2 <sup>nd</sup> Semester	PROFESSIONAL ELECTIVE-I CSE325	<ul style="list-style-type: none"> <li>• CSE 325(A)Smart Systems Design &amp;Programming</li> <li>• CSE 325(B)High PerformanceComputing</li> <li>• CSE325(C)Principles Of ProgrammingLanguages</li> <li>• CSE325(D)Advanced DataStructures</li> <li>• CSE325(E)Digital ImageProcessing</li> <li>• CSE325(F)No SQL DataBases</li> </ul>
4 <sup>th</sup> year 1 <sup>st</sup> Semester	PROFESSIONAL ELECTIVE-II CSE414	<ul style="list-style-type: none"> <li>• CSE414(A)MobileComputing</li> <li>• CSE414(B)Distributed OperatingSystems</li> <li>• CSE414(C)Neural Networks &amp; DeepLearning</li> <li>• CSE414(D)Human ComputerInteraction</li> <li>• CSE414(E)PatternRecognition</li> </ul>
4 <sup>th</sup> year 1 <sup>st</sup> Semester	PROFESSIONAL ELECTIVE-III CSE415	<ul style="list-style-type: none"> <li>• CSE415(A)Computervision</li> <li>• CSE415(B)EmbeddedSystems</li> <li>• CSE415(C)Data Ware Housing &amp; DataMining</li> <li>• CSE415(D)Machine Learning</li> <li>• CSE415(E)CyberSecurity</li> </ul>
4 <sup>th</sup> year 2 <sup>nd</sup> Semester	PROFESSIONAL ELECTIVE-IV CSE421	<ul style="list-style-type: none"> <li>• CSE421(A)Client ServerComputing</li> <li>• CSE421(B)AugmentedReality</li> <li>• CSE421(C)SemanticWeb</li> <li>• CSE421(D)BigData</li> <li>• CSE421(E)Advanced Operating Systems</li> <li>• CSE421(F)Information Security &amp; Auditing</li> <li>• CSE421(G)Social Network Analysis</li> </ul>
4 <sup>th</sup> year 2 <sup>nd</sup> Semester	PROFESSIONAL ELECTIVE-V CSE422	<ul style="list-style-type: none"> <li>• CSE422(A)NetworkManagement</li> <li>• CSE422(B)FuzzyComputing</li> <li>• CSE422(C)Wireless SensorNetworks</li> <li>• CSE422(D)Bioinformatics</li> <li>• CSE422(E)Parallel Computing WithCUDA</li> <li>• CSE422(F)CloudComputing</li> <li>• CSE422(G)ComputingOptimization</li> </ul>
3 <sup>rd</sup> year 1 <sup>st</sup> Semester	OPEN ELECTIVE -I CSE311	<ul style="list-style-type: none"> <li>• CSE311(A)File Systems &amp; DataBases</li> <li>• CSE311(B)Computer OperatingSystems</li> <li>• CSE311(C)Fundamentals of ComputerNetworks</li> <li>• CSE311(D)Concepts of Object Oriented Programming</li> </ul>
4 <sup>th</sup> year 1 <sup>st</sup> Semester	OPEN ELECTIVE -II CSE411	<ul style="list-style-type: none"> <li>• CSE411(A)Introduction to SoftComputing</li> <li>• CSE411(B)WebDesigning</li> <li>• CSE411(C)Cloud Computing Overview</li> <li>• CSE411(D)Fundamentals of Digital ImageProcessing</li> </ul>



## Course Content:

### UNIT-I

12Periods

#### Overview of File Structures:

##### File System :

File Concept, Access methods, Protection.

##### Storing Data-Disks and Files:

The Memory Hierarchy-Magnetic Disks-performance implications of disk architecture-Redundant arrays of independent disks-data sharing-redundancy-levels of redundancy-disk space management-buffer management-files of records-page formats-record formats.

### UNIT-II

10Periods

#### Overview of Database Management:

File Systems vs DBMS , Introduction & Advantages of DBMS - What is database system – What is database - Why is database – Data Dependency

#### Database System Architecture:

Introduction – Three levels of architecture – The External level, The Conceptual level, The Internal level, Mappings, The database administrators, The database Management Systems, Client/Server Architecture, Distributed Processing.

### UNIT-III

10Periods

#### Introduction to Database Design

Database design and ER Diagram – Entities, Attribute, and Entity Set – Relationships and Relationship Set – Additional Features of ER Model

#### An Introduction to Relational Model:

Introduction – An Informal Look at the Relational Model – The Catalog – Base Tables and Views – Transaction

#### Relations:

Introduction – Tuples – Relation Types – Relational Values - Relation Variables

### UNIT-IV

10Periods

#### SQL: Overview –

UNION, INTERSECTION and EXCEPT – Nested Queries – Aggregation Operators – Null Values – Triggers and Active Databases – PL-SQL – Embedded SQL

### UNIT-V

8Periods

#### Schema refinement and normal forms :

Schema refinement, functional dependencies, reasoning normal forms, normalization up to 3rd & BC normal forms, lossless join & dependency preserving decomposition

#### Transaction management:

Transaction concept, transactions and schedules, concurrent execution of transactions, lock – based concurrency control

#### TEXT BOOKS:

1. Avi Silberschatz, Peter Baer Galvin and Greg Gagne "*Operating System Concepts*", Eighth Edition, Wiley Publications (Only for Unit – I)
2. C.J. Date "*An Introduction to Database Systems*", Eighth Edition – (Only for Unit – II)
3. Raghu Rama Krishna and Gehrke , "*Database Management Systems*", McGraw -Hill

## OPEN ELECTIVE – I (for Non-CSE Students)

COMPTUER OPERATING SYSTEMS	
<b>CSE 311(B)</b>	<b>Credits : 3</b>
Instruction : 3 Periods & 1 Tut/Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

### Prerequisites:

To undertake this course student must have good foundation of Computer Basics.  
 Student must be familiar with concepts of microprocessor and computer organization.  
 Prior programming experience with C (or any other programming language) is recommended.

### Course Objectives:

- Students should able to understand the importance and need of operatingsystems.
- Students should learn the inter process communication, resource allocation and deadlockmanagement.
- To understand the concept of memorymanagement.
- To make the students aware of the File systems and input/outputmanagement.
- Student must know the different operating systems available and how do they function.

### Course Outcomes:

By the end of the course, the student will be able to:	
1.	Be familiar with basics like need, functions, Challenges of Operating System and
2.	Analyze the theory and logic behind inter process communication, Synchronization and deadlock handling.
3.	Describe and differentiate various memory management techniques.
4.	Recognize and use file system interface, protection and security mechanism disk management and disk scheduling algorithms for better utilization of memory.
5.	Compare various features like scheduling, memory management etc of different Operating systems.

### Mapping of Course Outcomes with Program Outcomes:

Mapping	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12			
CO	1	1	1		1	1				1	2	1	2		
	2	2	3		2	2				2	2	2	2		
	3	2	3		2	2				2	2	2	2		
	4	2	3		2	2				2	2	2	2		
	5	2	3		3	3				2	2	2	2		



## SYLLABUS

### UNIT-I: 15Periods

#### **Introduction to OS:**

What is OS? History of Operating Systems, Operating System Concepts, Operating Systems Structure, Functions & need of Operating Systems.

#### **Process Management:**

Introduction to Processes, process control block, process state diagram. Scheduling algorithm, Threads and multithreading.

### UNIT-II: 15Periods

#### **Process coordination:**

Inter Process Communication, Classical IPC Problems: Dining philosopher problem, producer consumer problem, read & write problem.

#### **Deadlocks:**

**Resources, Deadlocks, the Optimal Algorithm, Deadlock Detection and Recovery, Deadlock Avoidance, Deadlock Prevention.**

### UNIT-III 15Periods

#### **Memory Management:**

Memory Management without Swapping or Paging, Swapping, Memory allocation and free space memory management algorithms.

#### **Virtual Memory Management:**

Virtual Memory, Page Replacement Algorithms, Modeling Paging Algorithms, Design issues for paging systems, Segmentation.

### UNIT-IV: 15Periods

#### **File Systems and Input/output:**

Files, Directories, Security, Protection mechanism, Principles of I/O Software & Hardware, Disk Structure, Disk Scheduling algorithm.

### UNIT-V: 15Periods

RTOS, DOS, Mobile OS – Introduction, Overview of Windows Operating Systems Scheduling, Linux Scheduling. Synchronization in Windows Operating Systems, Linux. Memory Management in Windows Operating Systems and Linux.

#### **Text Books:**

1. Andrew S. Tanenbaum “Modern Operating Systems “4<sup>th</sup> Edition, Pearson

#### **Reference Books :**

1. Avi Silberschatz, Peter Galvin, Grey Gagne “*Applied Operating Systems Concepts*”, 5th edition John Wiley & Sons;

#### **Web Resources:**

1. <http://nptel.ac.in/courses/106108101/>
2. [https://onlinecourses.nptel.ac.in/noc16\\_cs10/preview3](https://onlinecourses.nptel.ac.in/noc16_cs10/preview3)
3. <https://www.coursera.org/learn/iot/lecture/MrgxS/lecture-3-1-operating-systems>

**OPEN ELECTIVE – I (for Non-CSE Students)**

<b>FUNDAMENTALS OF COMPUTER NETWORKS</b>	
<b>CSE 311(C)</b>	<b>Credits : 3</b>
Instruction : 3 Periods & 1 Tut/Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

Basic knowledge of data structure and operating system.

**Course Objectives:**

- To understand the fundamental concepts of computer network and data communication.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

**Course Outcomes:**

By the end of the course, the student will be able to:	
1.	Analyzing the basics fundamental of Data Communications and Computer Networks protocols.
2.	Enumerate the layers of the OSI model and TCP/IP
3.	Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols.
4.	Should have the ability to administrate a network and analyze the flow of information in computer network.
5.	Identify the different types of network devices and their functions within a network.

**Mapping of Course Outcomes with Program Outcomes:**

Mapping	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO	1	3	3	2	2	3						1	3	3
	2	3	2	2	2	2						2	2	2
	3	3	3	3	2	3						1	2	2
	4	3	3	3	2	3						2	2	2
	5	3	3	2	1	3					1	2	2	2

**SYLLABUS**

**UNIT-I:**

**12Periods**

**Understanding of network and Internet:**

Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.

**Physical Layer:**

Guided transmission media, wireless transmission media.

**Data Link Layer**

Design issues, CRC codes, Elementary Data Link Layer Protocols, sliding window protocol.

**UNIT-II:**

**12Periods**

**Multi Access Protocols:**

ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet Mac Sub layer, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

**UNIT-III:****12Periods****Network Layer:**

Network Layer Design issues, store and forward packet switching connection less and connection oriented networks-routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Control to Infinity Problem, Hierarchical Routing, Congestion control algorithms.

**UNIT-IV:****12Periods****Internetworking:**

Tunneling, Internetwork Routing, Packet fragmentation, IPv4, IPv6 Protocol, IP addresses, CIDR, ICMP, ARP, RARP, DHCP.

**Transport Layer:**

Introduction and transport layer services, Multiplexing and Demultiplexing, Connection less transport (UDP), Principles of reliable data transfer, Connection oriented transport (TCP).

**UNIT-V:****12Periods****Application Layer:**

Principles of computer applications, Introduction, providing services, Applications layer paradigms, Client server model, standard client-server application, FTP, electronic mail, TELNET, DNS, Web and HTTP.

