University of Mumbai

Syllabus Structure(R-2007)

At

S.E. (Computer Engineering)

Semester-VI

Sr No.	Subject	Scheme of Instructions Periods per Week Each Period of 60 Min.		Scheme of Evaluation				
		Theory	Practical	Paper		TW	Practical &Oral	Total
				Hours	Marks			
1.	Advance Computer Network	4	2	3	100	25	50	175
2.	System Programming And Complier Construction	4	2	3	100	25	25	150
3.	Object Oriented Software Engineering	4	2	3	100	25	50	175
4.	Advance Microprocessor	4	2	3	100	25	25	150
5.	Data Warehouse And Mining	4	2	3	100	25	25	150
6.	Seminar		2			25	25	50
		20	12		500	150	200	850

University of Mumbai			
Class: T.E .	**Branch: Computer Engineering**	**Semester: VI**	
Subject: Advanced Computer Network (Abbreviated as ACN)			
Periods per Week (each 60 min)	**Lecture**	**04**	
	Practical	**02**	
	Tutorial	**--**	
		Hours	**Marks**
Evaluation System	**Theory**	**03**	**100**
	Practical and Oral	**--**	**50**
	Oral	**---**	**--**
	Term Work	**---**	**25**
	Total	**03**	**175**

Objectives: **This is advanced course in Computer Network. Main objectives of this course are to know details of TCP/I P along with all protocols, working of internet, applications on TCP/IP, managing TCP/IP and to prepare foundation for the future networks. Demonstration and practical should be the main approach of learning this course.**

Pre-requisites : Computer Network

Module	Contents	Hour
1	**Introduction:** Protocols and standards, Standards Organizations, Internet Standards, Internet Administration; Overview of reference models: The OSI model, TCP/IP protocol Suite, Addressing, IP versions. Connectors, Transceivers and Media converters, Network interface cards and PC cards, Repeaters, Hubs, Bridges, Switches, Routers and Gateways etc. H/W selection.	06
2	**Optical Networking:** SONET/SDH standards, Dense Wavelength division multiplexing (DWDM), Performance and design Considerations.	06
3	**ATM: The WAN Protocol :** Faces of ATM, ATM Protocol operations (ATM cell and Transmission) ATM Networking basics, Theory of Operations, B-ISDN reference model, PHY layer , ATM Layer (Protocol model), ATM layer and cell, Traffic Descriptor and parameters, Traffic Congestion control defined, AAL Protocol model, Traffic contract and QoS, User Plane overview, Control Plane AAL, Management Plane, Sub-DS3 ATM, ATM public services.	08
4	**Packet Switching Protocol:** X.25, theory of Operation and Network Layer functions, X.75, Inter networking protocols, SMDS , Subscriber Interface and Access Protocol, Addressing and Traffic Control.	04

5	**Common Protocols and interfaces in upper Layer:** **TCP/IP suite, Network Layer, Transport Layer, Applications Layer, Addressing and routing design, Socket programming**	**03**
6	**Routing in the Internet: Intra and inter domain routing; Unicast Routing Protocols: RIP, OSPF, BGP; Multicast Routing Protocols: MOSPF, DVMRP. Drawbacks of traditional routing methods, Idea of TE, TE and Different Traffic classes. IP over ATM, Multi protocol Label switching (MPLS) , Storage Area Networks (SAN).**	**06**
7	**Network Management and Services: SNMP: Concept, Management components, SMI, MIB, SNMP format, Messages**	**03**

8	**Traffic Engineering and Capacity Planning:** **Traffic engineering basics: Requirement Definitions: Traffic sizing, characteristics, Protocols, Time Delay considerations, Connectivity, Reliability, Availability and Maintainability, Throughput calculations** **Quality of Service: Introduction, Application, Queue Analysis: M/M/1 as a packet processing Model, QoS Mechanisms Queue management Algorithms, Feedback, Resource reservation ; Queued data and Packet switched traffic modeling. Application and QoS,** **Network Performance Modeling, Creating Traffic Matrix, Capacity Planning and Network vision, Design Tools**	**(**
9	**Multi-Media over Internet: RTP, RSVP, IP Multicasting, Voice Digitization standards, G.729 and G.723 and H.323** **Enterprise Network Security: DMZ, NAT, SNAT, DNAT, Port Forwarding, Pr oxy, Transparent Proxy, Packet Filtering and Layer 7 Filtering.** **Backbone Network Design: Backbone Requirements, Network Capacities Topologies, Topologies Strategies, Tuning Networks**	**(**

BOOKS

Text Books :

1. B. A. Forouzan, "TCP/IP Protocol Suite", Tata McGraw Hill edition, Third Edition.
2. N. Olifer, V. Olifer, "Computer Networks: Principles, Technologies and Protocols for Network design", Wiley India Edition, First edition.

