

M.SC (Information Technology) DEGREE COURSE

SCHEME OF EXAMINATION: CBCS PATTERN

(APPLICABLE TO STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2013 – 2014)

Part	Study Components	Ins. hrs/ week	Examinations				Credit
			Dur.Hr s	CIA	ESE	Total	
SEMESTER-I							
III	Paper I : Object Oriented Analysis And Design	4	3	25	75	100	4
III	Paper II : Advanced Computer Architecture	5	3	25	75	100	4
III	Paper III : Advanced Java Programming	5	3	25	75	100	4
III	Practical -I : Advanced Java Lab	4	3	40	60	100	4
III	Paper IV: Data Mining and Warehousing	4	3	25	75	100	4
III	Paper V : Information Coding Techniques	4	3	25	75	100	4
III	Paper VI : Introduction to Open Source Tools	4	3	25	75	100	4
SEMESTER-II							
III	Paper VII : Advanced Communication Network	5	3	25	75	100	4
III	Practical – II Advanced Communication Network Lab	5	3	40	60	100	4
III	Paper VIII : Cyber Law	5	3	25	75	100	4
III	Paper IX : Software Testing	5	3	25	75	100	4
III	ELECTIVE – I	5	3	25	75	100	4
III	Paper X: Mobile Applications Development	5	3	25	75	100	4
III	Mini Project			20	80	100	4
SEMESTER-III							
III	Paper XI :Cloud Computing	5	3	25	75	100	4
III	Paper XII: Web Technology	5	3	25	75	100	4
III	Paper XIII : Open Source with PHP&MYSQL	5	3	25	75	100	4
III	Practical – III : Web Technology Lab	5	3	40	60	100	4
III	Paper XI V:Soft Computing	5	3	25	75	100	4
III	ELECTIVE – II	5	3	25	75	100	4
SEMESTER-IV							
III	Project work and viva voice *					250*	10
Total						2250	90

*Project report – 200 marks; Viva voce – 50 Marks

List of Elective Subjects

Course : M.Sc Information Technology

SUBJECT	
ELECTIVE	
Elective- I	I. Digital image Processing II. Cyber Security III. WAP & XML
Elective- II	I. Microprocessor & its Applications Lab II. Advanced DBMS III. ERP

PAPER I: OBJECT ORIENTED ANALYSIS AND DESIGN

Goals :To enable the students to learn the object oriented techniques to system analysis and design.

Objectives : On successful completion of the course the students should have:

- Understood the trends and principles of object oriented methodologies.
- Gained problem solving skills using developing object based models.

UNIT I

Object Orientation – System Development – Review of Objects – Inheritance – Object Relationships – Dynamic binding – OOSD life cycle – Process – Analysis- Design - Prototyping – Implementation – Testing – Overview of Methodologies

UNIT II

OMT – Booch methodology, Jacobson – Methodology – patterns – Unified approach– UML –Class Diagrams – Dynamic Modeling

UNIT III

Using Case model – Creation of classes – Noun Phrase approach – responsibilities – Collaborators and relationships – Super – Sub class - Aggregation

UNIT IV

OO Design axioms – Class visibility – refining attributes- Methods – Access layer – OODBMS – Class mapping view layer

UNIT V

Quality Assurance testing – Inheritance and testing - Test Plan – Usability testing – User satisfaction testing

REFERENCE BOOKS

1. Ali Brahmi , “ Object Oriented System Development” , *McGraw-Hill International Edition*
2. Object-Oriented Analysis and Design by Grady Booch, *Addison – Wesley*

3. Object Oriented Modelling and Design by *James Rumbaugh , Micheal Blaha, Prentice Hall*

PAPER II: ADVANCED COMPUTER ARCHITECTURE

Goals: To enable the students to learn the parallel processing and SIMD arrays.

Objectives: On successful completion of the course the students should have:

- Understood the trends and principles of parallel processing in computers.
- Gained problem solving skills using parallel algorithms.

UNIT I

Overview of Computer Design – Risc Vs Cisc - Performance Related Issues – Performance Parameters – Instruction Set Architecture Design- Compiler Related Issues

UNIT II

Pipelining – Pipeline Hazards – Overcoming Hazards – Instruction Set Design And Pipelining – Concepts of Dynamic Scheduling – Dynamic Hardware Branch Prediction

UNIT III

Vector Processors – Compiler Support for ILP – Extracting Parallelism - Speculation

UNIT IV

Virtual Memory Architectures, Distributed Shared Memory Architectures – Synchronization – Cache Coherence Issues

UNIT V

Standards- Scsi – Typical Risc Processor, Stack Processors – Data Flow Systems

REFERENCE BOOKS

1. Kai Hwang, Faye A. Briggs, “Computer Architecture and Parallel Processing” Mc Graw – Hill Book Company, 1985.
2. V. Rajaraman, C. Siva Ram Murthy, “Parallel Computers Architectures and Programming”, PHI, 2003.
3. Kai Hwang, “Advanced Computer Architecture –Parallelism,Scalability,Programmability”, Mcgraw Hill, 1993.
4. Michael J. Quinn, “Parallel Computing Theory and Practice”, TMCH, Second Edition, 2002.

5. Barry Wilkinson, Micheal Allen, “Parallel Programming: Techniques and Applications”, Prentice Hall, 1999.

PAPER III : ADVANCED JAVA PROGRAMMING

Goals : To enable the students to learn the Advanced Java.

Objectives : On successful completion of the course the students should have:

- Understood the trends and principles of problem solving using Java as an internet tool.
- Gained problem solving skills using advanced Java.

