University of Pune

TYBSc Computer Science Syllabus

to be implemented from 2010-11

Note:

- For every semester, each theory course will have 40 marks examination and 10 marks for internal examinations (total 50 marks).
- Every laboratory course will have 80 marks external examination and 20 marks internal examination (total 100 marks), which will be conducted at the end of academic year.

Theory courses

Semester-III

CS-331: Paper-I: Systems Programming and Operating System – I

CS-332:Paper-II: Theoretical Computer Science and Compiler Construction-I

CS-333:Paper-III:Computer Networks-I

CS-334:Paper-IV: Web Development and PHP programming-I

CS-335:Paper-V: Programming in Java-I

CS-336:Paper-VI: Object Oriented Software Engineering

Semester-IV

CS-341:Paper-I: Systems Programming and Operating System – II

CS-342:Paper-II: Theoretical Computer Science and Compiler Construction-II

CS-343:Paper-III: Computer Networks-II

CS-344:Paper-IV: Web Development and PHP programming-II

CS-345:Paper-V: Programming in Java-II

CS-346:Paper-VI: Business Applications

Laboratory Courses:

CS-347: Lab Course-I: System Programming and Operating System

CS-348: Lab Course-II: Programming in Java and PHP

CS-349: Lab Course-III: Project (Using Java or PHP)

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : Systems Programming and Operating System-I

Code No. : CS-331

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Semester-III

Total Lectures:48

1. Introduction **[4]**

1.1. Types of program – System program and Application program.

1.2. Difference between system programming and application programming.

1.3. Elements of Programming environment - Editor, Preprocessor, Assembler, Compiler, Interpreter, Linker and Loader, Debugger, Device drivers, Operating System.

1.4. Simulation of simple computer smac0 (hypothetical computer) -Memory, Registers, Condition Codes, Instruction format, Instruction Set, smac0 programs.

2. Editors **[2]**

2.1 Definition, need/purpose of editor.

2.2 Types of editor

2.3 Structure of editor

3. Assembler **[10]**

3.1 Definition.

3.2 Features of assembly language, advantages

3.3 Statement format, types of statements – Imperative, Declarative, Assembler Directive.

3.4 Constants and Literals.

3.5 Design of assembler – Analysis Phase and Synthesis Phase.

3.6 Overview of assembling process

3.7 Pass Structure of Assembler – One pass, Two pass assembler.

3.8 Problems of 1-pass assembler - forward reference, efficiency, Table of Incomplete Instructions.

3.9 Design of 2-pass Assembler – Pass-I and Pass-II

3.10 Advanced assembler directives (LTORG, ORIGIN, EQU),

3.11 Data structure of 2-pass assembler.

3.12. Intermediate Code – Need, Forms-variant I and Variant II

4. Macros and Macro Processors [10]

4.1 Definition

4.2 Macro definition and call

4.3 Macro expansion – positional and keyword parameters

4.4 Nested macro calls

4.5 Advanced macro facilities – alteration of flow of control during expansion, expansion time variable, conditional expansion, expansion time loops. (with examples)

4.6 Design of macro preprocessor – Design overview, data structure, processing of macro definition and macro expansion (Except algorithms)

Macro assembler – Comparison of macro preprocessor and macro assembler. Pass structure of macro assembler.

5. Compilers [14]

5.1 Definition, Aspects of compilation

5.2 The structure of Compiler

Phases of Compiler – Lexical Analysis, Syntax Analysis, Semantic Analysis, Intermediate Code generation, code optimization, code generation

5.3 Memory allocation – static and dynamic memory allocation,

memory allocation in block structure languages, Array allocation and access.

5.4 Compilation of expression – Concepts of operand descriptors and register descriptors with example. Intermediate code for expressions – postfix notations, triples and quadruples, expression trees.

5.5 Code Optimization – Optimizing transformations - compile time evaluation, elimination of common sub expressions, dead code elimination, frequency reduction, strength reduction

6. Compiler Design options [2]

6.1 Interpreter - Use of interpreter, definition, Comparison with compiler, Overview of interpretation, Pure and impure interpreter.

6.2 P-code compiler

7. Linker and Loader [6]

7.1 Introduction

7.2 Concept of bindings, static and dynamic binding, translated, linked and load time addresses.

7.3 Relocation and linking concept – program relocation, performing relocation, public and external references, linking, binary program, object module.

Relocatability - nonrelocatable, relocatable, and self relocating programs (no algorithms), Linking for Overlays.

Reference Books:

1. Systems Programming and Operating Systems by D.M.Dhamdhere

(Second Revised Edition). [Chapters: 2, 3, 4, 5(5.1, 5.3, 5.4, 5.5), 6, 7]

2 System Software - An introduction to Systems Programming

- Leland L. Beck (Pearson Education) [Chapter: 1]

3. Compilers: Principles, Techniques and Tools – Aho, Lam, Sethi, Ullman

(Second Edition) Pearson Education [Chapter: 5 (5.2)]

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : Systems Programming and Operating System-II

Code No. : CS-341

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Semester-IV

Total Lectures:48

1. Introduction [5]

1.1 What Operating System Do – User View, System View, Defining OS

1.2 Computer System Organization

1.3 Computer System Architecture – Single processor system, Multiprocessor systems, Clustered Systems

1.4 Operating System Structure

1.5 Operating System Operations – Dual mode operation, Timer

1.6 Process Management

1.7 Memory Management

1.8 Storage Management – File system management, Mass storage management, Cashing, I/O systems

1.9 Protection and Security

1.10 Distributed Systems

1.11 Special Purpose System – Real time embedded systems, Multimedia systems, Handheld systems,

1.12 Computer Environment – Traditional computing, Client server computing, Peer to peer computing

1.13 Open Source Operating Systems – introduction, Linux only

2. System Structure **[4]**

2.1 Operating System Services

2.2 User Operating-System Interface – Command interpreter, GUI

2.3 System Calls

2.4 Types of System Calls – Process control, File management, Device management, Information maintenance, Communication, Protection