References:

1. W.Richard Stevens, "TCP/IP Volume1, 2, 3", Addison Wesley.
2. D.E.Comer, "TCP/IP Volume I and II", Pearson Education.
3. W.R. Stevens, "Unix Network Programming", Vol.1, Pearson Education.
4. J.Walrand, P. Varaiya, "High Performance Communication Networks", Morgan Kaufmann
5. A.S.Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.

TOPICS FOR EXPERIMENT

1. Installation of Proxy-Server
2. Installation of Mail-Server
3. Installation of Web-Server
4. Installation of DNS-Server
5. Packet grab and Analysis
6. Testing and measuring networks

TERM-WORK

Term work shall consist of at least 10 assignments/programming assignments and one

written test.

Marks

1 .Laboratory work (Experiments and Journal) 15 Marks

2. Test (at least one) 10 Marks

PRACTICAL/ORAL EXAMINATION

A Practical/Oral examination is to be conducted based on the above syllabus.

University of Mumbai			
Class: T.E .	**Branch: Computer Engineering**	**Semester: VI**	
Subject: System Programming And Compiler Construction (Abbreviated as SPCC)			
Periods per Week (each 60 min)	**Lecture**	**04**	
	Practical	**02**	
	Tutorial	**--**	
		Hours	**Marks**
Evaluation System	**Theory**	**03**	**100**
	Practical and Oral	**--**	**25**
	Term Work	**---**	**25**
	Total	**03**	**150**

Prerequisites : Programming Language (C/C++/ JAVA)
Objectives: This course is an introduction to design and implementation of various types of syst

software like assemblers, macros, loaders and linker s. The course also aims to give knowledge of principal structure of a compiler and about the basic theories and methods used to implement different parts of the compiler.		
Module	**Contents**	**Hou**
1	**System Software: Concept, introduction to various system programs such as assemblers, loaders , linkers ,macro processors, compilers, interpreters, operating systems, device drivers**	**03**
2	**Assemblers : Basic Assembler functions , Elements of Assembly language programming, Overview of the assembly process, Design of Single pass and multi pass assemblers. Examples: SPARC Assembler.**	**06**
3	**Macros & Macro processors : Macro definition and examples, Definitions and concept of parameterized macro, nested macros, conditional macro expansion, recursive macro. Design of simple macro processor**	**04**
4	**Loaders and Linkers – Basic loader functions, Linking and Relocation concept, Concept of linkage editors, dynamic linking loader**	**03**
5	**Compilers: Introduction to Compilers, Phases of a compiler, comparison of compilers and interpreters.**	**02**
6	**Lexical Analysis: Role of a Lexical analyzer, input buffering, specification and recognition of tokens, Finite Automata, Designing a lexical analyzer generator, Pattern matching based on NFA's.**	**03**
7	**Syntax Analysis: Role of Parser, Top-down parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers.**	**06**
8	**Syntax Directed Translation: Syntax directed definitions, construction of syntax tree, Top-down translation and Bottom-up evaluation of inherited attributes, analysis of syntax directed definitions**	**03**
9	**Run Time storage: Activation record, handling recursive calls, management of variable length blocks, garbage collection and compaction, storage allocation strategies.**	**04**
10	**Intermediate Code Generation: Intermediate languages: graphical representations, DAGs, Three address code, types of three address statements, syntax directed translation into three address code, implementation of three address statements**	**04**
11	**Code Generation : Semantic stacks, attributed translations, evaluation of expressions, control structures, and procedure calls**	**04**
12	**Code Optimization : Machine dependent and machine independent code optimization, Sources of optimization.**	**04**
13	**Compiler-compilers : JAVA compiler environment, YACC compiler-compiler**	**02**

Books

TEXT BOOKS

1. A.V. Aho, a nd J.D.Ullman: Principles of compiler construction, ***Pearson Education***

2 . A.V. Aho, R. Shethi and Ulman; Compilers - Principles, Techniques and Tools , ***Pearson Education***