UNIT I

Java Basics Review: Components and event handling – Threading concepts –Networking features – Media techniques

UNIT II

Data structures in Java – Ordered structures – sorting – trees

UNIT III

Advanced Networking and BEANS- Sockets- Content and Protocol Handlers – developing distributed applications – remote objects – object serialization – bean concepts – events in bean box- Bean –persistence

UNIT IV

Java in Databases- JDBC principles – database access- Interacting- database search – Creating multimedia databases – Database support in web applications

UNIT V

JAR file format creation – Internationalization – Swing Programming – Advanced java techniques

REFERENCE BOOKS

1. Jane Jaworski, “Java Unleashed” , *SAMS Techmedia Publications* 1999
2. Campione, Walrath and Huml, *The Java Tutorial*”, *Addison Wesley* 1999

PRACTICAL -I : ADVANCED JAVA LAB

1. Write a Java Program to implement the Concept of Function Overloading.
2. Write a Java Program to implement the Exceptional Handling.
3. Write a Java Program to an applet that receives two numerical values as the input from user and displays the sum of these two numbers.
4. Write a Java Program to displaying product list along with their prices and then allow user to buy any1 item from them with required quantity.
5. Write a Java Program to implement multithreading (three threads using single run method).
6. Write a Java Program to implement the URL.
7. Write a Java Program to implement the I- net Address.
8. Write a Java Program to Sending e-mail in Java.
9. Write a Java Program to implement the Login_Id Form using JDBC.
10. Write a Java Program to implement the SQL commands using JDBC.

PAPER IV: DATA MINING AND WAREHOUSING

Goals: To enable the students to learn the Data mining tasks& Data warehousing techniques.

Objectives: On Successful completion of the course the students should have:

- Understood the Association rules, Clustering techniques and Data warehousing.

Contents

UNIT I

Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective.

Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms.

UNIT II

Classification: Introduction – Statistical – based algorithms - distance – based algorithms – decision tree - based algorithms - neural network – based algorithms –rule - based algorithms – combining techniques.

UNIT III

Clustering: Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithms - Partitional Algorithms.

Association rules: Introduction - large item sets - basic algorithms – parallel & distributed algorithms – comparing approaches- incremental rules – advanced association rules techniques – measuring the quality of rules.

UNIT IV

Data warehousing: an introduction - characteristics of a data warehouse – data marts – other aspects of data mart. Online analytical processing: introduction - OLTP & OLAP systems – data modelling –star schema for multidimensional view –data modelling – multifact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.

UNIT V

Developing a data WAREHOUSE: why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse.

Applications of data warehousing and data mining in government: Introduction - national data warehouses – other areas for data warehousing and data mining.

REFERENCE BOOKS

1. Margaret H. Dunham, “Data mining introductory and advanced topics”, Pearson education, 2003.
2. C.S.R. Prabhu, “Data warehousing concepts, techniques, products and a applications”, PHI, Second Edition.
3. Arun K.Pujari, “ Techniques”, Universities Press (India) Pvt. Ltd., 2003.
4. Alex Berson, Stephen J. Smith, “data warehousing, data mining, & OLAP, TMCH, 2001.
5. Jiawei Han & Micheline Kamber, “ Data mining Concepts & Techniques”, 2001, Academic press

Paper V : INFORMATION CODING TECHNIQUES

Goal: To enable the students to learn the fundamentals of information coding techniques Objectives: On successful completion of the course the students should have:

- Understood the Information Entropy Fundamentals.
- Learnt various coding techniques.

UNIT I

Information Entropy Fundamentals: Relation between information and probability, mutual and self information entropy, Shannon's Theorem, Code design, Shannon-Fano coding, Huffman coding, implementation of Huffman Code.

UNIT II

Data and Voice Coding: context dependent coding, arithmetic codes, overall efficient consideration – voice coding, delta-modulation and adaptive modulation, linear predictive coding, silence coding, sub-band coding

UNIT III

Image and Video Compression: direct cosine transform, quantization loss, loss estimation – JPEG components and standards – Inter-frame coding, motion compensation techniques, MPEG-2 standards, Introduction to MPEG-4.

UNIT IV

Error Control coding: Backward error correction, linear block codes, BCH codes, Golay codes, efficiency of LBC, performance of simple ARQ, go back-n and selective repeat schemes – Forward correction codes- Convolution coding, decoding algorithms, Viterbi decoding, optimum decoding, performance measures.

UNIT V

Encryption Coding: Transposition and substitution coding, Data Encryption Standards (DES), key distribution problem, public key encryption, public key decryption and MIT algorithm- Direct sequence CDMA based encryption, orthogonal sequences, and R-S code

REFERENCE BOOKS

1. Viterbi, "Information Theory and Coding", McGrawHill, 1982.

2. Proakis, “Digital Communication”, McGrawHill, 1994.
3. “Data compression Book” BPB publication, 1992.

PAPER VI : INTRODUCTION TO OPEN SOURCE TOOLS

Goals : To enable the students to learn the Introduction to Linux, Unix networking programming, PHP programming Basics, and Perl programming.

Objectives : On successful completion of the course the students should have:

- Understood the Linux concept
- Understood the Unix networking programming
- Understood the PHP programming Basics
- Understood Perl programming.

UNIT I

Introduction to Linux – What every Linux users knows- The shell-The X windows system –Files and Directories.

UNIT II

Viewing Text – Editing Text – Pattern matching and Vim editors.