2.5 System Programs

2.6 Operating System Structure – Simple structure, Layered approach, Micro kernels, Modules

2.7 Virtual Machines – Introduction, Benefits

2.8 System Boot

3. Process Management **[4]**

3.1 Process Concept – The process, Process states, Process control block.

3.2 Process Scheduling – Scheduling queues, Schedulers, context switch

3.3 Operations on Process – Process creation with program using fork(), Process termination

3.4 Interprocess Communication – Shared memory system, Message passing systems.

4. Multithreaded Programming **[4]**

4.1 Overview

4.2 Multithreading Models

4.3 Thread Libraries – Pthreads

5. Process Scheduling **[6]**

5.1 Basic Concept – CPU-I/O burst cycle, CPU scheduler, Preemptive scheduling, Dispatcher

5.2 Scheduling Criteria

5.3 Scheduling Algorithms – FCFS, SJF, Priority scheduling, Round-robin scheduling, Multiple queue scheduling, Multilevel feedback queue scheduling

5.4 Thread Scheduling

6. Process Synchronization [5]

6.1 Background

6.2 Critical Section Problem

6.3 Synchronization Hardware

6.4 Semaphores: Usage, Implementation

6.5 Classic Problems of Synchronization – The bounded buffer problem, The reader writer problem, The dining philosopher problem

7. Deadlocks [7]

7.1 System model

7.2 Deadlock Characterization – Necessary conditions, Resource allocation graph

7.3 Deadlock Prevention

7.4 Deadlock Avoidance - Safe state, Resource allocation graph algorithm, Banker's Algorithm

7.5 Deadlock Detection

7.6 Recovery from Deadlock – Process termination, Resource preemption

8. Memory Management [9]

8.1.Background – Basic hardware, Address binding, Logical versus physical address space, Dynamic loading, Dynamic linking and shared libraries

8.2 Swapping

8.3 Contiguous Memory Allocation – Memory mapping and protection, Memory allocation, Fragmentation

8.4 Paging – Basic Method, Hardware support, Protection, Shared Pages

8.5 Segmentation – Basic concept, Hardware

8.6 Virtual Memory Management – Background, Demand paging, Performance of demand paging, Page replacement – FIFO, OPT, LRU, Second chance page replacement

9. File System **[4]**

9.1 File concept

9.2 Access Methods – Sequential, Direct, Other access methods

9.3 Directory and Disk Structure – Storage structure, Directory overview, Single level directory, Two level directory, Tree structure directory, Acyclic graph directory, General graph directory

9.4 Allocation Methods – Contiguous allocation, Linked allocation, Indexed allocation

9.5 Free Space Management – Bit vector, Linked list, Grouping, Counting, Space maps

Reference books:

1) Operating System Concepts - Siberchatz, Galvin, Gagne (8th Edition).
2) Operating Systems : Principles and Design – Pabitra Pal Choudhary (PHI Learning Private Limited)

Note: Case study specified in reference book may be taken for the detail study of syllabus, but not recommended to ask in University examination.

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : Theoretical Computer Science (TCS)

Code No. : CS-332

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Semester-III Total Lectures:48

AIM

To have a introductory knowledge of automata, formal language theory and computability.

OBJECTIVES

• To have an understanding of finite state and pushdown automata.
• To have a knowledge of regular languages and context free languages.
• To know the relation between regular language, context free language and corresponding recognizers.
• To study the Turing machine and classes of problems.

1. Preliminaries [3 Lectures]

1.1 Symbol, Alphabet, String, Prefix& & Suffix of Strings, Sets, Operations on sets, Finite & infinite sets Formal Language