3 Leland Beck " System Software " ***Addision Wesley***

4. D. M. Dhamdhere; Systems programming & Operating systems , ***Tata McGraw Hill***

REFERENCES

1. J.J Donovan: Syste ms Programming.

2. Dick Grune, Koen G.L, Henri Bal; Modern Compiler Design, ***Wiley Publications***

3. Kenneth C. Louden; Compiler Construction, Principles and Practice , ***Cengage Learning***

4. John R. Levine; Linkers and Loaders, ***Morgan Kaufman***

TERM WORK

1. Design and implementation of 2 pass assemblers for X86 machine.
2. Design and Implementation of Macro Processor
3. Design a Lexical Analyser for a language whose grammar is known.
4. Design and Implementation of simple Parser using Lex Yacc.
5. Implementation of code optimization techniques.
6. Generate target code for the code optimized , considering the target machine to be X86.
7. Study of Different Debugger Tools.

PRACTICAL & ORAL EXAMINATION

Practical and Oral examination is based on the entire syllabus and may not be restricted to the
practical carried out in the practical examination

University of Mumbai			
Class: T.E .	**Branch: Computer Engineering**		**Semester: VI**
Subject: OBJECT ORIENTED SOFTWARE ENGINEERING (Abbreviated as OOSE)			
Periods per Week (each 60 min)	**Lecture**	**04**	
	Practical	**02**	
	Tutorial	**--**	
		Hours	**Marks**
Evaluation System	**Theory**	**03**	**100**
	Practical and Oral	**--**	**50**
	Oral	**---**	**--**
	Term Work	**---**	**25**
	Total	**03**	**175**

Module	Contents	Hour
1	1.1 Software life cycle models: Water fall, RAD, Spir al, Open-source, Agile process 1.2 Understanding software process 1.2.1 Process metric 1.2.2 CMM levels	04
2	2.1 Planning & Estimation 2.1.1 Product metrics 2.1.2 Estimation- LOC, FP, COCOMO models. 2.2 Project Management 2.2.1 Planning 2.2.2 Scheduling 2.2.3 Tracking.	08

3	**3.0 Workflow of Software life cycle** **3.1 Requirement Workflow** **3.1.1 Functional , Nonfunctional** **3.1.2 Characteristics of Requirements** **3.1.3 Requirement Elicitation Techniques** **3.1.4 Requirement Documentation –Use case specification, Activity Diagram** **3.2 Analysis workflow** **3.2.1 Static Analysis** **3.2.1.1 Identifying Object – Methods of identifying objects and types - Boundary, Control, Entity** **3.2.1 Dynamic Analysis** **3.2.1.1 Identifying Interaction – Sequence and Collaboration diagrams, State chart diagram** **3.3.Design Workflow** **3.3.1 System Design Concept – Coupling and Cohesion** **3.3.2 Architectural Styles** **3.3.3 Identifying Subsystems and Interfaces** **3.3.4 Design Patterns**	**22**
4	**4.1 Implementation Workflow** **4.1.1 Mapping models to Code** **4.1.2 Mapping Object Model to Database Schema** **4.2 Testing** **4.2.1 FTR – Walkthrough and Inspection** **4.2.2 Unit Testing, Integration, System and Regression Testing** **4.2.3 User Acceptance Testing** **4.3 Software Quality – Quality Standards , Quality Matrices** **Testing & SQA: FTR, unit testing, integration testing, product testing, and acceptance testing**	**08**
5	**5.1 Software Configuration Management** **5.1.1 Managing and controlling Changes** **5.1.2 Managing and controlling versions**	**03**
6	**6.1 Maintenance** **6.1.1 Types of maintenance** **6.1.2 Maintenance Log and defect reports.** **6.1.3 Reverse and re-engineering**	**03**

BOOKS

Text Books:

1. **Bernd Bruegge, "Object oriented software engineering", Second Edition, Pearson Educatior**
2. **Stephan R. Schach, "Object oriented software engineering", Tata McGraw Hill.**
3. **Roger Pressman, "Software Engineering", sixth edition, Tata McGraw Hill.**

References:

1. **Timothy C. Lethbridge, Robert Laganiere " Object-Oriented Software Engineering – practical software development using UML and Java", Tata McGraw-Hill, New Delhi**

TOPICS FOR EXPERIMENT

1. **At least two review assignments covering object oriented concepts.**
2. **Coding Assignment on Mapping models to Code**
3. **A full- fledged mini project in which a student will design an application using OOAD case tool covering all the workflows with UML Documentation**
4. **Assignments on Design Patterns.**
5. **Working assignments using Project Management tools**
6. **Study of Configuration Management tool**

TERM-WORK

Term Work

Term work shall consist of at least 10 assignments/programming assignments and one written test

Marks

1. **Laboratory work (Experiments and Journal) 15 Marks**
2. **Test (at least one) 10 Marks**

The final certification and acceptance of TW ensures the satisfactory performance of laborato Work and Minimum Passing in the term work.