**Text Books:**

1. BehrouzA. Forouzan, "*Data Communications andNetworking*"
2. BehrouzForouzan , "*TCP/IP Protocol Suite*", 3rd edition, McGrawHill

**Reference Books :**

1. Andrew Tanenbaum , "*Computer Networks*", 4th edition, PrenticeHall
2. BehrouzForouzan, "*Computer Networks- A Top-Down approach*", McGrawHill
3. William Stallings, "*Data and computer communication*", Eighth edition, Pearson
4. Kurose and Ross, "*Computer Networking- A Top-Down approach*", 5th edition, Pearson

**Web Resources:**

<http://nptel.ac.in/courses/106105082/>

## OPEN ELECTIVE – I (for Non-CSE Students)

<b>CONCEPTS OF OBJECT ORIENTED PROGRAMMING</b>	
<b>CSE 311(D)</b>	<b>Credits : 3</b>
Instruction : 3 Periods & 1 Tut/Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

### **Prerequisites:**

Basic Knowledge of Programming Fundamentals  
 Knowledge of Programming Languages (such as C, C++)

### **Course Objectives:**

- Understand Object Oriented Programming Concepts
- Learn Basics of Java Programming Language
- Apply Object Oriented Programming Concepts in Problem Solving Using Java

### **Course Outcomes:**

By the end of the course, the student will be able to:

1.	Identify the Classes for Real Time Applications
2.	Establish the Connectivity Among The Classes Using Inheritances and Interfaces
3.	Modularize the Application Using Packages
4.	Add the Test Cases By Including The Runtime Errors Using Exceptions Handling Mechanism.
5.	Develop the GUI Using Applet and AWT Frameworks

### **Mapping of Course Outcomes with Program Outcomes:**

Mapping	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
<b>CO</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>3</b>										<b>2</b>	<b>1</b>
	<b>2</b>		<b>2</b>	<b>2</b>	<b>2</b>									<b>2</b>	
	<b>3</b>		<b>3</b>	<b>3</b>		<b>2</b>								<b>1</b>	
	<b>4</b>				<b>2</b>	<b>2</b>								<b>1</b>	
	<b>5</b>		<b>3</b>	<b>3</b>		<b>3</b>								<b>1</b>	<b>1</b>

## SYLLABUS

### **UNIT-I:**

**12Periods**

#### **OOP Concepts:**

Data Abstraction, Encapsulation, Inheritance, Benefits of Inheritance, Polymorphism, Classes and Objects, Procedural and Object Oriented Programming Paradigms

#### **Java Programming:**

History of Java, Java Buzzwords, Data Types, Variables, Operators, Control Structures, Arrays, Simple Programs in Java

**Introduction To Classes And Methods:** Classes, Objects, Constructors, Methods, Parameter Passing, Static Fields and Methods, Access Control, This Reference, Overloading Constructors and Methods, Recursion, Final Keyword, Garbage Collection, Finalize Method, Inner Class and Uses of Inner Classes.

### **UNIT-II:**

**12Periods**

#### **Inheritance:**

Basics, Using Super Keyword, Multilevel Hierarchy, Member Access Rules, Preventing Inheritance - Using Final, the Object Class and its Methods

#### **Polymorphism:**

Dynamic Binding, Method Overriding, Abstract Class and Methods

#### **Interfaces:**

Interfaces vs. Abstract Class, Defining an Interface, Implementing Interfaces, Accessing Implementations through Interface References, Extending Interfaces  
**Packages:** Defining, Creating and Accessing a Package, Understanding Class Path, Importing Packages

**UNIT-III:**

**10Periods**

**Input / Output:**

I/O Basics, Streams, Byte Streams and Character Streams, the Predefined Streams, Reading Console Input, Reading Characters, Reading Strings, Writing Console Output, the Print Writer Class, Reading and Writing Files, Automatically Closing a File

**String Handling:**

String Class, String Constructors, String Operations, String Conversion and toString(), StringBuffer.

**UNIT-IV:**

**12Periods**

**Exception Handling:**

Fundamentals, Exception Types, Use of Try and Catch, Throw, Throws, Finally, Multiple Catches, Built-In Exceptions, User Defined Exceptions

**Multithread Programming:**

Thread Priorities, Synchronization, Messaging, Reading A Thread, Creating Multiple Threads, Use of Alive and Join, Inter-Thread Communication- Suspending, Resuming and Stopping Threads, Producer-Consumer Problem With Multithreading

**UNIT-V:**

**12Periods**

**Applets:**

Basics, Applet Class, Applet Architecture, Applet Skeleton, the HTML Applet Tag, a Simple Banner Applet, Difference between Application Program and Applet Program

**Event Handling:** The Delegation Event Model, Event Classes, Event Listener Interfaces, Handling Mouse and Keyboard Events

**Using AWT Controls:**

AWT Classes, Labels, Buttons, Check Boxes, Choice, Lists, Scroll Bars, Text Field, Text Area, Layout managers.

**Text Books:**

1. Herbert Schildt "*Java The Complete Reference*", Seventh Edition, Tata McGraw Hill.

**Reference Books :**

1. P.J. Deitel and H.M. Deitel, "*Java for Programmers*", Pearson Education
2. P.Radha Krishna, "*Object Oriented Programming through Java*", Universities Press.

**Web Resources:**

1. <http://www.nptelvideos.com/video.php?id=1472>
2. <https://www.edx.org/course/javacheng-xu-she-ji-java-programming-pekings-04830340x>
3. <https://www.coursera.org/courses?languages=en&query=java>

<b>DATA BASE MANAGEMENT SYSTEMS</b>	
<b>CSE 312</b>	<b>Credits : 4</b>
Instruction : 4 Periods & 1 Tut/Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

Elementary knowledge about computers including some experience using UNIX or Windows. Knowledge about data structures and algorithms, corresponding to the basic course on Data Structures and Algorithms.

**Course Objectives:**

- Understand basic database concepts, including the structure and operation of the relational datamodel.
- Understand logical database design principles, including E-R diagrams and database normalization.
- To learn the basics of SQL and construct queries using SQL.
- Understand the concept of database transaction and concurrency control, backup and recovery, data object locking and protocols.

**Course Outcomes:**

**Students will be able to :**

CO-1: Interpret the basic concepts of Database Management Systems, Transaction Management and Architecture of DBMS

CO-2: Apply the principles of ER Model and Relational Model in Conceptual and Logical Database Design.

CO-3: Construct and evaluate SQL Queries and Relational Algebra, Relational Calculus expressions.

CO-4: Apply the principles of normalization in schema refinement.

CO-5: Investigate different transaction management and recovery techniques

**Mapping of Course Outcomes with Program Outcomes:**

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO-1	PSO-2
CO-1	1	1	1	1	1	0	0	0	1	0	0	1	1	1
CO-2	1	2	2	1	1	0	0	1	1	0	0	1	2	1
CO-3	2	3	3	1	2	1	0	1	1	1	1	1	2	2
CO-4	2	2	3	2	1	1	0	1	1	1	1	1	2	2
CO-5	2	2	3	2	1	1	0	1	1	1	1	1	2	2

1-low,2-Medium3-strong

**SYLLABUS**

**UNIT-I:**

**12Periods**

**Introduction to DBMS:**

Overview of DBMS, File system versus a DBMS , Advantages of a DBMS, Three Schema architecture of DBMS, Data Models, Database Languages, Transaction Management , Structure of a DBMS ,Client/Server Architecture ,Database Administrator andUsers.

**Entity-Relationship Model:**

Design Issues, ER Modeling concepts ,Cardinality constraints, Weak-entity types, Subclasses and inheritance, Specialization and Generalization, Conceptual Database Design With the ERModel.

**UNIT-II:****10Periods****Relational Model:**

Structure of Relational Databases, Basics of Relational Model ,Integrity Constraints, Logical Database Design, Introduction to Views, Destroying/ Altering Tables and Views, Relational Algebra, Relational Calculus.

**UNIT-III:****12Periods****SQL:**

Concept of DDL, DML, DCL, Set operations, Nested queries ,Aggregate Functions, Null Values, Referential Integrity Constraints, assertions, views, Embedded SQL ,Cursors Stored procedures and triggers, ODBC and JDBC, Triggers and Active Database, designing active databases.

**UNIT-IV:****12Periods****Database Design:**

Schema Refinement, Functional Dependencies, Reasoning about Functional Dependencies, Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF

**Security:**

Access Control, Discretionary Access Control - Grant and Revoke on Views and Integrity Constraints, Mandatory Access Control.

**UNIT-V:****15Periods****Transaction Management:**

The ACID Properties, Transactions& Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control.

**Concurrency Control:**

2PL,Serializability and Recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks, Specialized Locking Techniques, Concurrency Control without Locking.

**Crash Recovery:**

Introduction to ARIES, The Log, Other Recovery-Related Structures, The Write-Ahead Log Protocol, Check pointing, Recovering from a System Crash, Media Recovery.

**Text Books:**

1. Raghu Ramakrishnan, Johannes Gehrke "Database Management Systems", 3rd Edition, McGraw- Hill

**References Books:**

1. A.Silberschatz.H.Korth, "Database System Concepts" , 5th Edition,McGraw-Hill

**Web Resources:**

1. <https://www.youtube.com/playlist?list=PLYvBGMFYV3auVdxQ1-88ivNFpmUEy-U3M>
2. [http://nptel.ac.in/courses/IIT-MADRAS/Intro\\_to\\_Database\\_Systems\\_Design/pdf/1\\_Introduction.pdf](http://nptel.ac.in/courses/IIT-MADRAS/Intro_to_Database_Systems_Design/pdf/1_Introduction.pdf)
3. <https://www.youtube.com/watch?v=1057YmExS-I>

<b>COMPUTER GRAPHICS</b>	
<b>CSE 313</b>	<b>Credits : 4</b>
Instruction : 4 Periods & 1 Tut/Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

Elementary knowledge in C programming, solving mathematical expressions.

**Course Objectives:**

During the course, the student will be able to

1. Explain applications in the real world and the graphics systems used in developing graphics.
2. Design basic primitives (both 2D and 3D) using algorithms.
3. Apply transformations on the objects.

**Course Outcomes**

By the end of the course, the student will be able to:

1. Explain computer graphics, applications and contemporary terminology, hardware components etc.
2. Design 2D and 3D objects using algorithms and apply attributes of primitives, anti -aliasing.
3. Apply geometric transformations on 2D and 3D objects.
4. Apply viewing transformations on 2D and 3D objects
5. Explain visible surface methods

**Articulation Matrix**

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2											1		
CO2	1	2	3	1	2				2	1	2	3		2
CO3	2	2	2	1	2				2	1	2	3		2
CO4	2	2	2	1	2				2	1	2	3		2
CO5	1	2	2	1	2				2	1	2	3		2

**SYLLABUS**

**UNIT-I:**

**8Periods**

**Introduction:**

**Applications:**

Usage of Graphics and their applications, Presentation Graphics- Computer Aided Design- Computer Art- Entertainment- Education and Training- Visualization- Image Processing- Graphical User Interfaces.

**Overview of Graphics Systems:**

Video Display Devices - Raster Scan systems - Random Scan Systems - Graphics Monitors and Workstations - Input devices - Hard Copy Devices- Graphics Software.



**UNIT-II:****12Periods****Output Primitives & its Attributes:**

Points and Lines-Line Drawing Algorithms- Loading the Frame buffer- Line function- Circle-Generating Algorithms- Ellipse Generating Algorithms- Filled Area Primitives-Filled Area Functions- Cell Array- Character Generation.

**Attributes of Output Primitives:**

Line and Curve Attributes-Color and Gray scale levels- Area Fill Attributes- Character Attributes-Bundled Attributes- Inquiry Functions- Anti aliasing.

**UNIT-III:****16Periods****Two Dimensional Geometric Transformations:**

Basic Transformations – Matrix Representations - Homogeneous Coordinates - Composite Transformations - Other Transformations, Transformations between Coordinate Systems, Affine Transformations, Transformation Functions.

**Two Dimensional Viewing:**

The viewing Pipeline-Viewing Coordinate Reference Frame-Window-to-Viewport Coordinate Transformation-Two Dimensional Viewing Functions-Clipping Operations-Point Clipping-Line Clipping-Polygon Clipping-Curve Clipping- Text and Exterior Clipping.

**Structure And Hierarchical Modeling:** Concepts of Structures and Basic models- Editing.

**UNIT-IV:****16Periods****Three Dimensional Concepts and Object representations & Transformation:**

3D display methods - 3D Graphics - Polygon Surfaces - Curved Lines and Surfaces - Quadratic Surfaces-Super Quadrics - Blobby Objects - Spline Representations - Cubic Spline methods -Bezier Curves and Surfaces – B-Spline Curves and Surfaces.

**Three Dimensional Geometric and Modeling Transformations:**

Translation – Rotation - scaling - Other Transformations - Composite Transformations – 3D Transformation Functions.

**UNIT-V:****12Periods**

**Three Dimensional Viewing :** Viewing Pipeline- Viewing Coordinates- Projections- View Volumes- General Projection Transformations-Clipping-Hardware Implementations- Three Dimensional Viewing.

**Visible Surface Detection Methods:** Classification of visible-surface detection algorithms, Back face method, Depth buffer method, Scan line method.

**Text Books:**

1. Donald Hearn & M. Pauline Baker, "Computer Graphics C Version", 2004, Pearson Education, NewDelhi,
2. Zhigang Xiang, Roy A Plastock, "Schaum's Outlines- Computer Graphics " adapted by P S Avadhani ,2nd Edition, McGraw Hill.