1.2 Relation, Equivalence Relation,(reflexive, transitive and symmetric closures)

1.3 Principle of Induction

2. Finite Automata [12 Lectures]

2.1 Deterministic finite Automaton – Definition , DFA as language recognizer, DFA as a pattern recognizer

2.2 Nondeterministic finite automaton – Definition and Example

2.3 NFA with ε- transitions Definition and Example

2.4 NFA TO DFA : Method (From Book 4) & NFA with ε- to DFA & Examples

2.5 Finite automaton with output – Mealy and Moore machine, Example

2.6 Minimization of DFA, Algorithm & Problem using Table Method

3. Regular languages [5 Lectures]

3.1 Regular Expressions (RE) : Definition & Example

3.2 Regular Expressions Identities

3.3 Equivalence of FA and RE (RE To FA)

3.4 Pumping lemma for regular languages and applications

3.5 Closure properties of regular Languages
(Union, concatenation, Intersection and Kleene closure)

4. Context Free Grammar & Languages [12 Lectures]

4.1 Chomsky Hierarchy

4.2 CFG : Definition & examples, Derivation, LMD, RMD, Reduction, Parse Tree

4.3 Ambiguous Grammar : Concept & Examples

4.4 Simplification of CFG :

4.4.1 Removing Useless Symbols,

4.4.2 Removing unit productions

4.4.3 Removing **ϵ** productions & Nullable symbols

4.5 Normal Forms :

4.5.1 Chomsky Normal Form (CNF) Method & Problem

4.5.2 Greibach Normal form (GNF) Method & Problem

4.6 Regular Grammar : Definition, Equivalence of FA & Regular Grammar

4.6.1. Construction of regular grammar equivalent to a given DFA

4.6.2 Construction of a FA from the given right linear grammar

4.7 Closure Properties of CFL's(Union, concatenation and Kleene closure)

Method and examples

5. Push Down Automaton [6 Lectures]

5.1 Definition of PDA and examples

5.2 Construction of PDA using empty stack and final State method : Examples using stack method

Equivalence between acceptance by final state And Empty stack method & examples

5.3 Definition DPDA & NPDA, their correlation and Example of NPDA

5.4 CFG (in GNF) to PDA : Method and examples

6. Turing Machine [10 Lectures]

6.1 The Turing Machine Model and Definition of TM

6.2 Language accepted by TM

6.3 Design of Turing Machines

6.4 Nondeterministic Turing Machine

6.5 Problems on language recognizers

6.6 Recursive Languages

6.6.1. Recursive and Recursively enumerable Languages.

6.6.2. Difference between recursive and recursively enumerable language.

6.7 Types of Turing Machines (Iterated, Composite and Universal)

6.8 Turing Machine Limitations

6.9 Decision Problem, Undecidable Problem,Halting Problem of TM

6.10 Introduction to LBA (Basic Model) &CSG.(Without Problems)

References :-

1 Introduction to Automata theory, Languages and computation
John E. Hopcroft and Jeffrey Ullman – Narosa Publishing House

2. Introduction to Automata theory, Languages and computation
John Hopcroft, Rajeev Motwani and Jeffrey Ullman –
Third edition Pearson Education

3. Introduction to Computer Theory
Daniel I. A. Cohen – Second edition – John Wiley & Sons

4. Principles of Compiler Design (Refer 2.4)
Alfred V. Aho and Jeffrey Ullman – Narosa Publishing House

5. Theory of Computer Science (Automata, Language & Computation)
K. L. P. Mishra & N. Chandrasekaran, PHI Second Edition

6. Introduction to Languages and The Theory of Computation
John C. Martin TMH, Second Edition

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : COMPILER CONSTRUCTION

Code No. : CS-342

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Semester-IV Total Lectures:48

Aim : *To understand the various phases of a compiler and to develop skills in designing a compiler*

Objective :

- *To understand, design and implement a lexical analyzer.*
- *To understand, design and implement a parser.*
- *To understand, design code generation schemes*

1. Introduction [2 Lectures]

Translator-Compiler, Interpreter definition,

Phase of compiler

Introduction to one pass & Multipass compilers, cross compiler, Bootstrapping

2. Lexical Analysis [6 Lectures]

Review of Finite automata as a lexical analyzer,

Applications of Regular Expressions and Finite Automata(lexical analyzer, searching using RE), Input buffering, Recognition of tokens

LEX: A Lexical analyzer generator (Simple Lex Program)

Error handling.

3. Parser [20 Lectures]

Definition

Top-Down Parser

Top-Down Parsing with Backtracking: Method & Problems

Drawbacks of Top-Down parsing with backtracking

Elimination of Left Recursion(direct & indirect)

Recursive Descent Parsing : Definition

Need for Left Factoring & examples

Implementation of Recursive Descent Parser

Using Recursive Procedures

Predictive [LL(1)]Parser(Definition, Model)

Implementation of Predictive Parser[LL(1)]

FIRST & FOLLOW

Construction of LL(1) Parsing Table

Parsing of a String using LL(1) Table

Bottom-Up Parsers

Operator Precedence Parser

Basic Concepts

Operator Precedence Relations form Associativity & Precedence

Operator Precedence Grammar

Algorithm for LEADING & TRAILING(with ex.)

Algorithm for Operator Precedence Parsing (with ex.)

Precedence Functions

Shift Reduce Parser

Reduction

Handle

Handle Pruning

Stack Implementation of Shift Reduce

Parser (with examples)

LR Parser

Model

Types [SLR(1), Canonical LR, LALR]

Method & examples.

YACC (from Book 3)

4. Syntax directed Translation (SDT) [12 Lectures]

4.1 Syntax Directed Definitions(SDD)

4.1.1 Inherited & Synthesized Attributes

4.1.2 Evaluating an SDD at the nodes of a Parse Tree, Example

4.2 Evaluation Orders for SDD's

4.2.1 Dependency Graph

4.2.2 Ordering the Evaluation of Attributes

4.2.3 S-Attributed Definition

4.2.4 L-Attributed Definition

4.2.3 Semantic Rules With Controlled Side Effects

4.3 Application of SDT

4.3.1 Construction of syntax trees,

4.3.2 The Structure of a Type

4. 4 SDT Schemes

4.4.1 Postfix Translation Scheme

4.4.2 Parser Stack Implementation of Postfix SDT's

5. Code Generation & Optimization [8 Lectures]

5.1 Variants of Syntax Tree

5.1.1. DAG for Expression

5.1.2 The Value-number method for constructing DAG's

5.2 Issues in design of code generator

5.3 Definition of basic block, flow graphs

5.4 Directed acyclic graph (DAG) representation of basic block

5.5 Loop Optimization (Dominators and its properties)

(Prerequisites for 5.5 Optimization from Syspro & OS Course)

References :-

1) Compilers: Principles, Techniques, and Tools

Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman

2) Principles of Compiler Design By :

Alfred V. Aho, Jeffrey D. Ullman (Narosa Publication House)

3) LEX & YACC (O'reilly Publication)

