

5.1 DATABASE PROGRAMMING

L T P
Periods/Week 4 - 3

RATIONALE

The Course is aimed to provide the students an exposure of various database management operations and detail about the structured query language which supports different operations in a database. After completion of the course, the students will be able to design the user-friendly modules for different types of databases.

DETAILED CONTENTS

1. Basic Concepts and Installation of SQL Server (08 Periods)
Installing SQL server, starting and stopping an instance of database engine, SQL server management studio, using management studio with database engine, backup and recovery.
2. SQL Components and Data Definition Language (08 Periods)
SQL's basic objects, data types, aggregate functions, scalar functions, null values, creating database objects, modifying database objects, removing database objects.
3. SQL (Structured Query Language) (20 Periods)
SQL * Plus. DDL (Data Definition Languages): Creating Tables, Creating a table with data from another table, Inserting values into a table, updating columns of a table, Deleting Rows, Dropping a Table. DML (Data Manipulation Language): Database Security and Privileges, Grant and Revoke Command, Maintaining Database Objects, Commit and Rollback, various types of select commands, various types of join.
4. Stored procedures and User defined functions (08 Periods)
Procedural extensions, IF statement, WHILE statement, local variables, try and catch statements, stored procedures, user defined functions, system catalog.
5. Indexes, Views and Security (06 Periods)
Guidelines for creating and using indexes, creating and using views, advantages and disadvantages of views, security system of database engine, database security, roles, authorization: grant, deny, revoke statements, implementation of database concurrency.
6. Triggers and Cursor (06 Periods)
Introduction to triggers, creating and using triggers, database level triggers, server level triggers, Cursor and recursive iteration
7. Introduction to Distributed Databases, Parallel databases, Object Oriented and Object Relational Databases (08 Periods)

LIST OF PRACTICALS

1. Installing and Uninstalling SQL Server.
2. Performing backup and recovery procedures using SQL Server.
3. Using and Understanding SQL server management studio.
4. Creating, modifying and removing database objects.
5. Working with queries involving joins, correlation, sub-queries, set operators.
6. Creating and using stored procedures and user defined functions.
7. Creating indexes
8. Creating and using views.
9. Using and understanding grant, revoke and deny statements
10. Creating and using database triggers.

INSTRUCTIONAL STRATEGY

Teacher has to explain the basic concepts of SQL (Structured Query Language), its installation and commands. Further, the advanced topics would be detailed like Indexes, Views, Triggers etc. The students may be asked to design a working examples developed using the various database commands learnt.

RECOMMENDED BOOKS

1. Fundamentals of Database Systems by Ramez Elmasri, Shamkant Navathe; Pearson Education.
2. Data Base Management System By Ivan Byross
3. A Database System Concepts by Abraham Silberschatz, Henry F. Korth, S. Sudarshan; Tata McGraw Hill.
4. Advanced Database Management Systems by Rini Chakrabarti Dasgupta, Wiley-India Pvt Ltd. Daryaganj, New Delhi
5. Database System Concepts: Design and Applications by S.K. Singh; Pearson Education.
6. Beginning Microsoft SQL Server 2008 Programming by Robert Vieira, Wrox.
7. Microsoft SQL Server 2008 Bible by Paul Nielsen, Uttam Parui; Wiley India Publication.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	08	12
2	08	12
3	20	32
4	08	12
5	06	10
6	06	10
7	08	12
Total	64	100

5.2 VISUAL PROGRAMMING WITH C#

L T P
Periods/Week 4 - 3

RATIONALE

Visual programming technique based on Object Oriented Concepts. This subject will give the students an in depth understanding the features of NET. The practical exercise of C# and ASP.NET during the course of study will reinforce the understanding of the subject.