UNIT III

Unix Network Programming-Introduction to TCP/IP: Introduction –The Transport Layer TCP and UDP. Elementary sockets: Sockets Introduction, Elementary TCP sockets – I/O multiplexing – Socket options

UNIT IV PHP Programming Basics

PHP - Introduction, PHP Basics: - Syntax- Variables- Controls and functions-Strings. Arrays: - Using Arrays, Manipulating Arrays, Associative Arrays

UNIT V Perl Programming

Perl - Introduction, Perl Basics: - Syntax, Variables, Strings, Numbers, Operators, Arrays: - Using Arrays, Manipulating Arrays, Associative Arrays, Chop, Length, and Sub string. Hashes, Arguments, Logic, Looping, Files, Pattern Matching, Environment Variables, Using cgi-lib for Forms.

File Management PERL: - File Handling, Reading From Files, Appending Files, Writing to Files, File Checking, Reading Directories.

Databases PERL: - DBI Module, DBI Connect, DBI Query, MySQL Module, MySQL Connect, MySQL SelectDB, MySQL Query.

REFERENCE BOOKS

1. Linux Ina Nutshell – A desktop Quick Reference – O'Reilly 5th Edition, Ellensivever, Aarom weber, Stephen Figgins, Robers Love and Arnold Robbins
2. Linux CookBook 2nd Edition Michael Stutz , SPD Pvt.ltd 2004 edition.
3. PHP 5 and MySQL Bibble Wiley Dream tech India Pvt.ltd 2006 Edition.
4. Perl CookBook –Tom Christinasen & Nathan Torkington , O'Relliy ,SPD Pvt ltd,2006 Edition.

PAPER VII –ADVANCED COMMUNICATION NETWORKS

Goals: To enable the student to learn the network architecture, issues of different layers & different topologies.

Objectives: On successful completion of the course the students should have Learn the architecture of network, issues of different layers and topologies.

UNIT-I

The OSI Model-Layers in the OSI Model-TCP/IP Protocol Suite-Addressing-LANS-Point to point WANS-Switched WANS-Connecting Devices.

UNIT-II

IP Addressess-Classful Addressing-Other issues-Subnetting and Supernetting-IP Address Lassless addressing-Variable length blocks-Subnetting-Address allocation-Delivery-Forwarding and Routing of IP Packets

UNIT-III

ARP and RARP-Internet Protocol-ICMP & IGMP

UNIT IV

TCP Services-features-segments-TCP connection-State Transition diagram-Error Control-Congestion Control=-TCP Timers—Options-TCP package
Unicast and Multicast routing protocols

UNIT IV

Host Configuration-BOOTP and DHCP-DNS-Remote Login:TELNET-File transfer-FTP and TFTP-E-mail-SMTP-POP-IMAP-SNMP-Next generation:IPv6 and ICMPv6

REFERENCE BOOKS:

1. TCP/IP Protocol Suite, Behrouz.A.Forouzan Tata McGraw Hill, 3E
2. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill, 2007
3. Guide to Networking Essentials, Greg Tomsho,Ed Tittel, David Johnson,Fifth Edition, Thomson.
4. An Engineering Approach to Computer Networking , S.Keshav, Pearson Education.

5. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall.
6. The Internet and Its Protocols, A. Farrel, Elsevier.

PRACTICAL -I: ADVANCED COMMUNICATION NETWORK LAB

1. Write a program to Detect Errors using Vertical Redundancy Check (VRC).
2. Write a program to Detect Errors using Longitudinal Redundancy Check (LRC).
3. Write a program to Detect Errors using Cyclic Redundancy Check (CRC).
4. Write a Socket program to implement Asynchronous Communication.
5. Write a Socket program to implement Isochronous Communication.
6. Write a program to implement Stop & Wait Protocol.
7. Write a program to implement Sliding Window Protocol.
8. Write a program to implement the Shortest Path Routing using Dijkstra algorithm.
9. Write a Socket Program to Perform file transfer from Server to the Client.
10. Write a Program to implement Remote Procedure call under Client / Server Environment

PAPER VIII- CYBER LAW

Goals : To enable learner to understand, explore, and acquire a critical understanding Cyber Law.

Objectives : To make learner conversant with the social and intellectual property issues emerging from 'Cyberspace'.

UNIT 1:

Introduction - Basics of Information Technology- Basics of Indian Legal System- Overview of IT Law-
Cyber Law in India: I.T Act, 2000 - Introduction and its application - Relevant Amendments in all other laws

UNIT 2:

E-Contract -The Law of Contract- Construction of Electronic contracts- Issues of security-Employment Contracts-Consultant Agreements- Digital Signature.

E-Banking & E-Commerce

E-commerce-Salient Features- Banking relationships-Institutional and individual- E-Money- Regulating E-Transaction- Role of RBI and Legal Issues- Credit card and Internet

UNIT 3:

Constitutional protection under Cyber law :Freedom of speech and expression - Human Rights violations - Revisiting industrial and Labor Laws- E-Media and Print Media.

Cyber Crimes & Intermediaries: Crime : Meaning & Concept- Rights and liability-Civil, Criminal and tortuous- Offences- concept and Legal parameters under I.T Law- Offences-detection and investigation- Offences and punishments-global scenario- Rights & liabilities of Intermediaries- Overlapping between IPC & ITA.

UNIT 4:

IPR regime and Cyber Laws : Understanding Copy right in information Technology - Legal issues in Internet and Software Copy right - Patents ,Trade Marks & Data Base.**Telemedicine & Cyber Law:** Introduction of Telemedicine- Internet Advertisement- Video Conferencing- Data Theft & disclosure-

UNIT 5

Jurisdiction & Future Perspective of Cyber Law :Concept of Jurisdiction- Indian context of Jurisdiction- Jurisdictional issues- International Law in the IT context- Information Technology Amendment Bill - Information Technology Rules.