**References Books:**

1. David F. Rogers, "Procedural Elements for Computer Graphics", 2003, Tata McGraw Hill NewDelhi.
2. J.D.Foley, S.K Feiner ,A Van Dam. F. H. John "Computer Graphics-Principles & Practice in C", 2004, Pearson Education.

**Web Resources:**

1. <http://nptel.ac.in/courses/106106090/>
2. <https://www.coursera.org/courses?languages=en&query=computer+graphics>
3. [https://courses.edx.org/courses/BerkeleyX/CS-184.1x/2013\\_October/syllabus/](https://courses.edx.org/courses/BerkeleyX/CS-184.1x/2013_October/syllabus/)

<b>COMPUTER NETWORKS</b>	
<b>CSE 314</b>	<b>Credits : 4</b>
Instruction : 4 Periods & 1 Tut/Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

- Adequate knowledge of Data Communications.
- Good programming knowledge in C and Java for better understanding of network programming.

**Course Objectives:**

- To make the student understand the contemporary technologies in network protocols and network architecture.
- To acquire the knowledge on design principles of network infrastructure. → To learn and understand the design issues in framing and error handling.
- To gain a sufficient knowledge on addressing the nodes in the network and connecting them using the network level protocols.
- To make them familiarize with different application layer protocols and network management elements.

**Course Outcomes:**

By the end of the course, the student will be able to:

1. Identify the network model and the hardware components at physical layer.
2. Analyze the organization structure; choose the most appropriate network architecture and technology.
3. Contrast connection oriented and connection less services for datagram transformation. Discuss routing algorithms, congestion control algorithms and network layer protocols.
4. Illustrate transport layer, application layer protocols and security issues in transport layer.
5. Analyze domain name system, SNMP architecture and management protocols.

**Mapping of Course Outcomes with Program Outcomes:**

Mapping	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO	1	3	2		2	2				1	1				
	2	2	1	2	2	2		1		1		1	1		3
	3	1			1										
	4	2	1		3	2	2	2	1	2	2	1	2	3	1
	5	2	2		2	3					1	1		2	2

1-low,2-Medium3-strong

## SYLLABUS

### **UNIT-I: 15Periods**

#### **Basics of Computer Networks:**

Network software architecture- layers and protocol , Reference Models- OSI, TCP/IP and Differences between OSI and TCP/IP, Network Topologies ,ARPANET.

#### **Physical Layer:**

Guided and unguided transmission media, wireless transmission media, Hardware components at physical layer, Switching Techniques: Circuit Switching - Packet Switching – Message Switching, Security issues in physical layer.

### **UNIT-II: 15Periods**

#### **Data link layer and Design issues:**

Framing - error detection and correction –checksum, CRC, Elementary Data link Protocols, Sliding Window protocols: Go-back-n , Selective Repeat ,HDLC.

#### **Medium Access sub layer:**

Channel Allocation Problems Static and Dynamic, Multiple Access protocols: ALOHA - CSMA -CSMACD- IEEE Standard803.3 Ethernet ,802.4 Token bus.

### **UNIT-III: 15Periods**

#### **Network Layer:**

Network Layer design issues, Virtual circuit and Datagram subnets. Store and forward packet switching, Implementation of connection less and connection oriented services and comparisons, Routing Algorithms, Congestion controlling Algorithms, Traffic shaping ,Tunneling, protocols in network layer IPV4,IPV6,DHCP.

### **UNIT-IV: 20Periods**

#### **Transport Layer:**

Transport layer services, Transport layer protocols TCP & UDP, Flow control, Buffering, Multiplexing and Crash recovery, session control protocol, security issues in transport layer.

#### **Application Layer:**

The World Wide Web (WWW),Protocols in application layer: HTTP/HTTPS,SMTP,POP,FTP,MIME.

### **UNIT-V: 10Periods**

The Domain Name System, Resource records, Name services, Electronic Mail concepts, SNMP architecture, SNMP Manager/Agent communication, SNMP management.

#### **Text Books:**

1. Andrew S.Tanenbaum, “*Computer Networks*”, Fourth Edition, PearsonEducation.
2. Behrouz a Forouzan “*Data Communications and Networking*“, 4th Edition. Tata McGraw-Hill.

#### **Reference Books:**

1. William Stallings,”*Data and Computer Communications*”,7th Edition , Pearson Education

#### **Web Resources:**

- 1.[http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New\\_index1.html](http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New_index1.html)
- 2.<https://www.udacity.com/course/computer-networking--ud436>
- 3.<https://www.coursera.org/courses?languages=en&query=computer+network>
4. <https://alison.com/learn/computer-networking>

<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>	
<b>CSE 315</b>	<b>Credits : 4</b>
Instruction : 4 Periods & 1 Tut/Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

Some programming skills and a good back ground in discrete mathematics, data structures and probability will be very helpful.

**Course Objectives:**

- Student will understand the basic design concepts (e.g., pseudocode, specifications, top-down design).
- Student will learn the different algorithm design strategies (procedural knowledge).
- Student can acquire the knowledge to solve the complexities of different problems.
- Student will be able to choose appropriate design strategies for different problems.

**Course Outcomes:**

CO1: Demonstrate the steps for algorithmic problem solving, types of problems and asymptotic notations. Analyze the recursive and non-recursive algorithms using time and space complexity.

CO2: Analyze the brute force, decrease –and -conquer, divide -and- conquer methods for solving the sorting, searching, permutations and combinations, subset sum, matrix multiplication, convex hull and closest pair problems.

CO3 : Examine the transform-and-conquer, dynamic programming approaches for solving of pre-sorting techniques, heap sort, Balanced Trees, optimal binary search tree, Warshall’s & Floyd’s algorithms , Knapsack problems.

CO4: Apply prim’s, Kruskal’s and Dijkstra’s for finding a shortest path in a graph. Apply Huffman methods for encode and decode the text.

CO5: Demonstrate the concepts of P , NP and NP-hard problems . Analyze limitations of Back tracking, branch and bound approaches.

**Mapping of Course Outcomes with Program Outcomes:**

Mapping		PO												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO	1	3	3	2	2				1	2	2			1	1
	2	2	3	2	3		2	1	1	2	2	1		2	
	3	2	3	2	3	1	2	1	1	2	2	1		2	
	4	2	2	2	3	1	2	1	1	2	2	2	1	1	1
	5	2	3		2				1	2	2	1		1	

## SYLLABUS

**UNIT-I:**

**12Periods**

**Introduction :**

Introduction, Steps for algorithmic problem solving , Important Problem Types Analysis framework (Orders of growth, Cases), Asymptotic Notations and Efficiency Classes, Mathematical Analysis for recursive Algorithms and Non-recursive Algorithms, Empirical Analysis, Algorithm Visualization.

**Case Study:** Pseudo code Conventions, Time and Space Complexities

**UNIT-II:****14Periods****Brute Force:**

Brute Force- Selection and Bubble sort, Sequential Search, String Matching, Closest- Pair, Convex Hull Problems, Exhaustive Search -Travelling Salesman problem, knapsack problem, Assignment Problem.

**Decrease and Conquer:**

Decrease by a constant: Insertion Sort, Algorithms for generating combinatorial problems, Decrease by constant factor algorithms, Variable size decrease.

**Divide-and-Conquer :**

Mergesort, Quicksort, Binary Search, Multiplication of large integers and Strassen's Matrix Multiplication, Closest- Pair, Convex Hull Problems.

**UNIT-III:****12Periods****Transform and conquer:**

Presorting, Gauss Elimination, Balanced Trees – 2-3 Trees, Heapsort, Horner's rule and binary exponentiation, Problem reduction.

**Dynamic Programming:**

Computing a Binomial Coefficient, Warshall's and Floyd's Algorithm, Optimal Binary Search Trees, The Knapsack Problem and Memory Functions.

**UNIT-IV:****12Periods**

**Greedy Technique:** Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm – Huffman Trees.

**Space And Time Tradeoffs:** Sorting by computing, Input Enhancement in String Matching- Horspool's Algorithm, Boyer-Moore Algorithm, Hashing, B-Trees

**UNIT-V:****14Periods**

**Limitations of Algorithm Power:** Lower-Bound Arguments, Decision Trees, P, NP and NP complete problems, Challenges of Numerical Algorithms

**Coping with the limitations of Algorithms Power** – Backtracking, Branch-and-Bound Case study for Backtracking: Graph Coloring

**NP Problems** - Approximation Algorithms for NP-hard Problems, Algorithms for solving Nonlinear Equations.

**Text Books:**

1. Anany Levitin, "Introduction to Design & Analysis of Algorithms", 2003, Pearson Education, New Delhi.

**Reference Books :**

1. Ellis Horowitz, S. Sahni et al, "Fundamentals of Computer Algorithms", 2001, Galgotia Pub.
2. Thomas H. Corman, Charles E. Leiserson, Ronald R. Rivest & Clifford Stein, "Introduction to Algorithms" Prentice Hall of India, New Delhi
3. Aho, Hopcroft & Ullman, "The Design and Analysis of computer Algorithms", 2003 Pearson Education, New Delhi
4. Gilles Brassard & Paul Bratley, "Fundamentals of Algorithmic", Prentice Hall of India, New Delhi

**Web Resources:**

1. <http://nptel.ac.in/courses/106101060/>
2. <https://www.edx.org/course/subject/data-analysis-statistics>
3. <https://www.udacity.com/courses/data-science>
4. <https://www.coursera.org/specializations/algorithms>

<b>DATABASE MANAGEMENT SYSTEMS LAB</b>	
<b>CSE 316</b>	<b>Credits : 2</b>
Instruction : 3 Periods/Week	Sessional Marks : 50
End Exam : 3Periods	End Exam Marks : 50

**Prerequisites:**

Elementary knowledge about computers including some experience using UNIX or Windows.

**Course Objectives:**

- To understand the basics of SQL and construct queries using SQL.
- To learn connectivity between web pages, OLAP,OLTP.

**Course Outcomes:**

By the end of the course, the student will be able to:

1. Practise basic SQL queries.
2. Practise compile complex queries like nested queries and joins.
3. Construct triggers, views and stored procedures.
4. Apply the principles of ER model and normalization for refined schema in logical database design.

**Mapping of Course Outcomes with Program Outcomes:**

Mapping	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO	1	1	2	2	1	2	1	0	0	1	0	0	0	2	2
	2	2	3	2	2	2	1	0	0	1	0	0	0	2	2
	3	2	3	2	2	2	1	0	0	1	0	0	0	2	2
	4	2	3	3	2	2	1	0	1	3	2	2	2	3	2

## SYLLABUS

**List of Experiments:**

1. SQL DDL ,DMLStatements
2. SQLConstraints.
3. Inbuilt functions inRDBMS.
4. Aggregate functions
5. Nested Queries & JoinQueries.
6. Creation and dropping ofViews.
7. CreatingTriggers.
8. StoredProcedures.

**Sample Applications:**

1. Development of an Online Course Portal for acampus
2. Book Bank ManagementSystem
3. Car Rental ManagementSystem
4. Exam/academic system for College Management
5. Real estate Managementsystem
6. University ManagementSystem
7. Database manager for a Magazine agency or a newspaperagency

8. Ticket booking for performances
9. Inventory Control System
10. Students management System

**REFERENCE BOOKS:**

1. Raghu Ramakrishnan, Johannes Gehrke "*Database Management Systems*", 3rd Edition, McGraw- Hill
2. A.Silberschatz.H.Korth, "*Database System Concepts*", 5th Edition, McGraw-Hill

**WEB REFERENCES:**

1. <https://dev.mysql.com/doc/refman/5.5/en/sql-syntax-data-definition.html>

<b>COMPUTER NETWORKS LAB</b>	
<b>CSE 317</b>	<b>Credits : 2</b>
Instruction : 3 Periods/Week	Sessional Marks : 50
End Exam : 3Periods	End Exam Marks : 50

**Prerequisites:**

Basic knowledge of Data communication and programming.

**Course Objectives:**

- Learn socket programming.
- Be familiar with simulation tools.
- Have hands on experience on various networking protocols.