DETAILED CONTENTS

- 1 Introduction to Microsoft. Net Framework (06 Periods)
Introduction to client server architecture, Introduction to .NET framework, feature of .Net framework, architecture and component of .Net, elements of .Net. Common Language Runtime (CLR), Common Type System (CTS), Common Language Specifications (CLS), Microsoft Intermediate Language (MSIL), Just In Time Compiler.
- 2 Introduction (10 Periods)
C# variable, function, visual programming, object oriented concept: abstraction, Inheritance, Polymorphism, Classes, collections, Debugging
- 3 Graphical user Interface Concepts (16 Periods)
Windows forms, Control Properties and Layout, Using common Dialogs, Event Handling: mouse and Keyboard, Labels, Textboxes, Buttons, Group Boxes, Panels, Check Boxes and Radio Buttons , Picture Boxes , tooltips, Menus, Control: Month Calender , Data Time Picker , Link Labe , List Box , Checked List Box, Combo Box, Tree View, List View, data grid, Grid View, Tab control, Multiple Document Interface(MDI) Window, Multithreading : Thread States, Lifecycle of a Thread, Thread Priorities and scheduling, creating and executing Thread , Synchronization and Class Monitor , Exception Handling
- 4 Graphics and Multimedia (06 Periods)
Drawing classes and the coordinate system , graphics context and graphics objects ,color and font control, drawing lines, rectangle, ovals ,Arcs , Loading , Displaying and scaling images , animating a series of images, introduction to WPF, Animation and Media using WPF
- 5 File Processing and Streams (06 Periods)
Data hierarchy, files and streams, classes file and directory, reading and writing sequential access file, Serialization
- 6 Data Access (06 Periods)
Data access techniques, XML, LINQ, SQL , ADO.NET object Model ,LINQ to SQL, ADO.NET and LINQ, LINQ to XML, Introduction to ORM using nhibernate, LINQ with nhibernate
7. Windows Communication Foundation (14 Periods)
Describing WCF, advantage over Web services, Interoperability with Applications Built on Other Technologies creating WCF implementing service class, selecting host defining endpoint creating WCF client, messaging Options, Controlling Local Behavior, Security, transaction in WCF, Restful communication, communication with POX RSS and ATOM, Queuing, creating workflow services

LIST OF PRACTICALS

1. Exercise on opening projects.
2. Exercise on all the menus
3. Exercise on all basic Controls.
4. Exercise on designing form.
5. Exercise on LINQ.
6. Creating Web services and consuming the same
7. Creating WCF and consuming the same.

INSTRUCTIONAL STRATEGY

Since the subject is comparatively new and the students are required some background of programming language, thus, with the coverage of both theory and practicals more stress should be given to practical work.

RECOMMENDED BOOKS

1. Beginning Visual C#,2012 by Watson; Wiley India Publications
2. Applications of .NET Technologies, by ISRD Group, Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Programming Microsoft C#-Francesco Balena
4. The complete Reference-C#- Jeffrey R. Shapiro

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	06	10
2	10	15
3	16	25
4	06	10
5	06	10
6	06	10
7	14	20
Total	64	100

5.3 COMPUTER AND NETWORK TROUBLESHOOTING

L T P
Periods/Week 4 - 3

RATIONALE

This subject gives the knowledge and competency to diagnose the faults for trouble shooting for systematic repair and maintenance of computers and computer peripherals.

DETAILED CONTENTS

1. Installation & Servicing (18 Periods)
Environmental requirements for computer system and peripherals, Site preparation and design of computer room, Installation of computer system (Window/open source/Desktop/Server) and peripherals. Preventive and corrective maintenance, concept of grounding shielding, Power supply requirements and considerations for computer and its peripherals. Study of Motherboard ,Testing and specifications of computer system, Repair and replacement of parts of computer, understanding PC specifications.
2. Networking (15 Periods)
LAN configurations failure, cabling connectivity, hub, bridge, switches, managing network services TCP/IP, Address management, DNS, Domain, Work Group
3. Trouble shooting of computers, component and peripherals (15 Periods)
Managing Network Services: TCP/IP, address Management, DNS, DOMAIN, Workgroup (Create workgroup), Network addresses Management of Gateway, Map Network drive, client-server technology, Network Neighborhood. Installation and troubleshooting of Routers, Access Point, LAN Cards Input/output channels, Hub, Switches,
4. Sharing of devices on Networks, Installation and management of network sharing tools i.e squidproxy, managing IP addresses, 2-Tier, 3-Tier Network Architecture (08Periods)
5. Establishment of LAN/WAN: (08 Periods)
Sub-netting of IP address, Access Point Configuration, Router Configuration, Configuration of manageable switch

LIST OF PRACTICALS

1. Installation of modems and startup a new internet connection in a standalone machine.
2. Study of troubleshooting and maintenance of computer systems
3. Installation and study of ISDN, PSTN lines, V-sat, RF-link
4. Study of BNC, RJ-45 connectors
5. Study of cables and their connecting structure (i.e simple or cross cable (color coding of cables)
6. Study and management of Network resources,

7. Study and Installation of Firewall in your system
8. Sharing of resources on LAN

INSTRUCTIONAL STRATEGY

While taking the theory classes, the teachers should lay emphasis on the practical aspects of trouble shooting and maintenance. As the given subject is based on hardware aspects of computer system, it needs lot of technical skills to study it thoroughly, field visit to maintenance repair and assembly centres will be beneficial to the students.