REFERENCE BOOK:

1. A handbook on Information technology , Cyber law and E-Commerce, Syed shakil Ahmed, Capital Law House
2. Business Process Outsourcing, Data Protection and Information Security, Rodney D Ryder, Wadhwa & Co.
3. Computer Forensic Computer Crime Scene Investigation , John Vacca , Charles River.
4. Cyber Laws, Justice Yatindra Singh, Universal Publisher
5. Cyber Space & The Law Issues & Challenges, Ranabir Singh & Ghana Syam Singh, Nalsar University
6. Cyber Laws Demystified, Naavi, Ujvala Consltant Pvt. Ltd Pub Nagapur
7. Indian Legislation on Cyber Crime, Sharma S. R., Anmol.
8. Hacking in the Computer World, Sandeep Gupta, Mittal

PAPER IX-SOFTWARE TESTING

Goals : To help students to develop skills that will enable them to construct software of high quality software that is reliable, and that is reasonably easy to understand, modify and maintain.

Objectives: To foster an understanding of why these skills are important

UNIT I INTRODUCTION

Testing as an Engineering Activity – Role of Process in Software Quality – Testing as a Process – Basic Definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support for Developing a Defect Repository

UNIT II TEST CASE DESIGN

Introduction to Testing Design Strategies – The Smarter Tester – Test Case Design Strategies – Using Black Box Approach to Test Case Design Random Testing – Requirements based testing – positive and negative testing — Boundary Value Analysis – decision tables - Equivalence Class Partitioning state-based testing— cause effect graphing – error guessing - compatibility testing – user documentation testing – domain testing Using White-Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing - Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White-box Based Test Design – code complexity testing – Evaluating Test Adequacy Criteria.

UNIT III LEVELS OF TESTING

The Need for Levels of Testing – Unit Test – Unit Test Planning –Designing the Unit Tests The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – scenario testing – defect bash elimination -System Testing – types of system testing - Acceptance testing – performance testing - Regression Testing – internationalization testing – ad-hoc testing - Alpha – Beta Tests – testing OO systems – usability and accessibility testing

UNIT IV TEST MANAGEMENT

People and organizational issues in testing – organization structures for testing teams – testing services - Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process - Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT V CONTROLLING AND MONITORING

Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation - Test metrics and measurements –project,

progress and productivity metrics – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of reviews – Developing a review program – Components of Review Plans– Reporting Review Results. – evaluating software quality – defect prevention – testing maturity model.

REFERENCES:

1. Srinivasan Desikan and Gopalaswamy Ramesh, “ Software Testing – Principles and Practices”, Pearson education, 2006.
2. Aditya P.Mathur, “Foundations of Software Testing”, Pearson Education,2008.
3. Boris Beizer, “Software Testing Techniques”, Second Edition,Dreamtech, 2003
4. Elfriede Dustin, “Effective Software Testing”, First Edition, Pearson Education, 2003.
5. Renu Rajani, Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2004.

PAPER X: MOBILE APPLICATIONS DEVELOPMENT

Goal :This course is designed to provide an overview of recent and near-future developments in the realm of mobile learning.

Objective : The objective of the programme is to equip the students with mobile application development skills

UNIT I:DEVELOPMENT FRAMEWORKS AND TOOLS: N-tier client server – Java Wireless Toolkit: CLDC and MIDP – Hello MIDP – Publishing frameworks: Cocoon – Architecture – Generators, Transformers, Serializers – Sitemap – XSP – Hello Cocoon.

UNIT II :

XML FOR MOBILE COMPUTING: XML Schema – RDF – RDF Schema – UML and RDF – XML and UML.

MOBILE GRAPHICAL UI: Model View Controller – Presentation Abstraction Control – Transform based techniques – PAC TG – Single Channel Specialization – Specialization on Server – Java Wireless Toolkit GUI – Example – Modeling with UML – UML extensions – Optimizing GUI.

UNIT III

SYNCHRONIZATION AND REPLICATION: Taxonomy – For mobile applications – SyncML – WebDAV – Using UML.

LOCATION BASED SERVICES: Data acquisition of location information – Geographical Positioning System based solution – Non GPS solution – Geographical Information System – Location information modeling: GML – Location based Java Wireless Toolkit application.

UNIT IV:

MOBILE SECURITY: Taxonomy of problems – Security in wireless networks – Distinguishing privacy and security – Modeling security with UML.

UNIT V:

MOBILE DEVELOPMENT PROCESS: UML based development – Use cases – Testing: Mobile infrastructure – Validating use cases – Effect of dimensions of mobility on testing – Case study: Electrical field service company – Requirements – Detailed design – Implementation.

REFERENCES:

1. Reza B Far, “Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML”, Cambridge University Press, United Kingdom, 2005.
2. Golden G Richard III, Loren Schwiebert, Frank Adelstein and Sandeep K S Gupta, “Fundamentals of Mobile and Pervasive Computing”, McGraw-Hill Inc., USA, 2005.

3. Michael Juntao Yuan, “Enterprise J2ME: Developing Mobile Java Applications”, Pearson Education, USA, 2004.
4. Mohammad Ilyas and Imad Mahgoub, “Mobile Computing Handbook”, Aurebach Publishers, 2005.