**Course Outcomes:**

By the end of the course, the student will be able to:

1. Implement various Network Topologies and protocols using Simulation Tools.
2. Analyze the performance of the protocols in different layers.
3. Implement and compare various routing algorithms
4. Implement programs using socket

**Mapping of Course Outcomes with Program Outcomes:**

Mapping	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO	1	3	3	3	2	3			2				3	2
	2	2	2	3	1	3			2				2	3
	3	3	2	2	2	2		1	2			1	2	3
	4	3	3	2	2	2		1	2			1	3	2
	5	3	3	2	2	3		1	1			1	2	3

**SYLLABUS**

**LIST OF EXPERIMENTS to be performed using open source tools**

1. Implementation of Error Detection and Error Correction Techniques.
2. Implementation of Stop and Wait Protocol and Sliding Window Protocol.
3. Implementation of High level data link control protocol.
4. Study the performance of network with CSMA/CA protocol and compare with CSMA/CD protocols.
5. Simulate network topology STAR ,BUS,RING
6. Study of Socket Programming and Client – Server model.
7. Write a code simulating ARP /RARP protocols.
8. Write a code simulating PING and TRACEROUTE commands.
9. Implementation of Distance vector routing algorithm.
10. Implementation of Link state routing algorithm.

**References:**

1. BehrouzForouzan, "TCP/IP Protocol Suite", 3rd edition, McGrawHill



## **Soft Skills Lab**

**Code: CSE318**

**Credits: 2**

**Instruction: 3Periods**

**Sessional Marks -100**

### **Purpose of the Course**

The course broadly aims at training the students for the improvement of their soft skills which go a long way in building their career. The course exposes the students to the proper etiquette suitable for the corporate world and provides an opportunity to realize the importance of team work, assertive personality, and goal oriented career buildup. The course serves as a platform for the engineering students to complement their technical skills.

### **Course Objectives**

- To prepare the students to function effectively in teams that would help them building a successful career.
- To make the students aware of the importance of verbal and non-verbal communications skills
- To enable the students to make successful presentations and participate in group discussions
- To make the students identify their strengths and pinpoint the areas where they should work to enhance their time management skills
- To help the students carry out self-analysis, self-motivation and build up confidence to set appropriate goals in life

### **Course Outcomes**

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

- Work effectively in teams and emerge as leaders.
- Practice positive postures and gestures and communicate with others effectively.
- Present a topic confidently using positive body language and appropriate material aids.
- Participate in group discussions and give a proper direction to the discussion by playing a few positive roles.
- Set a few short term and long term goals for himself and meet the demand of the time-bound tasks which would give him direction for his successful career.

## SYLLABUS

### **Module I – Art of communication 9Periods**

1. Definition of Communication
2. Types of Communication
3. Non-verbal Communication
4. Listening skills
5. Feedback

**D.A.** - Practice of proper hand shake, practice of different postures and gestures and activity on giving feedback

### **Module II-Presentation Skills 6Periods**

1. Purpose
2. Effective presentation strategies
3. Analysis of audience
4. Preparing an outline of the presentation,
5. Audio –visual aids
6. Body language.

**D.A.** -Group presentation by each team

### **Module III -Group Discussions 9Periods**

1. Introduction- as a part of selection process-guidelines for GD
2. Types of GD
3. Nature of topics of G.D
4. Roles to be played by participants in a GD
5. Evaluation process

**D.A**–Group discussions

### **Module – IV Team Building and Leadership 6Periods**

1. Importance of teamwork
2. Different stages of team formation
3. Good team vs. effective team
4. Team player and Team leader
5. Types of leadership
6. Decision making and negotiating skills

**D.A**-Decision making for a given situation

### **Module –V Time-Management 3Periods**

1. Importance of time-management
2. Time-Management models
3. Prioritization
4. The art of saying No“
5. Identifying Time Wasters

**D.A** -Time- Bound activities devised by the facilitator

**Module VI-Goal-Setting****3Periods**

1. Different type of Goals (Immediate and Short term)
2. SMART Goals
3. Strategies to achieve goals

- Prepare a chart of immediate, short term and long term goals

**Module VII-Job-Interviews****9Periods**

1. Preparing Resumes and C.V's
2. Preparing for the interview
3. FAQ's (Integrity, Stress management, Close- Ask questions)

-Mock interviews

**REFERENCE BOOKS:**

1. Sanjay Kumar and Pushpa lata, *Communication Skills*, Oxford University press.
2. Allan Pease, **Body Language**, Sheldon Press.
3. John A. Kline and Bhavna Bhalla, *Speaking Effectively; Achieving Excellence in Presentations*, Pearson publication.
4. Steve Mandel, *Effective presentation Skills*, Viva books Pvt.Ltd.
5. Marc Mancini, *Time Management*, Tata McGraw Hill publishingComp.Ltd.
6. Peter Veruki, *The 250 Job Interview Questions*,Adams Media CorporationAvon, Massachusetts.

**Quantitative & Verbal  
Aptitude - I  
(Common for all Branches)**

<b>Code: CSE319</b>	<b>Credits: 2</b>
<b>Instruction: 4 Periods/Week (2QA + 2VA)</b>	<b>Sessional Marks -100</b>

**Course objectives:**

**Quantitative Aptitude -I**

1. To prepare the students on various principles related to numerical computations.
2. To explain concepts related to numerical estimation.
3. To illustrate and explain the fundamentals related to geometry and mensuration.

**Verbal Aptitude-I:**

4. To categorize and explain principles of grammar in order to minimize errors in English.
5. To list and quote high frequency words by giving relevant examples.
6. To categorize, apply and use data as per the requirement.
7. To construct and make use of idioms, phrasal verbs and other expressions used in professional contexts.
8. To critically evaluate reading material for better comprehension

**Course Outcomes:**

**Quantitative Aptitude –I**

The student will be able to	
1	Solve problems related to numerical computations in company specific and other competitive tests.
2	Able to recall and use the concepts to solve problems numerical estimation with respect to company specific and competitive tests.
3	Apply basic principles related to geometry and mensuration & solve questions in company specific and competitive tests.

## Verbal Aptitude-I:

The student will be able to	
1	Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.
2	Answer questions on synonyms, antonyms, hyponyms, hypernyms and other vocabulary based exercises while attempting company specific and other competitive tests.
3	Use their logical thinking ability and solve questions related to reasoning based exercises.
4	Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.
5	Analyze the given data/text and find out the correct responses to the questions asked based on the reading exercises; identify relationships or patterns within groups of words or sentences.

## SYLLABUS

### Section –A (Quantitative Aptitude –I)

#### UNIT I

6Periods

#### Numerical computation:

Applications based on Numbers, Chain Rule, Ratio Proportion

#### UNIT II

6Periods

#### Numerical estimation - I

Applications Based on Time and work, Time and Distance

#### UNIT III

4Periods

#### Numerical estimation – II

Applications based on Percentages, Profit Loss and Discount, Simple interest and Compound Interest Partnerships, Shares and dividends

#### UNIT IV

4Periods

#### Data interpretation

Data interpretation related to Averages, Mixtures and allegations, Bar charts, Pie charts, Venn diagrams

#### UNIT V

4Periods

Application to industry in Geometry and Mensuration

#### Books for practice

1. Quantitative aptitude by RS Agarwal, S Chand Publications
2. Verbal and non verbal Reasoning by RS Agarwal from S Chand publications

#### References

1. Barron's by Sharon Welner Green and Ira K Wolf (Galgotia Publications pvt.Ltd.)
2. Quantitative Aptitude by U Mohan Rao Scitech publications
3. Quantitative Aptitude by Arun Sharma McGrawhill publications
4. Quantitative Aptitude by Ananta Asisha Arihant publications

5. Quantitative Aptitude by AbhijitGuha
6. Quantitative Aptitude by Pearsonpublications
7. Material from 'IMS, Career Launcher and Time' institutes for competitiveexams.
8. Elementary and Higher algebra by HS Hall and SRknight.

**Websites:**

1. [www.m4maths.com](http://www.m4maths.com)
2. [www.Indiabix.com](http://www.Indiabix.com)
3. 800score
4. Official GREsite
5. Official GMATsite

**Section –B (Verbal Aptitude –I)**

**UNIT I**

**7Periods**

**Grammar:**

Parts of speech( with emphasis on appropriate prepositions, co-relative conjunctions, pronouns- number and person, relative pronouns), articles(nuances while using definite and indefinite articles), tenses(with emphasis on appropriate usage according to the situation), subject – verb agreement ( to differentiate between number and person),clauses(use of the appropriate clause , conditional clauses), phrases(use of the phrases, phrasal verbs), degrees of comparison(comparing apples and oranges, comparison and number), modifiers(misplaced and dangling modifiers, absence of modifiers), determiners, parallelism in structure(symmetry in two part sentences), word order, subjunctive mood, redundancy, special types of sentences, miscellaneous types, identifying errors in a given sentence, correcting errors in sentences.

**UNIT II**

**4Periods**

**Vocabulary:**

Synonyms and synonym variants (with emphasis on high frequency words), antonyms and antonym variants (with emphasis on high frequency words), homonyms, hyponyms, hypernyms and General idioms.

**UNIT III**

**5Periods**

**Reasoning:**

Critical reasoning (understanding the terminology used in CR- premise, assumption, inference, conclusion), Sequencing of sentences (to form a coherent paragraph, to construct a meaningful and grammatically correct sentence using the jumbled text), to use logical reasoning and eliminate the unrelated word from a group.

**UNIT IV**

**4Periods**

**Usage:**

Sentence completion (with emphasis on signpost words and structure of a sentence), contextual meanings (to use the appropriate word according to the situation), supplying a suitable beginning/ending/middle sentence to make the paragraph coherent, idiomatic language (with emphasis on business communication), punctuation depending on the meaning of the sentence, run on errors, sentence fragments, coma splices.

**UNIT V**

**4Periods**

**Reading Comprehension:**

Types of passages (to understand the nature of the passage), types of questions (with emphasis on inferential and analytical questions), style and tone ( to comprehend the author's intention of writing a passage), strategies for quick and active reading(importance given to skimming, scanning), summarizing ,reading between the lines, reading beyond the lines, techniques for answering questions related to vocabulary (with emphasis on the context), supplying suitable titles to the passage, identifying the theme and central idea of the given passages.

### **Books for Practice**

1. Practical English Grammar A. J. Thomson, A. V. Martinet by Oxford University press
2. Remedial English Grammar for Foreign Students by FT wood published by Macmillan Publishers
3. Objective English-Edgar Torpe, Showick Thorpe-Pearson Education

### **Reference Books and websites:**

2. Barron's by Sharon Welner Green and Ira K Wolf (Galgotia Publications Pvt.Ltd.)
3. Websites: Indiabix, 800 score, official CAT, GRE and GMATsites
4. Material from 'IMS, Career Launcher and Time' institutes for competitive exams.
5. R S Agarwal's book on Objective English and Verbal Reasoning from S Chand Publications.
6. Cambridge and Oxford Dictionaries
7. Collins Cobuild English Grammar by Goyal Publishers
8. Word Power Made Easy by Norman Lewis-Goyal Publishers





<b>COMPILER DESIGN</b>	
<b>CSE 321</b>	<b>Credits : 4</b>
Instruction : 4 Periods & 1 Tut/week	Sessional Marks : 40
End Exam : 3 Periods	End Exam Marks : 60

**Prerequisites:**

Basic fundamentals of Discrete Mathematics  
Principles of Automata Theory.

**Course Objectives:**

- Introduce the major concept areas of language translation and compiler design.
- Learn the design of lexical analyzer, syntax analyzer.
- Enrich the knowledge in various phases of compiler and its use, intermediate code generation, optimization techniques, machine code generation, and use of symbol table.
- Provide practical programming skills necessary for constructing a compiler.

**Course Outcomes:**

Student will be able to

CO1 - Identify the challenges of theory of computations, Explain different phases of a compiler and design of lexical analyser.

CO2 - Explain differentiate between various parsers and apply top down parsers.

CO3 - Apply bottom up parsers.

CO4 - Differentiate different intermediate code generation techniques

CO5 - Compare different code optimization techniques, how symbol table and run time storage are managed.

**Mapping of course outcomes with program outcomes:**

Mapping		PO												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO	1	1											2	1	
	2	2	2	3	1	2				1	1		2	2	
	3	2	2	3	1	2				1	1		2	2	
	4	2	2	2		2					1		2	2	
	5	2	2	2								1		2	2

## SYLLABUS

**UNIT-I :**

**The Theory of Automata:**

**12Periods**

Overview of Finite Automata and Formal Languages.

**Overall view of Compilers:**

Types of Translators, Brief discussion on various phases of Compilers, Design of lexical analyzer, LEX tool.

**UNIT-II :**

**Design of Parsers:**

**10Periods**

Top down Parsers, Problems with Top down Parsers, Backtracking, Left recursion, Left factorial, Predictive Parser.

