Shivaji University, Kolhapur

REVISED STRUCTURE

T.E. Computer Science & Engg. (Semester – V & VI)

W.E.F. 2015-16.

Semester – V

Sr. No.	Subject	L	T	P	Total	Theory Marks		TW	POE	Oral	Total Marks
						Written	Online				
1	Computer Graphics	3	-	2	5	50	50	50	-	-	150
2	System Programming	3	-	2	5	100	-	50	-	25	175
3	Object Oriented Modeling and Design	3	-	-	3	50	50	-	-	-	100
4	Computer Algorithms	4	1	-	5	100	-	25	-	-	125
5	Network Technologies	4	-	-	4	50	50	-	-	-	100
6	Programming Lab - III	3	-	4	7	-	-	50	50	-	100
7	Business English	-	1	-	1	-	-	25	-	25	50
	Total	**20**	**2**	**8**	**30**	**350**	**150**	**200**	**50**	**50**	**800**

Semester – VI

Sr. No.	Subject	L	T	P	Total	Theory Marks		TW	POE	Oral	Total Marks
						Written	Online				
1	Compiler Construction	3	-	2	5	50	50	25	-	-	125
2	Operating System - II	4	-	2	5	100	-	25	-	-	125
3	Database Engineering	4	-	2	6	50	50	25	50	-	175
4	Storage Networks	3	-	-	3	100	-	-	-	-	100
5	Information Security	3	1	-	4	50	50	25	-	-	125
6	Programming Lab - IV	2	-	2	4	-	-	25	50	-	75
7	Domain Specific Mini-Project	-	-	2	2	-	-	25	-	50	75
	Total	**19**	**1**	**10**	**30**	**400**	**100**	**150**	**100**	**50**	**800**

Note:

1. The term work as prescribed in the syllabus is to be periodically and jointly assessed by a team of teachers from the concerned department.
2. In case of tutorials, students of different batches be assigned problems of different types and be guided for the solution of the problem during tutorial session. Problems thus solved be translated into computer programs wherever applicable and executed by respective batches during practical session.
3. The assignments of tutorials and practicals need to be submitted in the form of soft copy and / or written journal.
4. Breakup of term work marks shall be as follows:
   a. For subjects having term work marks 25 -

- Mid-semester test – 5 marks.
- End-semester test – 5 marks.
- Tutorial assignments and / or practical performance – 15 marks.

b. For subjects having term work marks 50 –

- Mid-semester test – 10 marks.
- End-semester test – 10 marks.
- Tutorial assignments and / or practical performance – 30 marks.

5. The theory exam scheme is as under:

- 5.1 : For online exam the scheme to be followed is as under –

a. As mentioned in the structure above, **Three** theory papers of TE (CSE) Sem-V and **Three** theory papers of Sem-VI of 100 marks will be divided into two parts.
   - **Part-A**: 50 marks theory paper similar to the existing theory paper exam. The nature of the questions will be descriptive, analytical and problem solving.
   - **Part-B:** 50 marks computer based exam with multiple choice questions (MCQs) .

b. The marks obtained in the individual heads should be added and considered as marks of the respective theory paper out of 100 marks.

c. The questions of part-A and part-B will be based on the entire syllabus of the respective subjects.

d. The theory paper for part-A will consist of questions on all the **Six Units** of the syllabus carrying 50 marks.

e. The questions in part-B will be of 1 or 2 marks only.

f. Duration of part-A exam will of 2 hours and that of part-B will be of 1 hour.

g. No separate passing head for part-A and part-B.

h. The scheme of moderation / revaluation is not applicable for part-B, however is applicable for part-A

- 5.2 : For theory exam of 100 marks the scheme to be followed is as under :

a. The theory paper of 100 marks will be based on all **Six Units** of the syllabus.

b. The scheme of moderation / revaluation is applicable.

6. Passing scheme is as under -

a. The passing scheme for the subjects will be similar to existing scheme.

b. All the existing ordinances will be applicable for passing criteria.

T.E. (Computer Science and Engineering) Semester – VI

1. COMPILER CONSTRUCTION

Lectures: 3 hrs/week — Theory: 100 marks
Practicals: 2 hrs/week — Term work: 25 marks

Course Objectives:

1. To introduce the fundamentals of compilers and their phases.
2. To design and implement phases of a compiler.
3. To expose the students to various tools like Lex and Yacc.