PRACTICAL/ORAL EXAMINATION

A Practical/Oral examination is to be conducted based on the above syllabus.

University of Mumbai			
Class: T.E.	**Branch: Computer Engineering**	**Semester: VI**	
Subject: Advanced Microprocessors (Abbreviated as AMP)			
Periods per Week (each 60 min)	**Lecture**	**04**	
	Practical	**02**	
	Tutorial	**--**	
		Hours	**Marks**
Evaluation System	**Theory**	**03**	**100**
	Practical and Oral	**--**	**25**
	Oral	**---**	**--**
	Term Work	**---**	**25**
	Total	**03**	**150**

Pre-requisites : Computer Network		
Module	**Contents**	**Hours**
1	**Introduction to Pipelined Processors:** **Pipelining: An Overlapped Parallelism, Linear pipelining, Classification of Pipelined Processors, Principles of designing pipeline processor, Data Flow computers,** **Systolic architecture, Superscalar, Super pipeline and VLI W processors.**	**10**
2	**Intel 80386DX Processor:** **Detailed study of Block diagram, Signal interfaces, Bus cycles, Programming model, Operating modes, Address translation mechanism in protected mode, Memory management, Protection mechanism.**	**10**
3	**Intel P5 Micro architecture:** **Pentium Processor Block diagram, Superscalar operation, Integer pipeline Stages , Floating point pipeline stages, Branch prediction logic, Cache unit.**	**06**
4	**Intel P6 Micro architectures:** **Introduction to Pentium-Pr o Processor, Special Pentium-Pro features,** **Introduction to Pentium-2 Processor, Pentium-2 software changes, Pentium-3 processors.**	**06**
5	**Pentium-4 & IA-64 Architectures:** **Pentium-4 Net Burst Architecture, IA-64 Itanium Processor architecture**	**04**
6	**Sun SPARC Architecture:** **SPARC Processor, Data Formats, Registers, Memory model. Study of** **SuperSPARC and UltraSPARC architectures**	**06**
7	**Study of System Buses:** **Features, classifications, applications of the system buses like I SA, ATA,** **SCSI, PCI and USB. (Study of the buses is without signals and the timing** **diagrams),**	**06**

BOOKS
1) Computer Architecture and Parallel Procesing: By Hwang & Briggs (McGr aw Hill International edition). **2) Pentium Processor System Architecture: By Tom Shanley & Don Anderson (Mindshare Publishing).** **3) Intel Microprocessors: By Barry B. Brey (Pearson Education)** **4) Advanced Microprocessor: By Roy & Bhurchandi (Tata McGraw Hill).** **5) Advanced Microprocessors: By Daniel Tabak (McGraw Hill)** **6) The SPARC Architecture Manual (Version 8).** **7) Intel Manuals.**
TERM-WORK
<u>Term work: (25 Marks)</u> **Term work shall contain minimum 08 experiments based on the above syllabus and the implementation of the experiments is using any Higher Level Language.**
PRACTICAL & ORAL EXAMINATION
Practical and Oral examination is based on the entire syllabus and may not be restricted to the practical carried out in the practical examination

University of Mumbai			
Class: T.E .	**Branch: Computer Engineering**	**Semester: VI**	
Subject: Subject: DATA WAREHOUSING AND MI NING (Abbreviated as DWM)			
Periods per Week (each 60 min)	**Lecture**	**04**	
	Practical	**02**	
	Tutorial	**--**	
		Hours	**Marks**
Evaluation System	**Theory**	**03**	**100**
	Practical and Oral	**--**	**25**
	Oral	**--**	**--**
	Term Work	**---**	**25**
	Total	**03**	**150**

Pre- requisites: DBMS

Objectives: The data warehousing part of module aims to give students a good overview of the ideas and techniques which are behind recent development in the data warehousing and online analytical processing (OLAP) fields, inter ms of data models, query language, conceptual design methodologies and storage techniques. Data mining part of the model aims to motivate, define and characterize data mining &S process; to motivate, define and characterize data mining applications.