**UNIT-III:****18Periods**

Bottom up parser: Shift Reduce parser, Operator Precedence Parser, LR parser: LR(0), SLR,CLR parsers. LALR parser, parsing of string, YACC TOOL.

**UNIT-IV :****Syntax Directed Translation:****18Periods**

Syntax directed translation and implementation, Intermediate code, Postfix notation, DAG, Three address Code, Quadruples, and Triples, indirect triples.

**Machine independent Code Optimization:** The principle sources of optimization, local Optimization, Loop Optimization, DAG, Global data flow analysis.

**UNIT-V :****Code Generation:****18Periods**

Problems, Machine model, A simple code generator, Machine dependent code Optimization, Register allocation and assignment, Code generation from DAG, Peephole optimization.

**Brief discussion** on symbol tables, Run-time storage administration.

**Text Book:**

1. Aho, D. Ullman "*Principles of Compiler Design* ",SecondEdition,Pearson Education

**Reference Books:**

1. Santanu Chattopadhyay, "*Compiler Design*", Sixth Edition,PHI Learning Pvt.Ltd.
2. A.A.Puntambekar , "*Compiler design*". First Edition, Technical Publications.
3. Alfred V. Aho, ,Monica S. Lam, ,Ravi Sethi, Jeffrey D. Ullman, "*Compilers: Principles, Techniques, and Tools*",2nd Edition, Pearson Education

**Web resources:**

1. <http://nptel.ac.in/courses/106104123/>.
2. <http://www.nptelvideos.in/2012/11/compiler-design.html>.

<b>SOFTWARE ENGINEERING</b>	
<b>CSE 322</b>	<b>Credits : 4</b>
Instruction : 4 Periods & 1 Tut/Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

Basic Mathematical Knowledge

Basic knowledge on procedural and object oriented programming

Basic knowledge on problem solving.

**Course Objectives:**

- To make the candidate understand the usage of Engineering Principles to solve complex real time problem by using both Structured and object oriented concepts.
- To learn how to work in groups to find a solution to a given complex problem.
- Learn to Plan a software project based on available resources.
- To manage a Software Project that is being built and to measure the progress and process of building software project.

**COURSE OUTCOMES:**

1. Classify the process of project life cycle model and design the SRS
2. Summarize & Evaluate the different architecture styles
3. Design the real world system based on Functional Oriented and Object Oriented Approach by using UML & DFD diagrams
4. Apply testing techniques on software products
5. Analyse & estimate the Software quality by using COCOMO model

**Mapping of course outcomes with program outcomes:**

Mapping	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO	1	1	3	1	1	1	1	1	1	2	3	2	1	3	2
	2	1	1	1	1	1	1	1	1	2	2	2	1	3	1
	3	1	3	3	2	3	1	1	1	3	1	2	1	3	1
	4	1	1	3	1	2	1	1	1	2	1	1	1	3	2
	5	1	2	3	3	1	1	1	1	2	1	1	1	3	1

**Course Contents:**

**UNIT-I**

**16Periods**

**Introduction to Software Engineering** – The problem domain, Software Engineering Challenges, Software Engineering approach, Software Engineering Concepts, Software Development Activities.

**Software Process** – Software Process, Desired Characteristics of Software Process, Software Development Process Models, Effort Estimation with COCOMO Model.

**Software Requirements Analysis and Specification** – Need for SRS, Functional and Non Functional Requirements, Completeness, Consistency, Clarity and Correctness, Problem

Analysis, Requirements Specification, Functional Specification with Use Cases an Objected Oriented Approach, Metrics,

**UNIT-II**

**10Periods**

**Software Architecture** – Role of Software Architecture, Architecture views, Component and Connector View, Architecture Styles, Discussion, Evaluating Architectures

**UNIT-III**

**20Periods**

**Design:**

**Function-Oriented Design** – Design Principles, Module –Level Concepts, Structured Design Methodology (Mainly Data Flow Diagram), Metrics,

**Object-Oriented Design** – OO Concepts, Design Concepts, Unified Modeling Language.

**UNIT-IV**

**10Periods**

**Testing** – Testing Fundamentals, Black Box Testing, White Box Testing, Testing Process, Metrics,

**UNIT-V**

**10Periods**

**Planning a Software Project – Process Planning**, Case study on Effort Estimation with COCOMO Model, Project Scheduling – overall and detailed scheduling, Software Configuration Management Plan, Quality Plan,

**TEXT BOOKS:**

1. Pankaj Jalote ,"*An Integrated Approach to Software Engineering*", Third Edition, Narosa Publication.

**REFERENCES BOOKS:**

1. Timothy C. Lethbridge, "*Object Oriented Software Engineering (Practical Software Development using UML and Java)*" TataMcGraw-Hill.
2. Rajib Mall, "*Fundamentals of Software Engineering*" ,4<sup>th</sup> edition, PHI

<b>WEB TECHNOLOGIES</b>	
<b>CSE 323</b>	<b>Credits:4</b>
Instruction : 4 Periods & 1 Tut/ Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

Basic knowledge of computer fundamentals in JAVA programming language.  
Student must have knowledge of some programming languages (such as C, C++)

**Course Objectives:**

- To learn designing of dynamic and interactive web pages by embedding Java Script code in HTML.
- To know how to design and to develop simple database driven web applications using a server-side scripting language –PHP; servlet, JSP technology.
- To describe how a given web server responds to an HTTP request for a dynamic resource.
- To create good, effective and customized websites using HTML, CSS, PHP.

**Course Outcomes:**

By the end of the course, the student will be able to:	
1.	Given the knowledge of HTML, CSS and JAVASCRIPT, Learner is able to Design the static web pages using HTML5, apply styles using CSS and provide dynamic nature to the web pages using JAVASCRIPT to create a good website structure.
2.	Apply the PHP concepts of decision making, looping, form processing, cookies, sessions to create a responsive website, to deploy the website in the server, analyze the browser capabilities.
3.	Understand the need for a web server, servlets-life cycle, servlet API,HTTP Packages for handling http request and responses, cookies, session tracking concepts, compare servlets and CGI in website development with respect to handling request and responses..
4.	Understand Java Server Pages (JSP) objects, variables, error handling, passing control between JSP pages, scope and memory usage of objects, Compare JSP and servlets in website development.
5.	Develop a website to access database content from the user interface using database programming using PHP, Servlets and JSP. Identify the need of JSON in websites by understanding JSON syntax, objects and arrays.

**Mapping of course outcomes with program outcomes :**

Mapping	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO	1	1	1	2	3	-	2	1	1	1	1	1	2	2	-
	2	1	1	2	2	3	2	1	1	1	1	1	2	2	-
	3	1	2	3	-	-	2	1	1	1	1	1	2	2	-
	4	1	2	3	-	-	2	1	1	1	1	1	2	2	-
	5	1	1	2	2	3	2	1	1	1	1	1	2	2	-

**SYLLABUS**

**UNIT-I:**

**12Periods**

**HTML5 Common tags:**

Basics of HTML5, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, Meta tags, Character entities, frames and frame sets, Web site structure.

**Java Script:** Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

**UNIT-II:****14Periods****PHP:**

Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP.

**UNIT-III:****16Periods****Web Servers and Servlets:**

Introduction to web server installation, Introduction to Servlets: Lifecycle of a Servlet, The Servlet API, The javax.servelet Package, Reading Servlet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

**UNIT-IV:****16Periods****JSP Application Development:**

Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations.

**UNIT-V:****10Periods****Database Access:**

Database Programming using JDBC, Studying Javax.sql.\* package, Accessing a Database from Servlets &JSP Page , Application – Specific Database Actions.

**JSON:**

Introduction to JSON,JSON syntax, Need of JSON in real web sites, JSON object, JSON array, Complex JSON objects, Reading JSON objects using JQuery

**Text Books:**

1. Dietel and Nieto PHI/Pearson Education Asia., “*Internet and World Wide Web – Howto program* “,4<sup>th</sup>edition,PearsonEducation
2. Robin Nixon, “ *Learning PHP, MySQL, and JavaScript* “, 4<sup>th</sup> edition O.Reily
- 3.Lindsay Bassett ,” *Introduction to JavaScript Object Notation*”, first edition O.Reily

**References Books:**

1. Steven Holzner, “*HTML Black Book: The Programmer's Complete HTMLReference Book*” Coriolis GroupBooks
2. Hans Bergsten , Java Server Pages, 3<sup>rd</sup>edition,SPDO“Reilly
3. Deitel/Deitel/Santry ,”*Advanced Java™ 2 Platform How to Program*, ”2<sup>nd</sup>edition,OReily

**Web Resources:**

<http://www.imad.tech/https://www.w3schools.com/html/http://www.javatpoint.com/jsp-tutorial>  
<http://www.javatpoint.com/php-json-example>

<b>COMPUTER ARCHITECTURE</b>	
<b>CSE 324</b>	<b>Credits:4</b>
Instruction : 4 Periods & 1 Tut/Week	Sessional Marks :40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

Basic knowledge of Operating Systems and Computer Organization

**Course Objectives:**

- Understand the different classes of architecture.
- Understand the memory hierarchy in different classes of computer architecture.
- Learn the basic principle of pipelines and vector processing.
- Know the difference between instruction level and thread level parallel processing.

**Course Outcomes:**

By the end of the course, the student will be able to:

1. Describe the functional requirements, performance analysis and technology enhancements of different classes of architecture.
2. Explain about different levels of memory arrangement and demonstrate the memory hierarchical arrangement of Arm Cortex-A8 and Intel Core i7.
3. Analyze the principle of instruction level parallelism through pipelining in Intel Corei7 and ARM CORTEX A-8 processors.
4. Analyze the thread level parallelism on distributed shared memory and directory based coherence by applying synchronization techniques in multi core processor environment.
5. Illustrate the workloads for Google warehouse-scale computer.

**Mapping of course outcomes with program outcomes:**

Mapping	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO	1	1	3						1			1	1	1
	2	1	3		2				1			1	1	1
	3	1	2	3	2				1			1	1	2
	4	1	2	3	2				1			1	1	2
	5	1	2						1			1	1	2

**SYLLABUS**

**UNIT-I:**

**10Periods**

**Quantitative principles of Computer Design:**

Overview of Computer organization, Introduction, classes of computer, defining computer architecture, trends in technology and power, measuring and reporting performance, quantitative principles of computer design.

**UNIT-II:**

**12Periods**

**Memory hierarchy design:**

Introduction, ten advanced optimizations of cache performance, memory technology and optimizations, virtual memory and virtual machines, the design of memory hierarchy, memory hierarchies in Arm Cortex-A8 and Intel Corei7.

**UNIT-III:****14Periods****Instruction-Level Parallelism and its Exploitation:**

Instruction-level parallelism(ILP) - concepts and challenges, basic compiler techniques for exposing ILP, reducing branch costs, overcoming data hazards and dynamic scheduling, hardware based speculation, exploiting ILP using multiple issue and static scheduling, exploiting ILP using dynamic scheduling, multiple issue and speculation, studies of the limitations of ILP, multi-threading, Intel Corei7 and ARM CORTEX A-8.

**UNIT-IV:****14Periods****Thread Level Parallelism:**

Introduction, shared-memory architectures, performance of shared-memory multiprocessors, distributed shared-memory and directory-based coherence, synchronization, models of memory consistency, multicore processors and their performance.

**UNIT-V:****12Periods****Warehouse-Scale Computers:**

Introduction, programming models and workloads for warehouse-scale computers, computer architecture, physical infrastructure and costs, A Google warehouse-scale computer.

**Text Books:**

1. John L. Hennessy, David A. Patterson, " *Computer Architecture: A Quantitative Approach*" 5th Edition, An Imprint of Elsevier.

**Reference Books:**

1. John P. Shen and Miikko, " *Modern Processor Design : Fundamentals of Super Scalar Processors* ", H. Lipasti , Waveland Press.
2. Kai Hwang, Faye A. Briggs, " *Computer Architecture and Parallel Processing* ", MC Graw Hill.
3. Dezso Sima, Terence Fountain, Peter Kacsuk, " *Advanced Computer Architecture -A Design Space Approach* ", Pearson Ed.