UNIT 1- Introduction to Compiling:
Compilers, Phases of a compiler, Compiler construction tools, cousins of the compiler (6)

UNIT 2- Lexical Analysis:
Role of a Lexical analyzer, input buffering, specification and recognition of tokens, finite automata implications, designing a lexical analyzer generator. (5)

UNIT 3- Syntax Analysis:
Role of Parser, Writing grammars for context free environments, Top-down parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers. (7)

UNIT 4- Syntax Directed Translation and Intermediate Code Generation:
Syntax directed definitions, construction of syntax tree, S-attributed definitions, L-attributed definitions, Intermediate languages, assignment statements, back patching, procedure calls (7)

UNIT 5- Code Optimization:
Sources of optimization, Peephole optimization and basic blocks, loops in flow graphs, Data flow analysis and equations, code improving transformation and aliases (5)

UNIT 6- Code Generation:
Issues in design of a code generator and target machine, Run time storage management, Basic blocks and flow graphs, Next use information and simple code generator, Issues of register allocation, code generation from Dags. (6)

Text Book:

1. Compilers - Principles, Techniques and Tools - A.V. Aho, R. Shethi and J.D. Ullman (Pearson Education.)

Reference Books:

1. Crafting A Compiler with C - Charles Fischer, Richard LeBlanc (Pearson publication) (For practical use only)
2. Modern Compiler Design - D. Grune, H. Bal, C. Jacobs, K. Langendoen (Wiley publication) (For practical use only).
3. Modern Compiler Implementation in Java - Andrew W. Appel (Cambridge University Press 1998).
4. Compiler construction – D.M. Dhamdare (Mc-Millan)
5. Unix / Linux manuals.

Term work:

It should consist of minimum 10-12 experiments based on the above topics covering the following list of assignments.

1. Design of preprocessor for C program
2. Design a complete lexical analyzer for C language
3. Program to create a symbol table generator
4. Using recursive descent parsing method, design a syntax analyzer for Simple expression in C language.
5. Program to create a syntax tree for simple expression in C language using Recursive descent parsing techniques.
6. Implement intermediate code generator for the Boolean expression in three Address code format.
7. Implement intermediate code generator for the conditional statements in three Address code format
8. Program to implement bottom up parsing removing shift reduce conflict.
9. Write a program to implement code generator from a labeled tree.
10. Demonstration of compiler and interpreter using Lex and Yacc.

2. Operating System –II

Lectures: 4 Hrs / Week — Theory: 100 Marks
Practical: 2 Hrs / Week — Term Work: 25 Marks

Course Objectives: To expose students to

1. Fundamental architecture of UNIX operating system kernel.
2. Detail algorithms of buffer cache management.

3. Internal File system organizations and related algorithms in UNIX.
4. System calls for UNIX file system.
5. Process structure, creation and management in UNIX.
6. Architecture and algorithms of process scheduling and memory management.
7. I/O subsystem architecture and algorithms.

Unit 1: Introduction and buffer cache: (10)

General Overview of the System - History, System Structure, User Perspective, Operating System Services, Assumption About Hardware, Architecture of UNIX OS, Introduction to system concepts, Kernel Data Structure, System Administration.

Buffer Cache: - Buffer headers, structure of the buffer pool, scenarios for retrieval of a buffer, reading and writing disk blocks, advantages and disadvantages of cache.

Unit 2: Internal Representation of Files (8)

i-nodes, structure of the regular file, directories, conversion of a pathname to i-node, super block, i-node assignment to a new file, allocation of disk blocks, other file types.

Unit 3: System Calls for file system: (6)

System Calls for file system:- Open, Read, write, File and Record Locking, Adjusting the position of FILE I/O-LSEEK, Close, File Creation, Creation of Special File, Change Directory and Change Root, Change Owner and Change Mode, Stat and fstat, Pipes, Dup, Mounting and Un-mounting file systems, Link, Unlink, File System Abstractions, File system maintenance.

Unit 4: The Structure of process: (8)

Process stages and transitions, layout of system memory, the context of a process, Saving context of a process, manipulation of the process address space**.**

Unit 5: Process Control and Scheduling: (8)

Process Control: - Process creation, signals, process termination, awaiting process termination, invoking other programs, the user id of a process, the shell, System Boot and the Init process.

Process Scheduling: - Process Scheduling, system call for time, clock.

Unit 6: Memory management and I/O Subsystem: (8)

Swapping, Demand passing, a hybrid system with demand paging and swapping.
Driver interfaces, disk drives, terminal drivers, Streams.