MINI PROJECT

PROJECT WORK GUIDELINES

1. Guide has been allotted to each student by the department. Student can select any topic in discussion with the supervisor. Students should maintain a work diary where in weekly work carried out has to be written. Guide should review the work every week and put his/her signature. The work diary along with project report should be submitted at the time of viva voce.
2. CIA Marks Distribution: A minimum of two reviews have to be done, one at the time finalizing the questionnaire/ identifying the primary data and the second review at the time of commencement of report writing. They should be asked to present the work done to the respective guide in the two reviews. The guide will give the marks for CIA as per the norms stated below:

First Review	05 Marks
Second Review	05 Marks
Work Diary	10 Marks

	20 Marks

3. End Semester Examination: The evaluation for the end semester examination should be as per the norms given below:

External Examiner	30 Marks
Internal Examiner	30 Marks
Viva-voce Examination	20 Marks
(Jointly given by the external and internal examiner)	_____
	80 Marks

PAPER X : CLOUD COMPUTING

Goals : To set up cloud services for creating maps, cloud services for managing spatial data, and cloud services for processing spatial data.

Objectives: To evaluate cloud computing resources, and use ESRI and open source web GIS technologies.

UNIT I

INTRODUCTION TO CLOUD COMPUTING : Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services.

UNIT II

DEVELOPING CLOUD SERVICES : Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service –Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

UNIT III

CLOUD COMPUTING FOR EVERYONE : Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.

UNIT IV

USING CLOUD SERVICES : Collaborating on Calendars, Schedules and Task Management- Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files.

UNIT V

OTHER WAYS TO COLLABORATE ONLINE :Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis .

REFERENCE BOOK

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

PAPER XI - WEB TECHNOLOGY

Goals: An understanding of the goals and objectives of the .NET Framework. .NET is a revolutionary concept on how software should be developed and deployed.

Objectives: It will cover the practical aspects of multi-tier application development using the .NET framework.

UNIT 1

1.1 Introduction to .NET framework:

Managed Code and the CLR- Intermediate Language, Metadata and JIT Compilation - Automatic Memory Management.

1.2 Language Concepts and the CLR:

Visual Studio .NET - Using the .NET Framework.

1.3 The Framework Class Library:

.NET objects - ASP .NET - .NET web services – Windows Forms

UNIT 2:

2.1 Elements:

Variables and constants – data types – declaration. Operators – types – precedence. Expressions. Program flow – Decision statements – if .. then, if..then..else, select..case– Loop statements – while..end while, do..loop, for..next, for..each..next.

2.2 Types:

Value data types – Structures, Enumerations. Reference data types- Single-dimensional – Multi-dimensional arrays – jagged arrays – dynamic arrays

2.3 Windows programming:

Creating windows Forms – windows controls – Button, Check box, Combo box, Label, List box, Radio Button, Text box. Events – Click, close, Deactivate, Load, Mousemove, Mousedown, MouseUp.

2.4 Menus and Dialog Boxes:

Creating menus – menu items – context menu - Using dialog boxes – showDialog() method.

UNIT - III
APPLICATION DEVELOPMENT USING ADO .NET

UNIT 3:

3.1 Features of ADO.NET:

Architecture of ADO.NET – ADO.NET providers – Connection – Command – Data Adapter – Dataset.

3.2 Accessing Data with ADO.NET:

Connecting to Data Source, Accessing Data with Data set and Data Reader - Create an ADO.NET application - Using Stored Procedures.

UNIT 4:

4.1 ASP.NET Features:

Change the Home Directory in IIS - Add a Virtual Directory in IIS- Set a Default Document for IIS - Change Log File Properties for IIS - Stop, Start, or Pause a Web Site.

4.2 Creating Web Controls:

Web Controls - HTML Controls, Using Intrinsic Controls, Using Input Validation Controls, Selecting Controls for Applications - Adding web controls to a Page.

4.3 Creating Web Forms:

Server Controls - Types of Server Controls - Adding ASP.NET Code to a Page.

UNIT 5:

5.1 Overview of XML:

XML Serialization in the .NET Framework -SOAP Fundamentals-Using SOAP with the .NET Framework.

5.2 Introduction to web services:

Web Services protocol and standards – WSDL Documents - Overview of UDDI - Calling a Web Service from a Browser - Calling a Web Service by Using a Proxy - Creating a simple web service - Creating and Calling a Web Service by Using Visual Studio .NET.

REFERENCE BOOKS:

1. Introduction to Visual basic.NET - NIIT Prentice Hall of India,2005
2. Introducing Microsoft .NET- David S. Platt Microsoft Press”, Saarc Edition, 2001
3. Introduction to Microsoft ASP.NET Work Book - Microsoft- Microsoft Press
4. Developing XML Web Services Using Microsoft® ASP.NET -Microsoft- Microsoft Press
5. Designing Microsoft ASP.NET Applications-Douglas J. Reilly-Microsoft Press
6. ASP.NET-Danny Ryan and Tommy Ryan-Hungry Minds Maran Graphics

PAPER XII: OPEN SOURCE WITH PHP&MYSQL

Goals :acquired relevant skills necessary to design professional web pages. Laboratory will be the venue for actual application.

Objectives : Appraise the impact of PHP and mySQL on Information Technology Management and on Global Economies as it applies to data collection, eCommerce, and security on the Web

UNIT I

PHP and MySQL Part II: SQL tutorial - PHP/MySQL function – Displaying Queries in Tables- Building forms from Queries.