**Web Resources:**

<https://www.coursera.org/learn/comparch>



<b>Smart Systems Design &amp; Programming</b>	
<b>CSE 325(A)</b>	<b>CREDITS: 3</b>
<b>Instruction: 4 Theory &amp; 1 Tutorial/ Week</b>	<b>Sessional Marks: 40</b>
<b>End Exam: 3 Periods</b>	<b>End Exam Marks: 60</b>

**Prerequisites:**

Basic knowledge of Microprocessor & Interfacing, Computer Organization, Digital logic circuits

Student must have knowledge of C programming language.

**Course Objectives:**

- To learn the design and programming of microcontroller.
- To learn basics of ARM processor.
- To learn to program using ARM assembly language.
- To familiarize the students with Arduino kit and Raspberry Pi to implement small scale embedded system applications.

**Course Outcomes:**

By the end of the course students will be able:

CO-1:	To describe the Embedded system fundamentals, design and memory management.
CO-2:	To write programs in ARM based assembly level language.
CO-3:	To design Embedded system applications.
CO-4:	To test and debug embedded system applications.
CO-5:	To develop applications on Arduino and Raspberry Pi kits.

**Mapping of Course Outcomes with Program Outcomes:**

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		2		1		2	1		1	1		1		1
CO2	2	1	1	2	2	1		2	1	2			1	1
CO3		1	2	2	2	1		1	2	1	1	1	1	
CO4		1	2	3	2	1		1	2	1	1	1	1	
CO5	2	2		2	2	1			2	2	2	1	1	

**SYLLABUS**

**UNIT-I**

**10Periods**

**Introduction to Embedded Systems** - Application domain of embedded systems, Desirable features and general features, Figures of merit, classification of MCUs.

**Hardware Point of View** - Microcontroller Unit, Memory for embedded systems.

**Examples** – Mobile phone, Automotive electronics, RFID, WISENET, Robotics, Biomedical applications, Brain machine interface

**UNIT-II**

**10Periods**

**Hardware Software Co-design and Embedded Product Development Lifecycle Management** – Hardware Software Co-design, Modeling of systems, Embedded product development lifecycle management, Lifecycle models.

**Embedded Design: A Systems Perspective** – A typical example, Product design, The design process, Testing, Bulk manufacturing.

**UNIT-III**

**15Periods**

**ARM Architecture and Assembly Language Programming** – History, Architecture, Interrupt vector table, Programming, ARM Assembly language, ARM instruction set, Conditional execution, Arithmetic, logical & compare instructions, Multiplication, Division, Starting ALP, General structure of an Assembly Language Line, Writing ALP, Branch instructions, Loading Constants, Load and Store instructions.

#### **UNIT-IV**

**10Periods**

**Introduction to Arduino :** What Is Physical Computing?. The Arduino Way, The Arduino Platform, Really Getting Started with Arduino. Advanced Input and Output. Troubleshooting. **Case study:** Automatic Garden-Irrigation System. .

#### **UNIT-V**

**15Periods**

Introducing the Raspberry Pi: The History of Raspberry Pi, Exploring the Pi Board, Hardware Requirements of the Pi, The Pi Operating System, Connecting the Peripherals, Configuring the Pi, Getting Started with Python, Accessing the GPIO Pins, Using the GPIO Library in python, Connecting the Temperature/Humidity Sensor, Setting Up the Motion Sensor. **Case Study:** Weather Station

#### **Text Books:**

1. Das, Lyla B, *Embedded Systems: An Integrated Approach*, Pearson Education India, 2013.
2. Donat, Wolfram, *Learn Raspberry Pi Programming with Python*, Apress,2014.
3. Banzhi, Massimo, and Michael Shiloh, *Getting Started with Arduino: The Open Source Electronics Prototyping Platform*, Maker Media, Inc.,2014.

#### **Reference Books:**

3. Hohl, William, and Christopher Hinds. *ARM Assembly Language: Fundamentals and Techniques*, Crc Press,2016.
4. Monk, Simon, *Raspberry Pi cookbook: Software and hardware problems and solutions*, O'Reilly Media, Inc.,2016.
5. Simon Monk, *30 Arduino™ Projects for the Evil Genius*, The McGraw-Hill Companies.

#### **Web Resources:**

1. <http://nptel.ac.in/syllabus/117106111/>
2. Muhammad Ali Mazidi, *ARM Assembly Language Programming & Architecture*, Kindle edition

<b>HIGH PERFORMANCE COMPUTING</b>	
<b>CSE325(B)</b>	<b>Credits : 4</b>
Instruction : 4 Periods & 1Tut/ Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

Basic fundamentals of Data Structures  
 Knowledge on Computer Organization, Computer Networks  
 Exposure to Programming skills in C/C++

**Course Objectives:**

- Introducing different parallel machines
- Describe high performance computing in the context of scientific computing.
- Understand the concepts of parallel processing as it pertains to high-performance computing

**Course Outcomes:**

By the end of the course, the student will be able to:

1. Interpret contemporary computing machines, Performance metrics of multicore machines, parallel programs.
2. Apply PCAM methodology, Decomposition patterns for multicore machines, parallel programs.
3. Examine shared memory programming and Thread Management methods.
4. Analyze Loop-level parallelism, Task parallelism and its optimization issues.
5. Estimate Distributed memory programming and communication methods namely point-to-point, Non-blocking communication.

**Mapping of course outcomes with program Outcomes :**

Mapping	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO	1	2	1	1	2		1						1		
	2	2	2	1	1		1						1		
	3	2	2	1	2		1	1			1		1		
	4	2	2	2	2		1	1			1	1	1		1
	5	2	2	2	1		1	1			2	1	1		1

**SYLLABUS**

**UNIT I:**

**12Periods**

**Introduction:**

The era of multi core machines , A taxonomy of parallel machines , A glimpse of contemporary computing machines , Performance metrics , Predicting and measuring parallel program performance .

**UNIT II:**

**Multi core and parallel program Design:**

**15 Periods**

Introduction, The PCAM methodology, Decomposition patterns- Task parallelism, Divide-and-conquer decomposition, Geometric decomposition, Recursive data decomposition, Pipeline decomposition, Event-based coordination decomposition, Program structure

patterns- Single-program, multiple-data, Multiple-program, multiple-data, Master-worker, Map-reduce, Fork/join, Loop parallelism, Matching decomposition patterns with program structure patterns.

### **UNIT III :**

#### **Shared-memory programming: threads**

**17 Periods**

Introduction, Threads, Design concerns, Semaphores, Applying semaphores in classical problem, Monitors, Applying monitors in classical problems, Dynamic vs. static thread management, Debugging multithreaded applications, Higher-level constructs: multithreaded programming with out threads.

### **UNIT IV :**

#### **Shared- memory programming: OpenMP**

**17 Periods**

Introduction, first Open MP program, Variable scope, Loop-level parallelism, Task parallelism , Synchronization constructs . Correctness and optimization issues, A Casestudy: sorting in OpenMP.

### **UNIT V :**

#### **Distributed memory programming:**

**17 Periods**

Communicating processes, MPI Core concepts, MPI program, Program architecture, Point-to-Point communication, Non blocking communications, Point-to-Point communications, Error reporting and handling, Collective communications, Communicating objects, Node management: communicators and groups, One-sided communications, I/O considerations, Combining MPI processes with threads, Timing and performance measurements, Debugging and profiling MPI programs

#### **Text Book:**

1. Gerassimos Barlas, “ *Multicore and GPU Programming An Integrated Approach*“ , 1st Edition, MK Publishers.

#### **Reference Book:**

1. Ananth Grama, George Karypis , Vipin Kumar, Anshul Gupta, “*Introduction to Parallel Computing*”, 2nd edition , Addison Wesley publishers

#### **Web Resources:**

<https://www.udacity.com/course/high-performance-computing--ud281>  
<http://nptel.ac.in/courses/106108055/#>  
<http://cs.nyu.edu/courses/fall10/G22.2945-001/lectures.html>  
<http://www.hpc.cam.ac.uk/>  
<http://www.hpc.cam.ac.uk/getting-help/introtohpc-course/view>  
<https://hpc.llnl.gov/training/tutorials>  
<https://www.wolfram.com/training/courses/hpc/>  
<https://www.epcc.ed.ac.uk/online-courses/courses/online-courses/practical-introduction-hpc>

<b>PRINCIPLES OF PROGRAMMING LANGUAGES</b>	
<b>CSE325(C)</b>	<b>Credits: 4</b>
Instruction : 4 Periods & 1Tut/ Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

Basic knowledge of computer fundamentals,  
Student must have knowledge of some programming languages (such as C, C++), Functional programming.

**Course Objectives:**

- To understand the fundamental principles of language design.
- To learn formal syntax and semantics.
- Discuss about control structures and abstractions.
- Introducing data typing and abstractions.

**Course Outcomes:**

By the end of the course, the student will be able to:

1. Identify the importance of programming languages and programming environments.
2. Analyze the scope of the variables based on the data types.
3. Evaluating the expressions and programs for solving a computational problem.
4. Memorize the principles of programming language abstractions.
5. Analyse the concepts of Exception Handling in object oriented programming languages.

**Mapping of course outcomes with program Outcomes :**

Mapping		PO												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO	1	2	3	2	1	1			1	3	2	2	3	1	2
	2	2	2	3	3	2		1	1	2	2	1	2	2	2
	3	3	3	3	3	1	1	1	1	2	2	1	3	2	2
	4	2	2	3	1	1	1		1	3	1	1	2	1	2
	5	2	3	3	3	2			1	2	2	1	2	2	2

**SYLLABUS**

**UNIT-I:**

**15 Periods**

**Preliminaries:**

Reasons for Studying Concepts of Programming Languages, programming Domains Language, Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments.

**Describing Syntax and Semantics:**

Introduction, the General Problem of Describing Syntax, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs: Dynamic Semantics.

**Lexical and Syntax Analysis:**

Introduction, Lexical Analysis, The Parsing Problem, Recursive-Descent Parsing, Bottom-Up Parsing.

**UNIT-II:**

**15 Periods**

**Names, Bindings, and Scopes :**

Introduction, Contents, Variables, The Concept of Binding, Scope ,Scope and Lifetime, Referencing Environments, Named Constants .

**Data Types:**

Introduction, Primitive Data Types, Character String Types, User-Defined Ordinal Types Array Types , Associative Arrays , Record Types , Tuple Types , List Types , Union Types Pointer and Reference Types, Type Checking , Strong Typing, Type Equivalence,

Theory and Data Types.

**Expressions and Assignment Statements:**

Introduction , Arithmetic Expressions , Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short-Circuit Evaluation, Assignment Statements , Mixed-Mode Assignment .

**UNIT-III:**

**15 Periods**

**Statement-Level Control Structures:**

Introduction, Selection Statements, Iterative Statements, Unconditional Branching Guarded Commands.

**Subprograms :**

Introduction , Fundamentals of Subprograms Design Issues for Subprograms Local Referencing Environments Parameter-Passing Methods, Parameters That Are Subprograms , Calling Subprograms Indirectly , Overloaded Subprograms, Generic Subprograms , Design Issues for Functions , User-Defined Overloaded Operators, Closures , Coroutines.

**UNIT-IV:**

**7 Periods**

**Implementing Subprograms:**

The General Semantics of Calls and Returns, Implementing “Simple” Subprograms Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks Implementing Dynamic Scoping .

**UNIT-V:**

**10 Periods**

**Exception Handling and Event Handling :**

Introduction to Exception Handling, Exception Handling in Ada , Exception Handling in C++ , Exception Handling in Java, Introduction to Event Handling, Event Handling with Java Event Handling in c#.

**Text Books:**

1. ROBERT W. SEBESTA University of Colorado at Colorado Springs  
“*concepts of programming languages*”, Tenth edition
2. Terrence W. Pratt Marvin V. 56 Zelkowitz, “*Programming languages – Design and Implementation*”, .3 rd Edition, Prentice Hall of India.

**Reference Books:**

1. Fundamentals of Programming Languages, Design & Implementation by Seyed H.Roosta. Vikas publications. 1st Edition.
2. Paradigm and Practice – Doris Appleby Julius J. Vendekopple, “*Programming Languages*” 1st Edition., Tata McGrawHill

**Web Resources**

:<https://web.cs.dal.ca/~nzeh/Teaching/3136/Notes/binding.pdf>  
f [www2.hawaii.edu/~pager/313old/slides/pl8ch10.ppt](http://www2.hawaii.edu/~pager/313old/slides/pl8ch10.ppt).  
[cs.boisestate.edu/~alark/cs354/lectures/control\\_structures.pdf](http://cs.boisestate.edu/~alark/cs354/lectures/control_structures.pdf)

<b>ADVANCED DATA STRUCTURES</b>	
<b>CSE325(D)</b>	<b>Credits: 4</b>
Instruction : 4 Periods & 1 Tut/ Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

Knowledge of Data structures.