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : Computer Networks-I

Code No. : CS-333

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Semester-III

Total Lectures:48

Ch. No			Total Lectures	Reference Books
1	**Introduction to Computer Networks (Lectures: 7)**			
	Computer Networks	*goals and applications*	1	TAN. Ch. 1
	Network Hardware	*broadcast and point-to-point, topologies – star, bus, mesh, ring etc.*	1	TAN. Ch. 1
	Network Types	LAN, MAN, WAN, Wireless Networks, Home Networks, Internetworks, Protocols and Standards – *Definition of Protocol, Defacto and Dejure standard* *Peer –to-peer and Server – based LAN*	3	TAN. Ch. 1
	Network Software	Protocol Hierarchies - *layers, protocols, peers, interfaces,*	2	TAN. Ch. 1

		network architecture, protocol stack design issues of the layers – *addressing, error control, flow control, multiplexing and de-multiplexing, routing* Connection-oriented and connectionless service Service Primitives – *listen, connect, receive, send, disconnect and Berkley Socket* The relationships of services to protocol		
2	**Network Models**	**(Lectures: 5)**		
	OSI Reference Model	Functionality of each layer	2	FORO. Ch2
	TCP/IP Reference Model	Introduction to IP, TCP, and UDP TCP/IP Protocol Suite	1	FORO. Ch2
	Comparison of OSI and TCP/IP model		1	FORO. Ch2
	Addressing	Physical, Logical and Port addresses	1	FORO. Ch2
3	**The Physical Layer**	**(Lectures: 10)**		
	Basic Concepts	Signals, Types – Analog and Digital Signals, Bit rate, bit length, baseband transmission Transmission Impairments – *attenuation, distortion and noise* Data Rate Limits – *Nyquist's bit rate formula for noiseless channel and Shannon's law* **(Enough problems should be covered on every topic.)**	3	FORO. Ch3

	Performance of the Network	Bandwidth, Throughput, Latency(Delay), Bandwidth –Delay Product, Jitter **(Enough problems should be covered on every topic.)**	1	FORO. Ch3
	Line Coding	Characteristics, Line Coding Schemes – *Unipolar, NRZ, RZ, Manchester and Differential Manchester*	2	FORO Ch.4
	Transmission Modes	Parallel Transmission Serial Transmission – *Asynchrounous and Synchrouous*	1	FORO. Ch4
	Multiplexing	FDM and TDM		
	Switching	Circuit Switching, Message Switching and Packet Switching	1	TAN. Ch2
	ISDN	Services, Evolution, Architecture	2	TAN. Ch.2

4	**The Data Link Layer (Lectures:12)**			
	Design Issues	Services to Network Layer, Flow Control, Error Control	1	
	Framing	Character Count, Byte Stuffing, Bit Stuffing and Physical Layer Coding Violations	2	TAN Ch3
	Error Control	Hamming Code and CRC **(Enough problems should be covered**	2	TAN Ch3.

		on every topic.)		
	Elementary Data Link Layer Protocols	Utopia, A Simplex Stop-And-Wait, A Simplex protocol for noisy channel	2	TAN Ch3
	Sliding Window Protocols	Piggybacking-*Need,Advantages*/*Disadvantages*, 1-bit sliding window protocols, Pipelining – *Go-Back N and Selective Repeat*	3	TAN Ch3.
	Data Link Layer Protocols	HDLC – *frame format, all frame types* PPP – *Use, Frame Format, Use of PPP in the Internet*	2	TAN Ch.3
5	**The Medium Access Sublayer (Lectures:7)**			
	Random Access Protocols	ALOHA – *pure and slotted* CSMA – *1-persistent, p-persistent and non-persistent* CSMA/CD CSMA/CA	3	FORO. Ch12
	Controlled Access	Reservation, Polling and Token Passing	1	FORO. Ch12
	Channelization	FDMA, TDMA and CDMA-*Analogy, Idea,Chips, Data Representation, Encoding and Decoding, Signal Level, Sequence Generation* **(Enough problems should be covered on every topic.)**	3	FORO. Ch.12
6	**Wired LANS (Lectures:7)**			
	IEEE Standards	Data Link Layer, Physical Layer	1	
	Standard Ethernet	MAC Sublayer – *Frame Format, Frame Length, Addressing, Access Method* Physical Layer – *Encoding and Decoding, 10Base5, 10Base2, 10Base-*	6	FORO. Ch.13

		T, 10Base-F, Changes In The Standard – *Bridged Ethernet, Switched Ethernet, Full Duplex Ethernet* Fast Ethernet – *Goals, MAC Sublayer, Topology, Implementation* Gigabit Ethernet – *goals, MAC Sublayer, Topology, Implementation* Ten-Gigabit Ethernet – *goals, MAC Sublayer, Physical Layer*		

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : Computer Networks-II

Code No. : CS-334

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Semester-IV

Total Lectures:48

1	**Wireless LAN (Lectures: 2)**			
	IEEE 802.11	Architecture – *Basic Service Set, Extended Service Set*	1	FORO. Ch.14
	Bluetooth	Architecture – *piconet, scatternet*	1	FORO. Ch. 14
.	**The Network Layer (Lectures:11)**			
	Design Issues	Store-and-forward packet switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection Oriented Service, Comparison of Virtual Circuit and Datagram	3	TAN. Ch.5
	Logical Addressing	IPV4 Addresses – *Address Space, Notations, Classful Addressing, Subnetting, Supernetting,Classless Addressing, Network Address Translation(NAT)*	3	FORO. Ch. 19