UNIT II

PHP and AJAX: AJAX Introduction, History of AJAX, How does AJAX work, IE memory leaks, XML HTTP Request - GET or POST?, XML Http Request in IE Firefox, callback URL and URL rewriters, Problems and Challenges, Benefits of AJAX, How and when to use AJAX, Selecting the right tools and framework for Ajax.

UNIT III

PHP and Smarty: What is Smarty?, Basic Syntax, Variables, Variable Modifiers, Combining Modifiers, Built-in Functions, Custom Functions, Config Files, Debugging Console, Constants, Smarty Class Variables, Smarty Class Methods, Caching, Advanced Features, Extending Smarty With Plugins, Troubleshooting: Smarty/PHP errors, Tips & Tricks, Resources, BUGS.

UNIT IV

State Management: Creating Cookies -Set Cookies -Destroying Cookies -Creating Session Set Session Destroying Session Working with File:Opening File - Reading File- Writing File. Closing File - Appending File - Uploading File.

UNIT V

MySQL Function in PHP Database Connections-Managing Database Connections-Performing Queries-Closing Connection.

Text Book

1. PHP 5 and MySQL Bible Wiley Dream teck India Pvt.ltd 2006 Edition.

2. Professional LAMP Linux, Apache, MySQL and PHPs Web Development –Wiley dream teach 2006 Edition.

PRACTICAL –III : WEB TECHNOLOGY LAB

1. Simple Programs with ASP.NET AND C#

- a) Write a console application that obtains four int values from the user and displays the product.
- b) If you have two integers stored in variables var1 and var2, what Boolean test can you perform to see if one or the other (but not both) is greater than 10?
- c) Write an application that includes the logic from Exercise 1, obtains two numbers from the user, and displays them, but rejects any input where both numbers are greater than 10 and asks for two new numbers.
- d) Write a console application that places double quotation marks around each word in a string.
- e) Write an application that uses two command-line arguments to place values into a string and an integer variable, respectively. Then display these values.
- f) Write an application that receives the following information from a set of students:

Student Id:

Student Name:

Course Name:

Date of Birth:

The application should also display the information of all the students once the data is entered. Implement this using an Array of Structs.

g) Write programs using conditional statements and loops:

- i. Generate Fibonacci series.
- ii. Generate various patterns (triangles, diamond and other patterns) with numbers.
- iii. Test for prime numbers.
- iv. Generate prime numbers.
- v. Reverse a number and find sum of digits of a number.
- vi. Test for vowels.

vii. Use of for each loop with arrays.

2. Object oriented programs with C#

a) Program using classes.

b) Program with different features of C#

i. Function Overloading

ii. Inheritance (all types)

iii. Constructor overloading

iv. Interfaces

v. Using Delegates and events

vi. Exception handling

3. Programs using different controls VB NET

4. Programs using CSS.

5. Programs using ASP.NET Server controls.

6. Database programs with ASP.NET and ADO.NET

7. Programs using Language Integrated query.

8. Programs securing web pages.

9. Implement the exercise on AJAX.

10. Implement the exercise on JQuery.

Paper XI V:Soft Computing

Goals:To introduce the techniques of soft computing and adaptive neuro-fuzzy inferencing systems which differ from conventional AI and computing in terms of its tolerance to imprecision and uncertainty.

OBJECTIVES

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems

UNIT I FUZZY SET THEORY

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II OPTIMIZATION

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III NEURAL NETWORKS

Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Multilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV NEURO FUZZY MODELING

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOK

1. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, 2004, Pearson Education 2004.

REFERENCES

1. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
2. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, AP Professional, Boston, 1996.

ELECTIVE I :1. DIGITAL IMAGE PROCESSING

Goals:

To enable the students to learn the fundamentals of Digital Image Processing, image Compression and Segmentation

Objectives:

On Successful completion of the course the students should have:

Understood the fundamentals of Digital Image Processing, Image Compression and Segmentation

UNIT I

DIGITAL IMAGE FUNDAMENTALS : Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals - RGB, HSI models, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT, KLT, SVD.

UNIT II

IMAGE ENHANCEMENT : Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic mean filters, Homomorphic filtering, Color image enhancement.

UNIT III

IMAGE RESTORATION: Image Restoration - degradation model, Unconstrained restoration - Lagrange multiplier and Constrained restoration, Inverse filtering-removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations-spatial transformations.

UNIT IV

IMAGE SEGMENTATION: Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed Segmentation algorithm.

UNIT V

IMAGE COMPRESSION: Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

TEXTBOOK

1. Rafael C. Gonzalez, Richard E. Woods, , Digital Image Processing', Pearson, Second Edition, 2004.
2. Anil K. Jain, Fundamentals of Digital Image Processing', Pearson 2002.

REFERENCES

1. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, ' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.
3. D,E. Dudgeon and RM. Mersereau, , Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, , Digital Image Processing' , John Wiley, New York, 2002

ELECTIVE I : 2. CYBER SECURITY

Goals :

To enable the student to learn about the cryptography security standards etc.

Objectives :

On successful completion of the course the students should have

Understood the security issues of network.

UNIT I

Networking Concepts Overview : Basics of Communication Systems-Transmission Media - ISO/OSI and TCP/IP Protocol Stacks -Local Area Networks- Wide Area Networks - Internetworking - Packet Formats - Wireless Networks - The Internet. **Information Security Concepts** : Information Security Overview- Information Security Services-Types of Attacks -Goals for Security- E-commerce Security -Computer Forensics-Steganography -Security Engineering

UNIT II

Security Threats and vulnerabilities : Overview of Security threats -Hacking Techniques -Password Cracking-Insecure Network connections- Malicious Code - Programming Bugs - Cyber crime and Cyber terrorism-Information Warfare and Surveillance

Cryptography :Introduction to Cryptography - Symmetric key Cryptography - Asymmetric key Cryptography - Message Authentication and Hash functions -Digital Signatures - Public Key infrastructure - Diffe-Hellman key exchange protocol - Applications of Cryptography.