Student must have knowledge of some programming languages (such as C, C++, Java).

**Course Objectives:**

- Understand a variety of advanced data structures (skip lists, hash tables, priority queues, balanced search trees, graphs).
- Give the advantages and dis-advantages of each of the advanced data structure.
- Learn how to apply algorithm design techniques and data structures to solve problems.
- Learn different external sorting techniques and analyze their efficiency.

**Course Outcomes:**

By the end of the course, the student will be able to:	
1.	Describe a variety of advanced data structures (skip lists, hash tables, priority queues, balanced search trees, graphs).
2.	Identify different solutions for a given problem; analyze advantages and disadvantages to different solutions.
3.	Demonstrate an understanding of external memory and external sorting algorithms.
4.	Apply learned algorithm design techniques and data structures to solve problems.
5.	Master a variety of advanced abstract data type (ADT) and data structures and their implementations.

**Mapping of course outcomes with program outcomes :**

Mapping	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO	1	2	1	1	1	1							1	2	2
	2	1	3	3	2								1	3	3
	3	2	1	1	1									2	2
	4		3	3	3	1							1	3	3
	5	3	2	2	2	1							1	3	3

**SYLLABUS**

**UNIT-I:**

**12Periods**

**Skip lists and Hashing:**

Sets, Map, Dictionaries, representation of dictionary as ADT, Linear list, skip list, hash table representation, an application-text compression using dictionary.

**UNIT-II:****15 Periods****Balanced Search Trees:**

Red-black trees, Representation of Red-black tree, Insertion, Deletion and searching of nodes in Red-black tree. Splay trees, B-Trees, Indexed Sequential Access Method(ISAM), B-Trees of order m, Representation of B-Tree, Insertion, deletion and searching a node in B-Tree.

**UNIT-III:****12 Periods****Priority Queues:**

Binary heap, Applications of priority queues, leftist heaps, Binomial queues.

**UNIT-IV:****12Periods****Sorting:**

Shell sort, Heap sort, Quick sort, Indirect sorting, decision trees, bucket sort, External sorting.

**UNIT-V:****12 Periods****Graphs:**

Graph algorithms-Topological sorting, shortest-path algorithms- unweighted shortest path, graphs with negative edge cost, acyclic graphs, Network flow problems, Applications of DFS. Introduction to NP-Completeness.

**Text Books:**

1. SartajSahni, "Data Structures, Algorithms and Applications in C++", Second Edition, University Press
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Third Edition, Pearson Education.

**Reference Books:**

- 1 Richard F.Gilberg, BehrouzA, Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, Cengage Learning.
2. NB Venkateswarulu and EV Prasad, "C and Data structures: A Snap Shot Oriented Treatise with Live Examples from Science and Engineering", S Chand, 2010.

**Web Resources:**

1. <http://nptel.ac.in/courses/106102064/>
2. <http://nptel.ac.in/courses/106103069/>



<b>DIGITAL IMAGE PROCESSING</b>	
<b>CSE325(E)</b>	<b>Credits: 4</b>
Instruction : 4 Periods & 1Tut/ Week	Sessional Marks : 40
End Exam : 3Periods	End Exam Marks : 60

**Prerequisites:**

Knowledge of computer graphics,  
 Basic knowledge of linear algebra,  
 Basic knowledge of probability and statistics,  
 Basic programming skills (C/ Matlab preferred).

**Course Objectives:**

- To make the students to be familiar with basic image processing techniques for solving real problems,
- To make the students to have general overview on digital image processing concept along with its uses and applications,
- To make the students gain knowledge about representation of a digital image in different domains and the transformations between those domains,
- To make the students learn about various morphological operations on a digital image.

**Course Outcomes:**

By the end of the course, the student will be able to:

1. Apply the basic concepts of 2D image acquisition, sampling, quantization, relationships between pixels and components of image.
2. Analyze the filtering techniques in spatial domain for face reorganization, pattern reorganization and segmentation.
3. Analyze and apply the filtering techniques in frequency domain for classify the images.
4. Apply image morphological techniques for manipulate digital images
5. Apply the image Segmentation techniques on Edge detection and Region-Based Segmentation.

**Mapping of course outcomes with program outcomes:**

Mapping		PO												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO	1	3	2	1	2	2	0	1	1	1	1	1	1	1	1	3
	2	3	3	2	2	2	0	0	0	1	1	1	1	1	1	3
	3	3	3	2	2	2	0	0	0	1	1	1	1	1	1	3
	4	3	2	3	3	3	2	1	1	2	2	2	2	2	2	3
	5	3	1	3	3	3	2	1	1	2	2	2	2	2	2	3

**SYLLABUS**

**UNIT-I:**

**08Periods**

**Introduction to Digital Image Processing:**

Origins, Applications, Fundamental Steps, Components of a digital image processing system; Image Sensing and acquisition, Simple image formation model; Image Sampling and Quantization; Basic relationships between pixels; Mathematical tools used in digital image processing.

**UNIT-II:****10Periods****Intensity Transformations and Spatial Filtering:**

Background; Basic intensity transformation functions; Histogram Processing; Fundamentals of spatial filtering; Smoothing spatial filters; Sharpening spatial filters; Combining spatial enhancement methods.

**UNIT-III:****12Periods****Filtering in the Frequency Domain:**

Background; Preliminary concepts; Discrete Fourier transform of one and two variables, Properties of the 2D- Discrete Fourier transform; The basics of filtering in the frequency domain; Image smoothing using frequency domain filters; Image Sharpening Using Frequency Domain Filters; The fast Fourier transform.

**UNIT-IV:****7Periods****Morphological Image Processing:**

Preliminaries; Erosion and Dilation; Opening and closing; the Hit-or-Miss transformation; Basic morphological algorithms; Gray-Scale morphology.

**UNIT-V:****8Periods****Image Segmentation:**

Fundamentals; Point, Line, and Edge Detection; Thresholding; Region-Based Segmentation; Segmentation using morphological watersheds.

**Text Book:**

1. Gonzalez Rafael C and Woods Richard E, " *Digital Image Processing*", 3rd Edition, Prentice Hall, 2008.

**Reference Books:**

1. Pratt William K, " *Digital Image Processing: PIKS Scientific Inside*", 4th Edition, John Wiley, 2007. (TA1632.P917 2007)•
2. Pitas Ioannis, " *Digital Image Processing Algorithms and Applications*", John Wiley, 2000. (TA1637.P681)•
3. Jain Anil K, " *Fundamentals of Digital Image Processing*", PrenticeHall, 1989. (TA1632.J25)

**Web Resources:**

<http://nptel.ac.in/courses/117105079/>

<b>NOSQL DATABASES</b>	
<b>CSE325(F)</b>	<b>Credits:4</b>
Instruction : 4 Periods & 1 Tut/Week	Sessional Marks : 40
End Exam : 3Periods	Ena Exam Marks : 60

**Prerequisites:**

Knowledge on Relational Database management systems.

**Course Objectives:**

- Distinguish and describing how NoSQL databases differ from relational databases from a theoretical perspective.
- Explore the origins of NoSQL databases and the characteristics.
- Demonstrate competency in selecting a particular NoSQL database for specific use cases.
- Demonstrate Document databases with Mongo DB.

**Course Outcomes:**

By the end of the course, the student will be able to:	
1.	Compare and contrast the uses of relational RDBMSs and NoSQL systems for different types of data and applications.
2.	Differentiate various data models.
3.	Differentiate Key value Databases and document databases.
4.	Create a sample database using NoSql.

**Mapping of course outcomes with program outcomes:**

Mapping	P O												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO	1	2	3	1		3									3
	2	1	2			3									3
	3		3	1	3	3									3
	4		3	1	2	3							2		
	5					3								3	3

**SYLLABUS**

**UNIT-I :Why NoSQL?**

**10Periods**

The value of relational databases – Impedance mismatch – Application and integration databases – Attack of the cluster.

**UNIT-II :**

**Aggregate Data Models:**

**18Periods**

Aggregates - Example of Relations and Aggregates – Consequences of Aggregate Orientation - Key-Value and Document Data Models - Column-Family Stores

**More Details on Data Models :**

Relationships - Graph Databases - Schemaless Databases - Materialized Views - Modeling for Data Access.

**UNIT –III : Distribution Models:**

**16 Periods**

Single Server – Sharding - Master-Slave Replication - Peer-to-Peer Replication –Combining Sharding and Replication

**Consistency:**

Update Consistency - Read Consistency - Relaxing Consistency - The CAP Theorem - Relaxing Durability.

**UNIT-IV: Key-Value Databases:****16Periods**

What Is a Key-Value Store - Key-Value Store Features – Consistency – Transactions - Query Features - Structure of Data – Scaling - Suitable Use Cases - Storing Session Information - User Profiles, Preferences - Shopping Cart Data - When Not to Use - Relationships among Data – Multi operation Transactions - Query by Data - Operations by Sets.

**UNIT-V: Document Databases:****20 Periods**

What Is a Document Database? – Features – Consistency – Transactions – Availability - Query Features – Scaling - Suitable Use Cases - Event Logging - Content Management Systems - Blogging Platforms - Web Analytics or Real-Time Analytics - E-Commerce Applications - When Not to Use - Complex Transactions Spanning Different Operations - Queries against Varying Aggregate Structure.

**Introduction to MongoDB:**

Introduction to MongoDB - The Data Model - Working with Data – GridFS.

**TEXT BOOK:**

1. PramodJ.SadalagandMartinFowler, ”*NoSQLDistilled,ABriefGuidetotheEmerging World of Polyglot Persistence*” ,1<sup>st</sup> Edition, Addison Wesley
2. David Hows, EelcoPlugge, Peter Membrey , and Tim Hawkins, “*The definitive guide to MongoDB*”, “*A complete guide to dealing with big data using MongoDB*”. 1<sup>st</sup> Edition, Apress

**Web Resources:**

1. <http://allvidelectures.com/courses/course/96uv57kBOZ>.
2. <https://university.mongodb.com/>

<b>OPEN SOURCE TECHNOLOGIES LAB</b>	
<b>CSE 326</b>	<b>Credits : 2</b>
Instruction : 3 Hrlab/Week	Sessional Marks : 50
End Exam : 3Periods	End Exam Marks : 50

**Prerequisites:**

- Basic knowledge of Computer Networks
- Exposure to Problem solving techniques and programming skills

**Course Objectives:**

- Introducing Open Source project development to students.
- Introducing Open Source Technologies- HTML,CSS, JAVASCRIPT,PHP,MYSQL,
- APACHE.

**Course Outcomes:**

By the end of the course, the student will be able to:	
1.	Understand and analyze an open source software project.
2.	Examine open source project workflow using github.
3.	Develop static web pages using HTML, CSS.
4.	Develop a dynamic web site with Client side scripting language-Java script and Server side scripting language-PHP
5.	Integrate PHP, JAVASCRIPT and MYSQL technologies in open source environments to develop a complete web site and deploy the website using WAMP/MAMP/LAMP/XAMP Servers.

**Mapping of course outcomes with program outcomes:**

Mapping	P O												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO	1	2	3	-	-	-	-	1	1	-	1	-	2	1	-
	2	2	3	-	-	-	-	1	1	-	1	-	2	1	-
	3	1	2	2	2	3	2	2	1	2	1	1	2	1	-
	4	1	2	2	2	3	2	2	1	2	1	1	2	1	-
	5	1	2	2	2	3	2	2	1	2	1	1	2	1	-

**SYLLABUS**

**LIST OF EXPERIMENTS:**

**1 week**

Technical report on Open Source Software Development Style and famous open source projects

**GITUB(version Control System) 2 weeks**

Install git and create a GitHub account, Create a local git repository, Add a new file to the repository, Add a file to the staging environment, Create a commit, Create a new branch, Create a new repository on GitHub.

**HTML & Java Script(Technologies for Client Side Programming)**

**4 weeks**

HTML basic tags, HTML forms. Java script Basics, JavaScript syntax, Statements, Comments, Variables, Operators, If...Else, Popup Boxes, For Loop, While Loops, Events, Functions, Objects.