		(Enough problems should be covered on Addressing)		
	IPV4 Protocol	Datagram Format, Fragmentation, Checksum, Options	3	FORO. Ch. 20
	Routing	Properties of routing algorithm, Comparison of Adaptive and Non-Adaptive Routing Algorithms	1	TAN. Ch. 5
	Congestion Control	General Principles of Congestion Control, Congestion Prevention Policies	2	TAN. Ch. 5
3	**Address Mapping (Lectures: 04)**			
	Address Resolution Protocol(ARP)	Cache Memory, Packet Format, Encapsulation, Operation, Four Different Cases, Proxy ARP, RARP	4	FORO. Ch.21
4	**The Transport Layer (Lectures:06)**			
	Process-to-Process Delivery	Client Server Paradigm, Multiplexing and Demultiplexing, Connectionless Vs Conection-Oriented Service, Reliable Vs Unreliable	2	FORO. Ch.23
	User Datagram Protocol UDP)	Datagram Format, Checksum, UDP operations, Use of UDP	2	FORO. Ch.23
	Transmission Control Protocol (TCP)	TCP Services – *Process-to-Process Communicatio, Stream Delivery Service, Full – Duplex Communication* TCP Features – *Numbering System,Flow Control, Error Control, Congestion Control*	2	FORO. Ch.23

		TCP Segment – F*ormat*		
5	**The Application Layer (Lectures:07)**			
	Domain Name System (DNS)	Name Space, Domain Name Space, Distribution of Name Space, DNS in the Internet, Name – Address Resolution	2	FORO. Ch.25
	E-MAIL	Architecture, User Agent, Message Transfer Agent-SMTP, Message Access Agent-POP, IMAP, Web Based Mail	2	FORO. Ch.26
	File Transfer Protocol (FTP)	Communication over control connection, Communication over Data Connection, Anonymous FTP	1	FORO. Ch. 26
	WWW	Architecture, WEB Documents	1	FORO. Ch. 27
	HTTP	HTTP Transaction, Persistent and Non-persistent Connection, Proxy Server	1	FORO. Ch. 27
6	**Internetworking Devices (Lectures:5)**			
	Physical Layer Devices	Repeaters, Hubs		FORO. Ch. 15
	Data Link Layer Devices	Bridges – *Transparent and Source Routing Bridges, Bridges Connecting Different LANs*	2	FORO. Ch. 15
	Network Layer Devices	Routers	1	FORO. Ch. 15

	Gateways			FORO. Ch. 15
	Backbone Networks	Bus Backbone, Star Backbone, Connecting Remote LANs	1	FORO. Ch. 15
	Virtual LANs	Memebrship, Configuration, Commuication between Switches, Advantages	1	
7	**Network Security(Lectures:10)**			
	Cryptography	Encryption Model, Substitution Cipher and Transposition Cipher, Two Fundamental Cryptographic Principles **(Problems should be covered.)**	3	TAN. Ch. 8
	Communication Security	Firewalls	1	TAN. Ch. 8
	Web Security	Threats, Secure Naming, DNS Spoofing – *DNS Spoofing, Secure DNS, Self Certifying names*	2	TAN. Ch. 8
	Mobile Mode Security	Java Applet Security, Activex, JavaScript, Viruses	2	TAN. Ch. 8
	Social Issues	Privacy, Anonymous Remailers, Freedom of Speech, Steganography	2	TAN. Ch. 8

Reference Books:

1) **Computer Networks by Andrew Tanenbaum, Pearson Education.**
2) **Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill.**

3) **Computer Networks by Natalia and Victor Olifer, Wiley Publications.**

Guidelines For Examination:

1) **Frame and Packet formats should no be asked.**
2) **Problems should be asked atleast for 10 marks.**

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : Web Development and PHP programming-I

Code No. : CS-334

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Semester-III

Total Lectures:48

1. **Introduction to web techniques** **8**

   HTTP basics, Introduction to Web server and Web browser

   Introduction to PHP

   What does PHP do?

   Lexical structure

   Language basics

   Book 1 chapter 2

2. **Function and String** **10**

   Defining and calling a function

   Default parameters

   Variable parameters, Missing parameters

   Variable function, Anonymous function

   Types of strings in PHP

   Printing functions

   Encoding and escaping

Comparing strings

Manipulating and searching strings

Regular expressions

Book 1 chapter 3 and 4

3. **Arrays** **6**

Indexed Vs Associative arrays

Identifying elements of an array

Storing data in arrays

Multidimensional arrays

Extracting multiple values

Converting between arrays and variables

Traversing arrays

Sorting

Action on entire arrays

Using arrays

Book 1 chapter 5

4. **Introduction to Object Oriented Programming** **8**

Classes

Objects

Introspection

Serialization

Inheritance

Interfaces

Encapsulation

Book 1 , 2 chapter 12

5. **Files and directories** **6**

Working with files and directories

Opening and Closing, Getting information about file, Read/write to file,

Splitting name and path from file, Rename and delete files

Reading and writing characters in file

Reading entire file

Random access to file data

Getting information on file

Ownership and permissions

Book 2 chapter 7

6. Web Techniques **10**

Variables

Server information

Processing forms

Setting response headers

Maintaining state

SSL

Book 1 chapter 7

References

1. Programming PHP
   Rasmus Lerdorf and Kevin Tatroe

   O'Reilly publication

2. Beginning PHP 5
   Wrox publication

3. PHP web sevices
   Wrox publication

4. AJAX Black Book
   Kogent solution

5. Mastering PHP
BPB Publication

6. PHP cookbook

O'Reilly publication

7. Learning PHP and MYSQL

O'Reilly publication

8. PHP and MYSQL

O'Reilly publication

9. PHP for Beginners

SPD publication

10. www.php.net.in

11. www.W3schools.com

12 www.wrox.com

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : Web Development and PHP programming-II

Code No. : CS-344

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Sem IV

Total Lectures:48

1. **Databases** **10**
   Using PHP to access a database

   Relational databases and SQL

   PEAR DB basics

   Advanced database techniques

   Sample application (Mini project)

   Book 1 chapter 9

2. **Generating Graphics** **8**
   Basics of computer graphics

   Working with Raster images

   Manipulating Raster images

   Using text in images

   Book 2 chapter 16

3. **XML** **6**
   What is XML?