UNIT III

Security Management Practices : Overview of Security Management -Information Classification Process- Security Policy - Risk Management -Security Procedures and Guidelines -Business Continuity and Disaster Recovery

Security Laws and Standards :Security Assurance - Security Laws - International Standards -Security Audit - OCTAVE approach -SSE-CMM

UNIT IV

Access Control and Intrusion Detection : - Overview of Identification and Authorization -I & A Techniques -Overview of IDS -Intrusion Detection Systems and Intrusion Prevention Systems
Server Management and Firewalls:User Management -DNS Routing and Load Balancing -Overview of Firewalls -Types of Firewalls -DMZ and firewall features

Security for VPN and Next Generation Networks:VPN Security -Security in Multimedia Networks -Fax Security -Link Encryption Devices

UNIT V

Security Architectures and Models: Designing Secure Operating Systems -Controls to enforce security services -Information flow model and Biba model

System Security:Desktop Security -email security: PGP and SMIME -Web Security: web authentication, SSL and SET

OS Security:OS Security Vulnerabilities, updates and patches -OS integrity checks - Anti-virus software - Design of secure OS and OS hardening -Configuring the OS for security.

References:

- 1.Cyberwar: The Next Threat to National Security & What to Do About It (Hardcover)
by Richard A. Clarke.
2. Computer Security, 2nd ed. Dieter Gollmann Publisher: John Wiley & Sons, 2006
Cyber Security – Andrew S. Tanenbaum, 4th edition, PHI.

ELECTIVE I :3. WAP & XML

Goals: The goal of this course is to provide an introduction both methodological and practical to the most basic internet languages, architectures and applications, but also to illustrate some of the most challenging and innovative techniques on the fore.

Objective : Internet and World Wide Web have modified in a radical way how individuals and organizations interacts, for business, learning or leisure purposes. With Internet millions of people around the world have access to an xtraordinary amount of information, they can search it, exchange email, make phone calls, buy and sell goods and services, build and operate virtual enterprises.

UNIT I

The Rise of Mobile Data: Market Convergence Enabling Convergence – Key Services for the Mobile Internet. Overview of the Wireless Application Protocol: The Origins of WAP – Overview of the WAP Architecture – Components of the WAP Standard – Network Infrastructure Services Supporting WAP Clients – WAP Architecture Design Principles – Relationship to Other Standards.

UNIT II

The Wireless Markup Language: Overview – The WML Document Model – WML Authoring – URLs Identify Content – Markup Basics – WML – Basics – Basic Content – Events, Tashs and Bindings.

UNIT III

Variables – Other Content you can Include – Controls – Miscellaneous Markup – Sending Information – Application Security – Other Data: The Meta Element – Document Type Declarations – Errors and Browser Limitations – Content Generation – WML Version Negotiation.

UNIT IV

User Interface Design: Making Wireless Applications, Easy to Use: Web Site Design: Computer Terminals Vs Mobile Terminals – Designing a Usable WAP Site – Structured Usability Methods – User Interface Design Guidelines – Design Guidelines for Selected WML Elements.

UNIT V

Wireless Telephony Applications: Overview of the WTA Architecture – WTA Client Framework – WTA Server & Security – Design Considerations – Application Creation Toolbox – Future WTA Enhancements. The Mobile Internet Future: Better Content, Easier Access – Beyond Browsing – Beyond Cellular – Mobile Data Unleashed.

TEXT BOOKS

1. Sandeep Singhal, Thomas Bridgman, Lalitha Suryanarayana, Daniel Mauney, Jari Alvinen, David Bevis, Jim Chan, Stefan Hild

ELECTIVE II : 1. MICROPROCESSOR & ITS APPLICATIONS

Goal : To introduce the operation, programming, and application of microprocessor.

Objective : This course contains of fundamental concepts of computer organization, basic I/O interfaces and Interrupt operations

UNIT I

8085 CPU: 8085 Architecture – Instruction set – Addressing modes – Timing diagrams – Assembly language programming – Counters – Time Delays – Interrupts – Memory interfacing – Interfacing, I/O devices.

UNIT II

PERIPHERALS INTERFACING: Interfacing Serial I/O (8251)- parallel I/O (8255) –Keyboard and Display controller (8279) – ADC/DAC interfacing – Inter Integrated Circuits interfacing (I2C Standard)- Bus: RS232C-RS485-GPIB

UNIT III

8086 CPU :Intel 8086 Internal Architecture – 8086 Addressing modes- Instruction set- 8086 Assembly language Programming–Interrupts.

UNIT IV

8051 MICROCONTROLLER: 8051 Micro controller hardware- I/O pins, ports and circuits- External memory – Counters and Timers-Serial Data I/O- Interrupts-Interfacing to external memory and 8255.

UNIT V

8051 PROGRAMMING AND APPLICATIONS: 8051 instruction set – Addressing modes – Assembly language programming – I/O port programming -Timer and counter programming – Serial Communication – Interrupt programming –8051 Interfacing: LCD, ADC, Sensors, Stepper Motors, Keyboard and DAC.