RECOMMENDED BOOKS

1. PC Upgrading , Maintenance and Troubleshooting Guide by SK Chauhan, SK Kataria and Sons, New Delhi
2. Troubleshooting and Maintenance of electronic Equipment by K. Sudeep Singh: SK Kataria and Sons, New Delhi
3. Troubleshooting Computer System by Robert C Benner
4. IBM PC and Clones Govinda Rajalu
5. Computer Maintenance and Repair – Scholi Muller
6. Upgrading your PC by Mark Minersi
7. TCP/IP by Miller; Wiley India Publications.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	18	30
2	15	20
3	15	30
4	08	10
5	08	10
Total	64	100

5.4 CRYPTOGRAPHY AND NETWORK SECURITY

L T P
Periods/Week 4 - -

RATIONALE

This course has been designed by keeping in view the basic computer users and information system managers. The concepts needed to read through the ripe in the market place and understanding risks and how to deal with them. It is hoped that the student will have a wider perspective on security in general and better understanding of how to reduce and manage the security risks.

DETAILED CONTENTS

1. Introduction (12 Periods)
Need for securing a network; attacks from within and external, introduction to cyber crime, cyber law-Indian Perspective (IT Act 2000), cyber ethics, ethical hacking. What is hacking. attacker, phreaker etc.
2. Securing Data over Internet (12 Periods)
Introduction to basic encryption and decryption, concept of symmetric and asymmetric key cryptography, Cipher technique PPTP/L2TP, overview of DES, RSA and PGP. Introduction to Hashing: MD5, SSL, SSH, HTTPS, Digital Signatures.
3. Virus, Worms and Trojans (10 Periods)
Definitions, preventive measures – access control, checksum verification, process neutering, virus scanners, heuristic scanners, application level virus scanners, deploying virus protection.
4. Computer Network Attacks: (08 Periods)
Active Attacks, Passive Attacks, Stealing Passwords, Social Engineering, Bugs and Backdoors, Authentication Failures, Protocol Failures, Information Leakage, Denial-of-Service Attacks, Botnets, Phishing Attacks
5. Firewalls (08 Periods)
Definition and types of firewalls, defining access control policies, address translation, firewall logging, firewall deployment
6. Intrusion Detection System (IDS) (06 Periods)
Introduction; IDS limitations – teardrop attacks, counter measures; Host based IDS set up
7. Virtual Private Network (VPN) (08 Periods)
Basics, setting of VPN, VPN diagram, configuration of required objects, exchanging keys, modifying security policy

INSTRUCTIONAL STRATEGY

Since the facilities are not available in the polytechnic, students need exposure to various security systems and software available in some organizations, universities and engineering colleges. For this, visits may be organized for students. The teachers should also be exposed in this area. Some practical's can be conducted in the laboratory.

RECOMMENDED BOOKS

1. Cryptography and Network Security by Forouzon, Tata Mc Graw Hill Education Pvt Ltd, New Delhi
2. Cryptography and Network Security by Atul Kahate, Tata Mc Graw Hill Education Pvt Ltd, New Delhi
3. Cryptography and Network Security by Padmanabham, Wiley India Pvt Ltd. Daryaganj, New Delhi
4. Network Security by Eric Cole, Bible, Wiley- India Pvt Ltd. Daryaganj, New Delhi
5. Network security by William Stalling

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	12	20
2	12	20
3	10	10
4	08	15
5	08	10
6	06	10
7	08	15
Total	64	100

5.5 SOFTWARE QUALITY AND TESTING

L T P
Periods/Week 4 – 2

RATIONALE

The Course is aimed at teaching different techniques of testing a software after it is developed and to teach about various quality standards of a product. After completion of the course, the students will be able to design efficient test-cases for different software and compare it to the standard quality measures.