   XML document Structure

   PHP and XML

XML parser

The document object model

The simple XML extension

Changing a value with simple XML

Book 2 chapter 8

4. **Handling email with php** **8**
Email background

Internet mail protocol

Structure of an email message

Sending email with php

Email id validation and verification

Book 2 chapter 15

5. **Web services** **8**
Web services concepts

WSDL

Introduction to

SOAP XML-RPC

Creating web services

Calling web services

Book 3 chapter 3

6. **Ajax** **8**
Understanding java scripts for AJAX

AJAX web application model

AJAX –PHP framework

Performing AJAX validation

Handling XML data using php and AJAX

Connecting database using php and AJAX

Book 4 chapter 1,2 and 9

References

6. Programming PHP
   Rasmus Lerdorf and Kevin Tatroe

   O'Reilly publication

7. Beginning PHP 5
   Wrox publication

8. PHP web sevices
   Wrox publication

9. AJAX Black Book
   Kogent solution

10. Mastering PHP
    BPB Publication

6. PHP cookbook

   O'Reilly publication

7. Learning PHP and MYSQL

   O'Reilly publication

8. PHP and MYSQL

   O'Reilly publication

9. PHP for Beginners

   SPD publication

10. www.php.net.in

11. www.W3schools.com

12 www.wrox.com

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : Programming in Java-I

Code No. : CS-335

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Semester-III

Total Lectures:48

1. An Introduction to Java (3)
    - A Short History of Java
    - Features of Java
    - Comparison of Java and C++
    - Java Tools And Editors(Appletviewer,Jar,Jdb)
    - Java Environment.
2. An Overview of Java (3)
    - Types of Comments.
    - Built In Data Types.
    - Variables and Constants(Final Keyword Related to variables)
    - Operators
    - Memory Allocation Using new Operator.
    - Output using println() method
    - Control Statements.
    - Arrays, static and dynamic
    - Simple Java Program.
3. Objects and Classes (6)
    - Defining Your Own Classes and Use of 'this' Keyword.
    - Using Predefined Classes
    - Object the cosmic class
    - Constructor and Overloading Constructors

- Method Parameters
- Static Fields and Methods
- Access Specifiers (public, protected, private, friendly(defualt))
- Creating Accesses and using Packages
- Wrapper Classes
- Garbage Collection(finalize() Method)

4. Inheritance (5)
    - Inheritance Basics (extends Keyword) and Types of Inheritance
      Superclass, and Subclass and use of Super Keyword
    - Method Overriding and Use of final keyword related to method and class
    - Use of Abstract class
5. Interfaces and Inner Classes (4)
    - Defining and Implementing Interfaces
    - Object Cloning
    - Inner Classes
6. Exception Handling (5)
    - Dealing Errors
    - Catching exception and exception handling
    - Creating user defined exception.
    - Using assertion
7. Strings, Streams and Files. (8)
    - String class and StringBuffer Class
    - Stream classes
      Byte Stream classes
      Character Stream Classes
    - Using the File class
    - Creation of files
    - Reading/Writing characters and bytes
    - Handling primitive data types

- Random Access files

8. User Interface Components with AWT and Swing (11)
    - What AWT ? What is Swing? Difference between AWT and Swing.
    - The MVC Architecture and Swing
    - Layout Manager and Layouts, The JComponent class
    - Components -

      Buttons and Labels (JButton, JLabel), Checkboxes and Radio Buttons (JCheckBox and JRadioButton), Lists and Combo Boxes (JList and JCombo) along with the JScrollPane Class, Menus – Jmenu and the JPopupMenu Class, JMenuItem and JCheckBoxMenuItem, Scrollbars and Sliders(JScrollBar and JSlider), Dialogs (Message, confirmation, input (like file selection) and options(like color chooser))
    - Event Handling: Event sources, Listeners, Adapters, Anonymous class
9. Applet Programming (3)
    - Applet Life Cycle.
    - Applet HTML Tags.
    - Passing parameters to Applet
    - Repaint() and Update() method

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : Programming in Java-II

Code No. : CS-345

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Semester-IV

Total Lectures:48

1. Graphics Programming Using Swing (4)
    - Working with 2D Basic Shapes
    - Using Color
    - Using Font
    - Displaying Images
2. Multithreading (6)
    - What are threads
    - Running and starting thread
    - Running multiple threads
    - The Runnable interface
    - Thread priorities
    - Synchronization and interthread communication
3. Database Programming (10)
    - The design of jdbc, jdbc configuration
    - Types of drivers
    - Executing sql statements, query execution
    - Scrollable and updatable result sets, rowset
    - Metadata, transactions
4. Collections (6)

- Collections, Introduction to the Collection framework (Interfaces, Implementation and algorithms), Interfaces, collection classes : Set, List, Queue and Map
- Set : HashSet, TreeSet, and LinkedHashSet
- Interfaces such as Lists, Set, Vectors, LinkedList, Comparator, Iterator, hash tables.