Text Book:

1. The design of Unix Operating System - Maurice J. Bach (PHI)

Reference Books:

1. Linux System Programming - Robert Love, Publisher - SPD, O' REILLY
2. Unix concepts and administration – 3rd Edition – Sumitabha Das (TMGH).

Term Work:

It should consist of minimum 10-12 experiments based on the above topics and covering the following list of assignments. (Reference book – Linux System Programming by Robert Love may be referred for the assignments listed below.)

1. Fundamentals of Linux system programming and programmers overview of the Linux System (Refer Chapter No 01: Introduction and Essential Concepts)
2. Study & demonstration of how the Linux Kernel implements and Manages files. Ref Chapter No 02 : File I/O.
3. Study & demonstration of User Buffer I/O - Observe practically by writing 'C' program. (Refer Chapter No 03: Buffer I/O).
4. Study and demonstration of Advanced File I/O. (Refer Chapter No 04: Advanced File I/O).
5. Study and demonstration of Unix Process Management – from process creation to process termination (Refer Chapter No 05: Process Management).
6. Study and Demonstration of the File and Directory Management (Refer Chapter No 07: File and Directory Management).
7. Study and demonstration of Memory Management (Refer Chapter No 08: Memory Management).
8. Study and Demonstration of Signals (Refer Chapter No 09: Signals).
9. Study and Demonstration of Time, Sleep and Clock Management (Refer Chapter No 10: Time)
10. Study of boot loader like "Grub"
11. Study of compilation of Linux kernel.
12. Implementation of system call for UNIX/Linux.
13. Implement shell for UNIX/Linux operating system.

3. Database Engineering

Lectures- 4/week
Practical- 2/Week

Theory- 100 Marks
Term work -25 Marks
POE – 50 Marks

Course Objectives:

1. To understand Fundamental Concepts and algorithms related to database.
2. To gain familiarity with SQL & DBMS.
3. To understand basic concepts of Database Design

Unit 1: Introduction to databases [Text Book- 1 & 3] [8]

- 1.1 Introduction
- 1.2 Traditional File based Systems
- 1.3 Database Approach
- 1.4 Roles in Database Environment
- 1.5 History of Database management systems
- 1.6 Advantages and Disadvantages of DBMS's.
- 1.7 Structure of Relational Databases
- 1.8 Database Schema
- 1.9 Keys
- 1.10 Schema Diagram
- 1.11 Relational Query Languages.
- 1.12 Relational Operations

Unit 2: Structured Query Language (SQL) [Text Book -2 & 3] [8]

- 2.1 Introduction to SQL
- 2.2 Data Definition Commands
- 2.3 Data manipulation Commands
- 2.4 Queries
- 2.5 Advanced data management commands
- 2.6 More complex queries and SQL functions

Unit 3: Normalization [Text Book – 1] [6]

- 3.1 The purposes of Normalization
- 3.2 Data Redundancies and Update Anomalies
- 3.3 Functional Dependencies
- 3.4 The Process of Normalization
- 3.5 First Normal Form
- 3.6 Second Normal Form
- 3.7 Third Normal Form
- 3.8 Boyce-Codd Normal Form

3.9 Fourth Normal Form
3.10 Fifth Normal Form

Unit 4: Data Storage & Indexing [Text Book -3] [7]
4.1 File Organization
4.2 Organization of records in File
4.3 Data Dictionary Storage
4.4 Database Buffer
4.5 Basic Concepts indexing & hashing
4.6 Ordered Indices
4.7 Multiple-Key Access
4.9 Static Hashing
4.10 Dynamic Hashing
4.11 Bitmap Indices
4.12 Index Definition in SQL

Unit 5: Transaction Management & Concurrency Control [Text Book – 2 & 3] [10]
5.1 What is a Transaction?
5.2 Concurrency Control
5.3 Concurrency Control with Locking Methods
5.4 Concurrency Control with Times tamping Methods
5.5 Concurrency Control with Optimistic Methods

Unit 6: Recovery System [Text Book-3] [6]
6.1 Failure Classification
6.2 Storage
6.3 Recovery & atomicity
6.4 Recovery Algorithm
6.5 Buffer Management
6.6 Failure with loss of non- volatile Storage

Text Books:

1. Database Systems- A practical approach to Design, Implementation and Management by Thomos Connolly, Carolyn Begg, 3rd Edition, Pearson Education.
2. Database Systems – Design, Implementation and Management by Rob & Coronel, 5th Edition, Thomson Course Technology.
3. Database System Concepts by A. Silberschatz, H.F. Korth, S. Sudarshan, 6th edition, Mc Graw Hill Education.