DETAILED CONTENTS

1. Introduction (08 Periods)
Review of Software Engineering, Software Process Models, Metrics, Importance of Software Testing and Quality Assurance.
2. Software Quality Assurance Concepts and Standards (10 Periods)
Definition of Quality, Quality Concepts, Quality Control, Quality Assurance, SQA Activities, Software Reviews, Inspections, Walkthroughs, Formal Technical Reviews, Review Guidelines, Quality Assurance Standards, ISO 9000, ISO 9001:2000, ISO 9126, CMM, TQM, TQM principles, Six Sigma, SPICE.
3. Risk Management and Configuration Management (10 Periods)
Types of Software Risks, Risks Identification, Risk Projection, Risk Refinement, The RMMM Plan, Software Configuration Management, Baselines, Software Configuration Items, SCM Process: Version Control, Change Control.
4. Software Testing (10 Periods)
Testing Fundamentals, Verification and Validation, Test Strategies for Conventional and Object Oriented Software, Unit Testing, Integration Testing, Validation Testing, Alpha and Beta Testing, Recovery Testing, Security Testing, Stress Testing, Performance Testing, Debugging Process, Debugging Strategies.
5. Testing Techniques (10 Periods)
Black Box and White Box Testing techniques, Flow Graph Notation, Basis Path Testing, Control Structure Testing, Equivalence Partitioning, Boundary Value Analysis, Object Oriented Testing Methods: Applicability of Conventional Test Case Design Methods, Fault-Based Testing, Scenario-Based Testing, Random Testing and Partition Testing for Classes, Interclass Test Case Design.
6. Testing Process (08 Periods)
Test Plan Development, Requirement Phase, Design Phase and Program Phase Testing, Testing Tools, Features of test tools, guidelines for selecting a test tool, advantages and disadvantages of using testing tools, testing using automated tools.
7. Testing Specialized Systems (08 Periods)
Testing Client/Server Systems, Testing Web based Systems, Testing Off-the-Shelf software.

LIST OF PRACTICALS

1. Study of open source quality assurance and software testing tools.
2. Use of software testing tools like CPPUnit, JUnit.
3. Use of configuration management tools like CVS, VSS.
4. Study of test cases/design of TC
5. Study of test plan/preparation of TP
6. Study of Bug report/preparation of BR
- 7 Study and preparation of SRS

INSTRUCTIONAL STRATEGY

Since the subject has wider industrial scope, students need exposure to various open source testing tools and teachers should also be exposed in testing tools. Visits may be organized in software and testing industries.

RECOMMENDED BOOKS

1. Software Testing: Principles, Techniques and Tools by M.G. Limaye; Tata McGraw Hill
2. Software Engineering: A Practitioner's Approach by R.S. Pressman; Tata McGraw-Hill.
3. Effective Methods for Software Testing William E.Perry; John Wiley & Sons.
4. Software Engineering by Ian Sommerville; Pearson Education.
5. Software Engineering by K.K. Aggarwal, Yogesh Singh; New Age International.
6. Software Quality Assurance-Principles and Practice by Nina S Godbole; Narosa.
7. Software Testing Techniques by Boris Beizer,Dreamtech
8. Software Engineering by Rajiv Mall
9. Software Engineering by Pankaj Jalole
10. Software Testing and Quality Assurance by Naik; Wiley India Publications

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	08	10
2	10	20
3	10	15
4	10	15
5	10	20
6	08	10
7	08	10
Total	64	100

5.6 MICROPROCESSOR

L T P
Periods/Week 4 - 3

RATIONALE

The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a microcomputer. The development in microprocessors of 32 bit architecture brings them face-to-face with mainframe finding employment in R&D, assembly, repair and maintenance of hardware of microprocessors and computers. Microprocessors find application in process control industry. They also form a part of the electronic switching system between source and destination in long distance telecommunications. Thus the microprocessor is an area of specialization. Students of electronics and related engineering branches often use microprocessors to introduce programmable control in their projects, in industrial training.

DETAILED CONTENTS

1. Evolution and Architecture of a Microprocessor (with reference to 8085 microprocessor) (10 Periods)
Typical organization of a microcomputer system and functions of its various blocks. Concept of Bus, bus organization of 8085, Functional block diagram of 8085 and function of each block, Pin details of 8085 and related signals, Demultiplexing of address/data bus generation of read/write control signals, Steps to execute a stored programme
2. Programming (with respect to 8085 microprocessor) (16 Periods)
Brief idea of machine and assembly languages, Machines and Mnemonic codes. Instruction format and Addressing mode. Identification of instructions as to which addressing mode they belong. Concept of Instruction set. Explanation of the instructions of the following groups of instruction set. Data transfer group, Arithmetic Group, Logic Group, Stack, I/O and Machine Control Group. Programming exercises in assembly language. (Examples can be taken from the list of experiments).
3. Memories and I/O interfacing (10 Periods)
Memory organization, Concept of memory mapping, partitioning of total memory space. Address decoding, concept of I/O mapped I/O and memory mapped I/O. Interfacing of memory mapped I/O devices. Concept of stack and its function. Basic RAM Cell, N X M bit RAM, Expansion of word length and capacity, static and dynamic RAM, basic idea of ROM, PROM, EPROM and EEPROM.
4. Instruction Timing and Cycles (06 Periods)
Instruction cycle, machine cycle and T-states, Fetch and execute cycle.
5. Interrupts (05 Periods)
Concept of interrupt, Maskable and non-maskable, Edge triggered and level triggered interrupts, Software interrupt, Restart interrupts and its use, Various hardware interrupts of 8085
6. Peripheral devices (Introduction) (06 Periods)
8255 PPI and 8253 PIT, 8257 DMA controller, 8279 Programmable KB/Display Interface, 8251 Communication Interface Adapter, 8155/8156
8. Introduction of 16 Bit Microprocessor (06 Periods)
Salient features of 8086 microprocessor, block diagram, register organization. Limitation of 16 bit microprocessor