5. Servlet (10)
    - Introduction to Servlet(HTTP Servlet)
    - Life Cycle of servlet
    - Handing get and post request(HTTP)
    - Data handling using servlet
    - Creating and cookies
    - Session tracking using HTTP servlet
6. JSP (5)
    - Getting Familiar with JSP Server
    - First JSP
    - Adding Dynamic contents via expressions
    - Scriptlets, Mixing Scriptlets and HTML
    - Directives, Declaration, Tags and Session
7. Networking (5)
    - The java.net package
    - Connection oriented transmission – Stream Socket Class
    - Creating a Socket to a remote host on a port (creating TCP client and server)
    - Simple Socket Program Example.
8. JavaBeans Components (2)
    - Why beans?
    - The bean-writing process
    - Using beans to build an application

Reference Books :

1) Complete reference Java by Herbert Schildt(5th edition)
2) Java 2 programming black books, Steven Horlzner
3) Programming with Java , A primer ,Forth edition , By E. Balagurusamy
4) Java servlet Programming by Jason Hunter, O'Reilly
5) Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press.
6) Core Java Volume-II-Advanced Features, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press.

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : Object Oriented Software Engineering

Code No. : CS-336

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Semester-III

Total Lectures:48

Ch. No	Name of the Chapter / Topic	No. of Lectures
1	Object Oriented Concepts and Principles	[4]
	1.1 What is Object Orientation - 1.1.1 Introduction - 1.1.2 Object - 1.1.2 Classes and Instance - 1.1.3 Polymorphism - 1.1.4 Inheritance 1. 2 Object Oriented System Development - 1.2.1 Introduction - 1.2.2 Function/Data Methods (With Visibility) - 1.2.3 Object Oriented Analysis - 1.2.4 Object Oriented Construction 1.3 Identifying the Elements of an Object Model 1.4 Identifying Classes and Objects 1.5 Specifying the Attributes (With Visibility) 1.6 Defining Operations 1.7 Finalizing the Object Definition	
2.	Introduction to UML	[2]
	2.1 Concept of UML 2.2 Advantages of UML	
3.	Basic Structural Modeling	[5]
	3.1 Classes 3.2 Relationship 3.3 Common Mechanism 3.4 Class Diagram (Minimum three examples should be covered)	
4	Advanced Structural Modeling	[7]

	4.1 Advanced Classes 4.2 Advanced Relationship 4.3 Interface 4.4 Types and Roles 4.5 Packages 4.6 Object Diagram (Minimum three examples should be covered)	
5	Basic Behavioral Modeling	[9]
	5.1 Interactions 5.2 Use Cases and Use Case Diagram with stereo types (Minimum three examples should be covered) 5.3 Interaction Diagram (Minimum two examples should be covered) 5.4 Sequence Diagram (Minimum two examples should be covered) 5.5 Activity Diagram (Minimum two examples should be covered) 5.6 State Chart Diagram (Minimum two examples should be covered)	
Ch. No	**Name of the Chapter / Topic**	**No. of Lectures**
6	Object Oriented Analysis	[6]
	6.1 Iterative Development and the Rational Unified Process 6.2 Inception 6.3 Understanding Requirements 6.4 Use Case Model From Inception to Elaboration 6.5 Elaboration	
7	Object Oriented Design	[4]
	7.1 The Booch Method, The Coad and Yourdon Method and Jacobson Method and Raumbaugh Method 7.2 The Generic Components of the OO Design Model 7.3 The System Design Process 7.3.1 Partitioning the Analysis Model 7.3.2 Concurrency and Sub System Allocation 7.3.3 Task Management Component 7.3.4 The Data Management Component 7.3.5 The Resource Management Component 7.3.6 Inter Sub System Communication 7.4 Object Design Process	
8	Architectural Modeling	[6]

	8.1 Component 8.2 Components Diagram (Minimum two examples should be covered) 8.3 Deployment Diagram (Minimum two examples should be covered) 8.4 Collaboration Diagram (Minimum two examples should be covered)	
9	Object Oriented Testing	[5]
	9.1 Object Oriented Testing Strategies 9.2 Test Case Design for Object Oriented Software 9.3 Inter Class Test Case Design	

References:

Sr. No.	Authors	Title	Publication
1	Grady Booch, James Rambaugh	The Unified Modeling Language User/Reference Guide	Pearson Education INC
2	Ivar Jacobson	Object Oriented Software Engineering	Pearson Education INC
3	Craig Larman	Applying UML and Patterns	Pearson Education INC
4	Bennett, Simon	Object Oriented Analysis and Design	McGraw Hill

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Proposed Draft of

T.Y. B.Sc. COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

TITLE OF PAPER : Business Applications

Code No. : CS-346

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Semester-IV

Total Lectures:48

Ch. No	Name of the Chapter / Topic	No. of Lectures
1.	Sales and Distribution Management System	[8]
	1.1 Sales Budgeting-Market Segments/Customer/Product	
	1.2 Customer Enquiry and Preparation of Quotation.	
	1.3 Customer Order Processing	
	1.4 Pending Customer Orders	
	1.5 Sales Analysis	
	1.6 Case Study on Sales Analysis with specific reference to Shopping Mall / Sales Organization	
2.	Human Resource Management System	[10]
	2.1 Employee Database and Knowledge Management System	
	2.2 Recruitment – Technique	
	2.3 Employee Appraisal – Performance Efficiency	
	2.4 Employee Training	
	2.5 Leave Accounting and Payroll	
	2.6 Case Study on Human Resource Management	
3.	Manufacturing / Production Planning Control System	[10]