Termwork: Minimum 10 -12 Assignments based on the following topics.

1) Draw an E-R Diagram for any organization like Insurance Company, Library systems, College Management systems, Hospital Management systems etc.
2) Convert the Above mentioned E-R Diagram in Relational Tables
3) Installation & Demonstration of DBMS like MySql, Oracle, IBM-DB2 etc., Draw the architectures of installed DBMS.
4) Write a program of Database connectivity with any object oriented language.
5) Use DDL Queries to create, alter & drop Tables.
6) Use DML Queries to insert, delete, update & display records of the tables.
7) Create tables with using primary key & foreign key with all constraints.
8) Display the records using group by, order by, having and between clauses.
9) Display the records using Aggregate functions
10) Create Indexes & Views for the table.
11) Display the results of union, intersection, set difference, Cartesian product and Join operations of two different tables.
12) Write a program to implement Static Hashing.
13) Write a program to implement to Dense Index.
14) View the contents of data dictionary from the DBMS and write the contents.
15) Find the FC and F+ of relation schema r(A,B,C,G,H,I) and F= {A B, A C, CG H, CG I, B H}.

4. STORAGE NETWORKS

Lectures: 3 Hrs / Week Theory: 100 Marks

Course Objectives: : To expose students to

1. Finding key challenges in information management
2. Storage system architecture and data protection.
3. Storage Area Network- concepts, components and protocols.
4. Network -Attached Storage - concepts, components, implementation and protocols.
5. Architecture of Storage Virtualization.
6. Need of Replication, Replication techniques and Storage Security.

Unit 1: Introduction to information storage: (7)

Evolution of storage technology and architecture, Data Center Infrastructure, Key challenges in Managing Information, Information Lifecycle. Components of Storage System Environment, Disk Drive Components, Disk Drive Performance, Laws governing disk Performance, Logical Components of Host, Application requirements and disk performance.

Intelligent Storage System, Direct Attached Storage and Data Protection**:** Components of Intelligent Storage System, Intelligent Storage Array. Direct Attached Storage – types, benefits and limitation, Disk drive Interface, Introduction to parallel SCSI, SCSI command model.

Data Protection (RAID):- Implementation of RAID, RAID array components, RAID levels, Comparison, RAID ,Impact on disk performance, Hot Spares.

Unit 2: Storage Area Network: (6)

SAN – Evolution, Components of SAN, Fibre Channel Protocol Stack- Links, ports and topologies, FC-0: Cables, plugs and Signal Encoding, FC-1: 8b/10b encoding, ordered sets and link control protocol, FC-2: data Transfer, FC-3: common Services, FC-4 and ULPs, Fibre Channel SAN – point-to- point topology, Fabric topology, Arbitrated loop topology, Hardware components of Fibre channel SAN. IP SAN – iSCSI – components, connectivity, topology, protocol stack, discovery, names, session, PDU

Unit 3: Network -Attached Storage: (6)

Local File Systems, Network File System and File Servers, Benefits of NAS, NAS file I/O, Components of NAS, NAS Implementations, NAS File sharing Protocols, NAS I/O operations, Factors affecting NAS Performance.

Case Study: Direct Access File System, Shared Disk File System

Comparison: NAS, Fibre Channel SAN and iSCSI SAN

Unit 4: Storage Virtualization: (5)

Introduction, Virtualization in the I/O path, Limitations and requirements, Definition of Storage Virtualization, Implementation considerations, Storage Virtualization on block, level, File level Virtualization, Storage Virtualization on various levels of the storage, network, Symmetric and Asymmetric Storage Virtualization.

Unit 5: Business Continuity, Backup and Recovery: (6)

Introduction, Information Availability, Causeof Information unavailability, Measuring information Availability, Consequences of down time, BC terminology, BC planning life cycle, Failure Analysis, BC Technology Solutions, Backup Purpose, Backup, Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup, Process, Backup and Restore Operations, Backup Topology, Backup in NAS environment, Backup Technologies,

Unit 6: Replication and Storage Security: (6)

Local Replication, Uses of Local Replicas, Data Consistency, Local Replication Technologies, Restore and Restart Considerations.

Storage Security: Storage Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking.

Text Books:

1. A Information Storage and Management by G. Somasudaram – EMC Education Services (Wiley India Edition).
2. Storage Networks Explained by Ulf Troppen, Rainer Erkens, Wolfgang Müller (Wiley India Edition).