**PHP(Technology for Server Side Programming)**

**5 weeks**

Creating simple webpage using PHP, Use of conditional statements in PHP, Use of looping statements in PHP, Creating different types of arrays, Usage of array functions, Creating user

defined functions, Creation of sessions, cookies, Creation of cookies, Database connectivity in PHP with MySQL, Validating Input, Formatting the Output.  
Developing an Open Source Project using PHP, MySQL, Java Script and uploading in GitHub 3 weeks

**Text Books :**

1. Dietel and Nieto, " *Internet and World Wide Web – How to program* ", 4<sup>th</sup> Edition  
PHI/Pearson EducationAsia.
2. Steven Holzner, " *PHP : Complete reference*", 1<sup>st</sup> Edition, McGraw Hill Education

**Reference Books:**

**Web Resources:**

<https://www.udacity.com/course/how-to-use-git-and-github--ud775>

<https://www.codecademy.com/learn/learn-git>

<https://www.coursera.org/learn/html-css->

[javascripthttps://www.coursera.org/learn/duke-programming-](https://www.coursera.org/learn/duke-programming-)

<webhttps://www.w3schools.com/php/>

<b>SOFTWARE ENGINEERING LAB/MINI PROJECT LAB</b>	
<b>CSE 327</b>	<b>Credits: 2</b>
Instruction: 3 Hr lab/ Week	Sessional Marks : 50
End Exam : 3Periods	End Exam Marks : 50

**Prerequisites:**

Object Oriented Programming.

**Course objectives:**

- To impart state-of-the-art knowledge on Software Engineering and UML in a practical and interactive manner through an interactive simulation and hands on.
- To present sample case studies to demonstrate practical applications of different concepts.
- To provide a scope to students where they can solve small, real life complex problems.

**Course Outcomes:**

1. Analyze the case study and apply the UML notations.
2. Estimate the project metrics using COCOMO
3. Calculate the complexity using McCabe's Cyclomatic Complexity
4. Compare and contrast testing techniques

**Mapping of Course Outcomes with Program Outcomes :**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS1	Ps2
CO1	3	3	3	3	3	2	1	1	2	3	1	2	3	3
CO2	1	2	3	3	1	2	2	1	1	1	2	1	3	2
CO3	1	2	3	3	1	2	2	1	1	1	2	1	3	2
CO4	1	2	3	3	1	1	1	2	2	2	1	2	3	2

**SYLLABUS**

**LIST OF EXPERIMENTS :**

**Identifying Requirements from Problem Statements: 1 week**

Requirements, Characteristics of Requirements, Categorization of Requirements, Functional Requirements, Identifying Functional Requirements, Preparing Software Requirements Specifications

**Estimation of Project Metrics: 1week**

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

**Modeling UML Use Case Diagrams and Capturing UseCaseScenarios: 1 week**

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

**Identifying Domain Classes from the Problem Statements:** **1 week**  
Domain Class, Traditional Techniques for Identification of Classes, Grammatical Approach Using Nouns, Advantages, Disadvantages, Using Generalization, Using Subclasses, Steps to Identify Domain Classes from Problem Statement, Advanced Concepts

**Statechart and Activity Modeling:** **1week**  
Statechart Diagrams, Building Blocks of a Statechart Diagram, State, Transition, Action, Guidelines for drawing Statechart Diagrams, Activity Diagrams, Components of an Activity Diagram, Activity, Flow, Decision, Merge, Fork, Join, Note, Partition, A Simple Example, Guidelines for drawing an Activity Diagram

**Modeling UML Class Diagrams and Sequence Diagrams:** **1 week**  
Structural and Behavioral Aspects, Class diagram, Class, Relationships, Sequence diagram, Elements in sequence diagram, Object, Life-line bar, Messages

**Modeling Data Flow Diagrams:** **1week**  
Data Flow Diagram, Graphical notations for Data Flow Diagram, Symbols used in DFD, Context diagram and leveling DFD

**Estimation of Test Coverage Metrics and Structural Complexity:** **1 week**  
Control Flow Graph, Terminologies, McCabe's Cyclomatic Complexity, Computing Cyclomatic Complexity, Optimum Value of Cyclomatic Complexity, Merits, Demerits

**Designing Test Suites:** **1week**  
Software Testing, Standards for Software Test Documentation, Testing Frameworks, Need for Software Testing, Test Cases and Test Suite, Types of Software Testing, Unit Testing, Integration Testing, System Testing, Example, Some Remarks

#### **Text Books:**

1. Pankaj Jalote, “*An Integrated Approach to Software Engineering*”, Third Edition, Narosa Publication.
2. Object Oriented Software Engineering by Bernd Bruegge and Allen H. Dutoit, Second Edition, Pearson Publication.

#### **Reference Books:**

1. Timothy C. Lethbridge, “*Object Oriented Software Engineering (Practical Software Development using UML and Java)*”, Tata McGraw-Hill.
2. Rajib Mall, “*Fundamentals of Software Engineering*”, 4<sup>th</sup> edition, PHI



## Quantitative & Verbal Aptitude - II (Common for all Branches)

<b>Code: CSE328</b>	<b>Credits: 2</b>
<b>Instruction: 4 Periods/Week (2QA + 2VA)</b>	<b>Sessional Marks -100</b>

### Web Resources:

1. <http://vlabs.iitkgp.ernet.in/se/>

### Course Objectives:

#### Quantitative aptitude-II:

1. To categorize, apply and use thought process to distinguish between concepts of reasoning
2. To prepare and explain the fundamentals related to various possibilities and probabilities related to quantitative aptitude.
3. To critically evaluate numerous possibilities related to puzzles.

#### Verbal aptitude-II:

4. To prepare the students on the various aspects of writing, organizing data, and applying their writing skills in their professional career.
5. To demonstrate and recommend the techniques required when interacting in different situations.
6. To apply the professional qualities/skills necessary for a productive career and to instill confidence through attitude building.
7. To plan activities in order to expose students to the different abilities required for working in a team, encourage them to glean information on current affairs and promote factual reading.
8. To illustrate and explain the intricacies/nuances involved in framing responses to the questions asked, reading between lines and reading beyond lines.

### Course Outcomes:

#### Quantitative Aptitude-II

The student will be able to	
1	Use their logical thinking and analytical abilities to solve reasoning questions from company specific and other competitive tests.
2	Solve questions related to permutation & combinations and probabilities from company specific and other competitive tests.
3	Understand and solve puzzle related questions from specific and other competitive tests.

## Verbal aptitude-II:

The student will be able to	
1	Write paragraphs on a particular topic, essays (issues and arguments), e mails, summaries of group discussions, make notes, statement of purpose (for admission into foreign universities), letters of recommendation (for professional and educational purposes)
2	Converse with ease during interactive sessions/seminars in their classrooms, compete in literary activities like elocution, debates etc., raise doubts in class, participate in JAM sessions/versant tests with confidence and convey oral information in a professional manner using reason
3	Prepare his/her resume, apply the business English concepts learnt in the course, and refine one's overall demeanor which would be very essential to face the corporate world
4	Prepare his/her resume, apply the business English concepts learnt in the course, and refine one's overall demeanor which would be very essential to face the corporate world
5	Respond to their interviewer/employer with a positive mind, customize answers to the questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews (stress, technical, HR) that they would face during the course of their recruitment process

## SYLLABUS

### Section –A (Quantitative Aptitude –II)

#### UNIT I

8Periods

#### Numerical Reasoning:

Problems related to Number series, Analogy of numbers, Classification of numbers, Letter series, Seating arrangements, Directions, blood relations and puzzle test.

#### UNIT II

4Periods

#### Combinatorics:

Counting techniques, Permutations, Combinations and Probability

#### UNIT III

4Periods

Data

sufficiency

Syllogisms

#### UNIT IV

4Periods

#### Application of Base system:

Clocks (Base 24), Calendars (Base7), Cutting of Cubes and cuboids

#### UNIT V

4Periods

#### Puzzle Solving & Time Management using various problems solving tools and techniques:

Selective puzzles from previous year placement papers

Selective puzzles from book Puzzles to puzzle you by

shakunataladevi Selective puzzles from book more puzzles by

shakunataladevi Selective puzzles from book puzzles by

George summers

**Books for practice**

1. Quantitative aptitude by RS Agarwal, S Chand Publications
2. Verbal and non verbal Reasoning by RS Agarwal from S Chand publications
3. Puzzles to puzzle you by shakunataladevi orient paper back publication
4. More puzzles by shakunataladevi orient paper back publication
5. Puzzles by George summers orient paper back publication.

**References:**

1. Barron's by Sharon Welner Green and Ira K Wolf (Galgotia Publications Pvt. Ltd.)
2. Material from 'IMS, Career Launcher and Time' institutes for competitive exams.
3. Reasoning by BS Sijwali Arihant publications
4. Reasoning Arun Sharma McGraw Hill publications

**Websites:**

6. [www.m4maths.com](http://www.m4maths.com)
7. [www.Indiabix.com](http://www.Indiabix.com)
8. 800score
9. Official GRE site
10. Official GMAT site

## **Section –B (Verbal Aptitude –II)**

### **UNIT I**

**4Periods**

General Essay writing, writing Issues and Arguments( with emphasis on creativity and analysis of a topic), paragraph writing, story writing, guidance in framing a 'Statement of purpose', 'Letters of Recommendation', business letter writing, email writing, email and business letter writing etiquette, letters of complaints/responses to complaints. Information transfer is taught with the help of tables, bar diagrams, and pie charts while framing /sending lengthy data where testing is done through Reading comprehension and Critical reasoning. Contextual meanings with regard to inflections of a word, frequently confused words, words often mis-used, words often mis-spelt, multiple meanings of the same word (differentiating between meanings with the help of the given context), foreign phrases. Enhanced difficulty level in spotting errors will be taken up with reference to competitive test based exercises.

### **UNIT II**

**4Periods**

Just a minute sessions, reading news clippings in the class, extempore speech, telephone etiquette, making requests/suggestions/complaints, elocutions, debates, describing incidents and developing positive non verbal communication. Analogies, YES-NO statements (sticking to a particular line of reasoning)

### **UNIT III**

**4Periods**

Corporate readiness, business idioms and expressions, reading newspapers/magazines, brushing up on general awareness, latest trends in their respective branches, resume preparation, understanding business /corporate language, managing emotions, problem solving, importance of team work, goal orientation, professional grooming, positive attitude, assertiveness and inter personal skills. Data sufficiency (answering questions within the ambit of the given text), Fact- Inference-Judgment (to identify statements as FIJ), Syllogisms (with emphasis on fallacies in reasoning), strong and weak arguments.

### **UNIT IV**

**6Periods**

Voice, direct & indirect speech, question tags, one word substitutes, and foreign phrases. An overview on group discussions, preparation for a group discussion, intricacies of a group discussion, topics for GDs (with special focus on controversial topics), structure of participation in a group discussion, roles played by the participants in a group discussion, constructive criticism, standard procedures followed whilst participating in a group discussion, frameworks that can be used for discussion, analysis of the discussion and exposure to case-based group discussions.

### **UNIT V**

**6Periods**

Different types of interviews (with emphasis on personal interview), preparation for an interview, areas of questioning, answering questions on general traits like strengths/weaknesses/hobbies/extracurricular activities, choosing role models, importance of non verbal communication while participating in interviews, tips to reduce nervousness during personal interviews, handling stress, suggestions for responding to tough/unknown questions, preparation on self and personality development.

**Note: The concepts learnt in Semester I will be tested in the Mid-term and Semester end exams during the II Semester as well.**

### **Reading/ Listening material:**

1. Newspapers like 'The Hindu', 'Times of India', 'Economic Times'.
2. Magazines like Frontline, Outlook and Business India.
3. News channels NDTV, National News, CNN

### **References:**

1. Books written by Stephen Covey and Dale Carnegie-Seven Habits of Highly Effective People etc-Simon & Schuster, Running Press book publishers
2. Books written by Bertrand Russell-Oxford University Press

### **Suggested General Reading**

1. **Who Moved My Cheese?** By Spencer Johnson-GP Putnam's Sons
2. **The art of War**-Sun Tzu by Nabla, Barnes & Noble
3. **The Monk Who Sold Ferrari**-Robin Sharma by Harper Collins, Jaico Publishers
4. **The Hobbit** and other books by JRR Tolkein-HarperCollins

### **Suggested Authors**

1. William Dalrymple
2. V.S. Naipaul
3. Kushwanth Singh
4. Ernest Hemingway
5. Charles Dickens
6. Leo Tolstoy
7. R.K. Narayan
8. Amita v Ghosh
9. Vikram Seth
10. Oscar Wilde
11. Sudha Murthy
12. Anshu Singh
13. Arundhati Roy