9. Introduction of 80386, 80486, Motorola, 32 bit microprocessor. Intel, Pentium microprocessor, dual core, core2 dual, corei3, core i5, core i7, latest processor.

LIST OF PRACTICALS

1. Familiarization of different keys of 8085 microprocessor kit and its memory map
2. Steps to enter, modify data/program and to execute a programme on 8085 kit
3. Writing and execution of ALP for addition of two 8 bit numbers
4. Writing and execution of ALP for subtraction of two 8 bit numbers
5. Writing and execution of ALP for multiplication of two 8 bit numbers
6. Writing and execution of ALP for division of two 8 bit numbers
7. Writing and execution of ALP for arranging 10 numbers in ascending order
8. Writing and execution of ALP for arranging 10 numbers in descending order

INSTRUCTIONAL STRATEGY

The digital systems in microprocessors have significant importance in the area of electronics. Adequate competency needs to be developed by giving sufficient practical knowledge in microprocessors (programming as well as interfacing). Help may be taken in the form of charts, simulation packages to develop clear concepts of the subject. Programming exercises other than the given in the list may be given to the students.

RECOMMENDED BOOKS

1. Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi
2. Introduction to Microprocessor by Mathur, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Microprocessor and Microcontrollers by Dr BP Singh, Galgotia Publications, New Delhi
4. Microprocessor and Applications by Badri Ram: Tata McGraw Hill Education Pvt Ltd, New Delhi
5. Microprocessor and Microcomputers by Refiquzzaman, Prentice Hall of India Ltd., New Delhi.
6. Digital Logic and Computer Design by Mano, M Morris; Prentice Hall of India, New Delhi
7. Digital Electronics and Applications by Malvino Leach; Publishers McGraw Hills, New Delhi
8. Digital Integrated Electronics by Herbert Taub and Donald Sachilling; Prentice Hall of India Ltd., New Delhi
9. Digital Electronics by Rajaraman; Prentice Hall of India Ltd., New Delhi
10. Digital Electronics and Microprocessor by Rajiv Sapra, Ishan Publication, Ambala
11. 8086 Microprocessor by MT Savaliya, Wiley India Publications.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1.	10	14
2.	16	20
3.	10	14
4.	06	12
5.	05	08
6.	06	12
7.	06	12
8.	05	08
Total	64	100

5.7 MINOR PROJECT WORK

L T P
Periods/Week - - 6

Minor project work aims at exposing the students to the various industries dealing with computers. It is expected from them to get acquainted with computer environment possess desired attitudes. For this purpose student during middle of the course are required to be sent for a period of two to four weeks at a stretch in different establishments. Depending upon the interest of students they are sent for exposure to:

- 1) Industrial practices in installation and maintenance of computers and computer networks
- 2) Fabrication of computers
- 3) Fault diagnosis and testing of computers
- 4) Industrial practices in respect of documentation and fabrication
- 5) A variety of computers and peripherals in assembly organizations
- 6) Software package development organizations
- 7) Maintenance of database
- 8) Write be stored procedure or functions which can be attached as the library objects to the main projects
- 9) Write a procedure function to convert number of words.
- 10) Write a procedure function to convert all data function (create your own) Database connectivity, (SQL server, Oracle, Access), use of graphics, Encryption decryption program.

Note: The teachers may guide /help students to identify their minor project work and chalk out their plan of action well in advance.

As a minor project activity each student is supposed to study the operations at site and prepare a detail project report of the observations/processes/activities by him/her. The students should be guided by the respective subject teachers; each teacher may guide a group of 4 to 5 students.

The teachers along with field supervisors/engineers will conduct performance assessment of students. Criteria for assessment will be as follows:

	Criteria	Weightage
(a)	Attendance and Punctuality	15%
(b)	Initiative in performing tasks/creating new things	30%
(c)	Relation with people	15%
(d)	Report Writing	40%