5. INFORMATION SECURITY

Lectures : 3 Hrs/week Theory : 100 Marks
Tutorials: 1 hr/week Termwork :25 Marks

Course Objectives:

1. To introduce Information security services and mechanisms to the students.
2. To make students feel the security services widely used in Internet and Web services.
3. To give hands on exposure to various security tools and security related issues.
4. To practice ethics in using and developing security softwares.

UNIT I. Classical Encryption Techniques: Overview – The OSI Security Architecture, Security Attacks, Services and Mechanism, A Model for Network Security, Classical Encryption Techniques – Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography. (6)

UNIT II. DES and Public Key Cryptography: Block Cipher and Data Encryption Standard – Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles. Public Key Cryptography and RSA - Principles of Public Key Cryptosystems, The RSA Algorithm. (7)

UNIT III. Key Management and Authentication: Key Management; Other Public-Key Cryptosystems- Key Management, Diffie-Hellman Key Exchange, Message Authentication and

HASH Functions- Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions. (5)

UNIT IV. Digital Signatures and Authentication Applications: Digital Signatures and Authentication Protocols - Digital Signatures, Authentication Protocols, Digital Signature Standard. Authentication Applications - Kerberos, X.509 Authentication Service, Public - Key Infrastructure. (7)

UNIT V. Electronic mail and IP security: Electronic Mail Security - Pretty Good Privacy, S/MIME, IP Security – IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload. (6)

UNIT VI. Web and System Security: Web Security - Web Security Considerations, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction. Intruders - Intruders, Intruder Detection, Password Management, Firewall - Firewall Design Principles, Trusted Systems. (5)

Text Book:

1. Cryptography and Network security Principles and Practices – Williams Stallings (Pearson Education).

Reference Books:

1. Cryptography and network security – Atul Kahate (TMGH).
2. Cryptography and security – Shyalama (Wiley India).
3. Information Systems Security - Nina Godbole (Wiley India).
4. Cryptography & Network Security-Forouzan (Tata McGraw-Hill Education).

Term work: It should consist of 10-12 assignments based on exercise problems given in the text book and should include study of the following.

1. To study the Viruses, Threads and Advanced Block Cipher Encryption Techniques.
2. To study and analysis of security tools like OpenPuff security Tool, CloudSecurity Readiness Tool, Kismet, John the Ripper.

6. PROGRAMMING LABORATORY – IV

Lectures: 2 hrs/week
Practicals: 2 hrs/week

Term work: 25 marks
POE: 50 marks

Objectives:

1. To make the student familiar with basic .Net framework.
2. To make student understand the OO features and their implementations.

1. NET Architecture **(3)**
The Relationship of C# to .NET, The Common Language Runtime, A Closer Look at Intermediate Language, Assemblies, .NET Framework Classes, Namespaces

2. C# Basics **(4)**
Variables, Predefined Data Types, Flow Control, Enumerations, Arrays, Namespaces, The Main () Method, More on Compiling C# Files, Console I/O, Using Comments# Programming Guidelines, Dynamic variables, DLL creation & calling.

3. Objects and Types **(3)**
Classes and Structs, Class Members, Anonymous Types, Structs, Partial Classes, Static Classes, The Object Class, Extension Methods

4. Inheritance **(2)**
Types of Inheritance, Implementation Inheritance, Modifiers, Interfaces

5. Arrays **(2)**
Simple Arrays, Multidimensional Arrays, Jagged Arrays, Array Class, Array and Collection Interfaces, Enumerations

6. Operators and Casts **(2)**
Operators, Type Safety, Comparing Objects for Equality, Operator Overloading, User-Defined Casts

7. Windows Form & Database with ADO.NET **(4)**
Introduction to GUI application & components –add data control programmatically, Link data to control, process all control, track the visible forms, Find all MDI child forms, Save configuration setting for form, Force list box to scroll items, Restrict text box, Use of auto complete combo box ,Sort a list view, Database with ADO.NET-Overview of Ado.NET, Data components in Visual Studio .NET.

8. Strings **(1)**
System. String, Building Strings, String Builder Members, Format Strings, Regular Expressions

9. Threading (3)

Overview, Asynchronous Delegates, the Thread Class and Thread Pools, Threading Issues, Synchronization, Timers

10. Networking (2)

Networking-Obtain information about Local network, Detect changes in network, Download data over HTTP or FTP, Download a File & Process using Stream, Respond to HTTP request from your application.