Module	Contents	Hours
	Data Warehousing	
1	Overview and Concepts: Need for data warehousing, The building blocks of a Data warehouse.	04
2	Architecture and Infrastructure : Data Warehouse Architecture, Infrastructure and Metadata Management	04
3	Principles Of Dimension Modeling : Introduction to Dimensional Modeling, Advanced Concepts	04
4	Extract Transform Load Cycle : ETL overview, Extraction, Loading, Transformation techniques.	04
5	Information Access and Delivery Matching information to classes of users, OLAP – the need, Design of the OLAP database, OLAP operations: slice, dice, rollup, drill-down etc. OLAP implementations.	04

6	Implementation And Maintenance: Physical design process, Aggregates and Indexing. Data Warehouse Deployment	04
	Data Mining	
7	Introduction : Basics of data mining, related concepts, Data mining techniques. The KDD process	04
8	Concept Description: Class Characterization and comparison, Attribute relevance analysis, Attribute oriented Induction, Mining descriptive statistical measures in large databases.	04
9	Classification Algorithms: What is Classification? Supervised Learning, Classifier Accuracy, Decision Tree and Naïve Bayes Classifier.	04
10	Clustering: What is clustering? Types of data, Partitioning Methods (K- Means, K- Medoids) Hierarchical Methods(Agglomerative , Divisive)	04
11	Association rules: Motivation For Association Rule mining, Market Basket Analysis, Apriori Algorithm, FP tree Algorithm, Iceberg Queries. Advanced Association Rules (just concepts)	04
12	Web Mining: Web Content Mining, Web Structure Mining, Web Usage Mining.	04

BOOKS

Text Books:

1) Ralph Kimball, "The Data Warehouse Lifecycle toolkit', 2nd edition, Wiley India.
2) Han, Kamber, "Data Mining Concepts and Techniques", 2nd edition ,Elsevier
3) Reema Theraja "Data warehousing", Oxford University Press.
4) "Introduction to Data Mining", 1/e Pang-Ning Tan, Vipin Kumar, Michael Steinbach Pearson Education
5) M.H. Dunham, "Data Mining Introductory and Advanced Topics", Pearson Education.

Reference Books :

1) Paulraj Ponniah, "Data Warehousing Fundamentals", Wiley Student edition.
2) "Data mining For Business intelligence" Galit Shmueli, Nitin Patel, Peter Bruce; Wiley Student Edition.
3) "Data Warehousing, Data Mining & OLAP" Alex ber son & Stephen J Smith, Tat McGraw Hill.
4) "Data Mining with SQL Server 2008" Jamie McLennan & others, Wiley Indian Edition.
5) "Mastering Data Mining", M Berry and G. Linoff, Wiley Student Edition.

6) R. KimballI, "The Data Warehouse Toolkit', John Wiley.

TERM-WORK

Term work should consist of at least of the following:

1. One case study given to a group of 3 /4 students, who will star t form dimensional modeling and go upto generating OLAP reports..
2. Programming the data mining algorithms (classification, cluster ing and Association mining) in Java on example data sets. (Can compare with tools like WEKA).
3. Study of some BI tool like SQL SERVER or ORACLE etc.

PRACTICAL & ORAL EXAMINATION

Practical and Oral examination is based on the entire syllabus and may not be restricted to the practical carried out in the practical examination

University of Mumbai			
Class: T.E .	**Branch: Computer Engineering**	**Semester: VI**	
Subject: Seminar			
Periods per Week (each 60 min)	**Lecture**	**--**	
	Practical	**02**	
	Tutorial	**--**	
		Hours	**Marks**
Evaluation System	**Theory**	**--**	**--**
	Practical and Oral	**--**	**25**
	Oral	**--**	**--**
	Term Work	**---**	**25**
	Total	**--**	**50**

Objective : seminar should base on recent technical topics in the advanced development of computer engineering/ information technology.

TERM-WORK
Term work should consist of the following: 1. One topic given to a group of 3/4 students 2. Hard copy of seminar report.
PRACTICAL & ORAL EXAMINATION
Final presentation is compulsory in front of panel of examiners