TEXT BOOKS

1. Ramesh S Gaonkar, Microprocessor Architecture, Programming and application with 8085, 4th Edition, Penram International Publishing, New Delhi, 2000. (Unit I, II)
2. John Uffenbeck, The 80x86 Family, Design, Programming and Interfacing, Third Edition. Pearson Education, 2002.
3. Mohammed Ali Mazidi and Janice Gillispie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson Education Asia, New Delhi, 2003. (Unit IV, V)

REFERENCES

1. A.K. Ray and K.M.Burchandi, Intel Microprocessors Architecture Programming and Interfacing, McGraw Hill International Edition, 2000
2. Kenneth J Ayala, The 8051 Microcontroller Architecture Programming and Application, 2nd Edition, Penram International Publishers (India), New Delhi, 1996.
3. M. Rafi Quazzaman, Microprocessors Theory and Applications: Intel and Motorola prentice Hall of India, Pvt. Ltd., New Delhi, 2003.

ELECTIVE II : 2. ADVANCED DBMS

Goals

To enable the students to be familiar with distributed database management.

Objectives

On Successful completion of the course the students should have:

- Understood distributed database management, query processing, distributed object database Management systems

UNIT I

Introduction :Architecture. Advantages, Disadvantages, Data models,relational algebra, SQL, Normal forms.

UNIT II

Query Processing : General strategies for query processing, transformations, expected size, statistics in estimation, query improvement, query 'evaluation, view processing, query processor.

Recovery : Reliability, transactions, recovery in centralized DBMS, reflecting updates, Buffer management, logging schemes, disaster recovery.

UNIT III

Concurrency : Introduction, serializability, concurrency control, locking schemes, timestamp based ordering, optimistic scheduling, multiversion techniques, deadlocks.

UNIT IV

Object Oriented Data base Development : Introduction, Object definition language, creating object instances, Object query language. **Distributed Databases** : Basic concepts, options for distributing a database, distributed DBMS.

UNIT V

Data warehousing : Introduction, basic concepts, data warehouse architecture, data characteristics, reconciled data layer, data transformation, derived data layer, user interface.

Object Relational Databases : Basic concepts, enhanced SQL, advantages of object relational approach.

REFERENCES :

1. An Introduction to database systems by Bipin C. Desai, Galgotia Publications.
2. Modern Database Management by Feffray A. Lioffer, Mary B. Prescott, Fred R Mcfadden, 6th edition, Pearson Education.
3. Principles of distributed database systems, by M.Tamer &Valduries, 2nd edition, LPE Pearson education.
4. Database system concepts by Korth.

ELECTIVE II : 3. ENTERPRISE RESOURCE PLANNING

Goal:

To learn about ERP Implementation Technology.

Objective:

On successful completion of this subject the students should have :

Their problem solving skills in Building the Business Model

Learning about key concepts of Industrial and Financial Systems Knowledge on Multi Client Server Solution

UNIT – 1

Introduction To ERP - Evolution of ERP - Scenario and Justification of ERP in India- Evaluation of ERP, Various Modules Of ERP - Advantage of ERP - Reasons for the growth of ERP -An overview of Enterprise - Integrated Management Information - Business Modeling - ERP for make to order companies - Business Process Mapping for ERP Module Design

UNIT – 2

ERP and Related Technologies - Business Process Reengineering (BPR) - Management Information System (MIS) - Executive Information System (EIS)-Decision support System (DSS)- Supply Chain Management (SCM)

UNIT – 3

ERP implementation - ERP implementation lifecycle - Issues in implementing - ERP Modules – Methodologies - Project Teams –Process Definitions – Vendors and Consultants – Data Migration – Project management– Post Implementation Activities.

UNIT - 4

Enterprise Application Integration – ERP and E-Business – ERP Market – Marketplace - Dynamics - SAP AG - ERP Packages – Business Module in an ERP Package – Finance – Manufacturing – Human Resource – Plant Maintenance – Materials Management – Quality Management – Sales and Distribution

UNIT- 5

Future Directions in ERP - New markets - new channels - faster implementation methodologies - business modules and BAPIs - convergence on windows NT - Application platform - new business segments - more features - web enabling - market snapshot.

REFERENCE BOOKS:

1. Alexis Leon, “ERP DEMYSTIFIED”, Tata McGraw Hill, Second Edition, 2008
2. Mary Sumner, “Enterprise Resource Planning”, Pearson Education, 2007.
3. Pankaj Sharma, Enterprise Resource Planning ,PHI 2006

GUIDELINES FOR PROJECT WORK

1. The aim of the Project work is to acquire practical knowledge on the implementation of the programming concepts studied.
2. Each student should carry out individually one Project Work and it may be a work using the software packages that they have learned or the implementation of Concepts from the papers studied or implementation of any innovative idea.
3. The Project work should be compulsorily done in the Industry only under the supervision of the Department staff concerned.
4. The work has to be done in five reviews during IV Semester.
5. External Exam will be conducted as follows. End Semester Viva
 - ❖ An End- semester Internal Viva-voce will be conducted at the end of IV semester for 250 marks.
 - ❖ Both the Internal (Respective Guides) and External Examiners (100) + (100) Should Conduct the Viva-Voce Examination at the last day of the practical session.

- ❖ Along with the mark sheet an Annexure report containing the candidate's Register no and Title of the Project work should be sent to the Controller of Examinations by the Examiners and a copy of the same has to be retained in the Department.
- ❖ No candidate will be allowed to change the title of the Project work after the completion of End-semester Viva.
- ❖ For those absent on genuine grounds a common subliment End-Semester Viva-voce may be conducted at the COE for All degree by obtaining prior permission from the COE on the recommendations from the HODs of respective Department before the commencement of the next semester.