Text books:

1. Professional C# 2012 & .Net 4.5 (For Unit 1 to 6 & Unit 8 to 9) - Christian Nagel, Bill Evjen, Jay Glynn, Morgan Skinner, Karli Watson, Wrox Publication
2. A Programmer's Guide to ADO.Net in C# (For Unit 7 database with ADO.NET) - Mahaesh Chand, Apress Publication.
3. Visual C# 2010 Recipes- A Problem-Solution Approach (For Unit 7 & Unit 10) - By Allen Jones , Adam Freeman , Matthew MacDonald , Rakesh Rajan , Apress Publication.

Term work: It should consist of 10 to 12 experiments based on the above syllabus covering following list of assignments.

(Note: 60% of the experiment should be console based & 40 % experiment should be windows form application.)

1. Language Introduction (Includes console based application, creation of dll, running a program without IDE) calling a method from another program.
2. OOPS concepts in C#-Class, Implementation Inheritance, Extension methods (Use Any application).
3. Develop DLL file and use it in application program. (Use Any application)
4. Implementation of Interface Inheritance (Use Any Application).
5. Implementation of Multidimensional & Jagged array (Use Any application).
6. Use of properties in any application.
7. Implementation of Operator overloading (Any application).
8. String manipulation using String & String builder(Any application)
9. Develop program to use Regex.Matches method and Regular Expression pattern matching.
10. Design a Windows Form based application for different controls.(Any application)
11. Design a Windows Form based MDI application with different controls.(Any application)
12. Design a Windows Form based application for field validation.(Any application)

13. Design a any Windows Form based application with Database connectivity with all field validation .(Any application)
14. Develop a Windows Form application that performs SELECT, INSERT, UPDAE & DELETE queries and also displays the List of Books available in a Library System by fetching the details from a database. The C# application must also contain the filter capability.
15. Implement console based networking application to obtain information of network & detect changes in network.
16. Design a Windows form application to down load file & process it using stream.

7. **Domain Specific Mini-Project**

Practicals: 2 hrs/week **Termwork : 25 Marks**
Oral : 50 Marks

Course Objectives:

1. To expose the students to use engineering approach to solve domain specific real time problem.
2. To use the appropriate and newer technologies while developing the project.
3. To learn the skills of team building and team work.

The students should form group of 5 students each and every group is supposed to choose a specific domain in which they would like to carry on their Sem-VII and VIII project work. Further the group should identify the relevant problem and propose the solution, which can be implemented as a mini-project using suitable technology. The domain specific mini-project work should be evaluated by a team of teachers appointed by the department. The evaluation should be done in the mid and end of the semester during which the group should give presentation and demonstration of their work done. **Care should be taken to avoid out-sourcing of the work.** The termwork assessment is to be done as follows.

1. Mid term assessment – 5 marks.
2. End term assessment – 5 marks.
3. Final performance evaluation to be done by guide – 15 marks.

Equivalent subjects at T.E. (CSE) Sem-V & Sem –VI of Pre-revised course to the revised course of T.E. (CSE) Sem-V & Sem-VI

TE (CSE) Sem.-V

Sr.no.	TE (CSE) –I (Pre-Revised)	Equivalent / Replacement subject (Revised)
1	Computer Graphics	Computer Graphics of TE (CSE) Sem - V
2	System Programming	System Programming of TE (CSE) Sem - V
3	Operating Systems - I	Operating Systems – I of SE (CSE) Sem - IV
4	Computer Algorithms	Computer Algorithm of TE (CSE) Sem – V
5	Network Technologies	Network Technologies of TE (CSE) Sem-V
6	Programming Lab-III	Programming Lab-III of TE (CSE) Sem - V
7	Mini-Project-II	Domain Specific Mini-Project of TE(CSE) Sem-VI

T.E. (CSE) Sem.-VI

Sr.no.	TE (CSE) II (Pre-Revised)	Equivalent / Replacement subject (Revised)
1	Compiler Construction	Compiler Construction of TE (CSE) Sem - VI
2	Operating Systems - II	Operating Systems – II of TE (CSE) Sem - VI
3	Database Engineering	Database Engineering of TE (CSE) Sem - VI
4	Object Oriented Modeling & Design	Object Oriented Modeling & Design of TE (CSE) Sem - V
5	Information Security	Information Security of TE (CSE) Sem-VI
6	Programming Lab-IV	Programming Lab-IV of TE (CSE) Sem - VI
7	Soft Skills	Soft Skills of SE (CSE) Sem - III