	3.1 Capacity Requirements Planning for Equipment, MRP-I	
	3.2 Manpower and Time, Material Resource Planning, MRP-II	
	3.3 Production Planning – Work Order Management- EOQ	
	3.4 Material Procurement –Indenting, Purchasing, Vendor Analysis, BOM, Supplier Bill Passing and Receipt of Material	
	3.5 Case Study on Manufacturing/ Production Planning and Control	
4.	Banking	[8]
	4.1 Saving Bank Account Processing – Opening, Cancellation, Transfer, Transaction (Deposit, Withdrawal), Cheque Book issue process of Saving A/c's	
	4.2 ATM Application	
	4.3 E-Banking	
	4.4 Biometric Devices and its scope in Applications	
	4.5 Case Study on Banking	
5.	Advanced Business System	[12]
	5.1 Enterprises Resource Planning-Evaluation, Scope, Package ERP Solution Vs Custom Development Features of ERP, Different Modules of ERP, Selection of ERP Software	
	5.2 Supply Chain Management (SCM)	
	5.3 Customer Relationship Management (CRM): CRM covers Marketing, Sales and Service functions of a Company, CRM Process, Customer Acquisition / Development, Retention, Call Centre / Knowledge Centre, KPO's, BPO's	
	5.4 International Business Management-Basic Concept, Market Potential opportunities, Competitive Advantage	
	5.5 TQM – Total Quality Management, Six Sigma	

Demonstration of all above mentioned real life applications be arranged for the students

References:

References:

Sr. No.	Author	Title
1.	Mayer	Production and Operation Management
2.	K. Aswathapa	Human Resource and Personal Management
3.	M. M Shaikh	Enterprise Resource Planning and Business Process
4.	Dr. Milind Oka	Business Applications

Proposed Syllabus for TY BSC COMPUTER SCIENCE PRACTICAL

Title : CS - 347 (32109) System Programming and Operating System

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Assignments: Semester-I

1. Line Editor
   - command line argument
   - singly linked list
   - display, append, help, insert, delete, search, save, copy, move, quit.
2. Assembler
   - literals
   - declarative
   - literal table
   - 2pass START , ORIGIN , LTORG

   Set A - regular with littab/pooltab

   Set B- intermediate code generation

   Target code generation

   Errors- invalid stmnt mnemonics

   Invalid symbol

   Invalid literal space

   Symbol used but not defined

   Defined but not used

   Duplicate declaration
3. SMACO Simulator
4. Macro Preprocessor
   - multiple macro should be supported, multiple calls to same macro
   - no nested macro
5. DFA Driver
   - input start state(5 states)
   - use adjacency list and implement
   - take string as input and check whether string is validated or not

- error state should be rejected

6. Triples/quadruples generation

Assignments: Semester-II

1. Shell Simulation
    - with redirection commands and using fork do
      count, list, search, type line, set, show
    - system command should not used / for all built in programs child program should be created
2. CPU Scheduling
    - priority(both) , SJF(both) , RR
3. Deadlock Detection and avoidance
    - Bankers algorithm
4. Paging/segmentation
    - MFU, LRU, FIFO, second chance, optimal
5. Pthread Library
    - implementation of link allocation methods
6. Semaphores

Lab-I Slip format

2 Programs (40+40)

10 marks oral (External Examiner)

10 marks Journal (Internal Examiner)

Title : CS - 348 (32110) Programming in Java and PHP
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Assignments: Semester-I

Programming in Java

1. Java Basics

   Java tools, javac, java, javap, javadoc, jdb.

   Creating objects, using new, static keyword, final.

   Setting the classpath, constructors.

2. Packages & Arrays of Objects

   Console I/O.

   Scanner.

   BufferedReader.

   Wrapper classes.

3. Inheritance & Interfaces

   Reflection using class's class.

4. Exception Handling

   User define exceptions & use of keywords.

5. File Handling.
6. GUI Designing / AWT
7. Event Handling.
8. Applet

   Creation of an applet.

   Runtime parameter passing.

Programming in PHP

1. String Manipulation

   Implement user functions parallel to built-in functions (minimum four).

2. Assignment on Arrays

Develop an application using built-in functions viz sorting, iterator, set, stack and searching.

3. Inheritance

   Examining classes and objects using inheritance

4. Operations on Text file

   Operations on files using built-in file handling functions.

5. Reading Directory file

   Directory handling using built-in functions

6. Form validation (with sticky form)

   Self processing and sticky form applications

Assignments: Semester-I

Programming in Advanced Java

1. Multithreading & Graphics

   Creating & starting threads (using both Runnable & Thread class).

   Multiple Threads

   Synchronization (Race Condition)

   Simple Games & Animation

2. Database Programming Using JDBC

   ResultSet MetaData

   Database MetaData

3. Collection

   LinkList, Hashtable, TreeSet, Iterator.

   Algorithms (Sort, Binary Search).

4. Servlets

   Servlet Config

   Servlet returning HTML response

   Servlet & JDBC

   Servlets which redirects to another URL

   I/P from HTML using GET/POST

Cookies & HttpSession class(Shopping, counting number of visits)

Applet/Servlet Communication

5. JSP

   HTML with Scriptlets

   JSP tags (page, include)

   Implicit JSP Objects (request, response, session, out)

6. Networking

   Simple Client Server

   Server Handling Multiple Clients using Multiple Threading

Programming in Advanced Java

1. Assignment on sessions / cookies

   Develop program using session and cookies.

2. Database connectivity and database manipulation

   Develop sample application for database operations (no documentation).

3. Creating and reading image files
4. Sending an e-mail

   Offline email handling (using LAN)

5. Java script application using AJAX

   Simple application using AJAX with JAVA script and XML

6. Database access using AJAX

   Database connectivity and manipulation using AJAX

Lab-II Slip format

2 Programs – Java (sem I) and Web technology (sem II)

Or Java (sem II) and Web technology (sem I) (40+40)

10 marks oral (External Examiner)

10 marks Journal (Internal Examiner)

Title : CS – 349 (32111) Project (Using Java or PHP)

A Project of 100 marks. The marks will be converted to grade.

Grading will be as follows:

Marks	**Grade**
Below 40	D (Indicates FAIL)
40 - 49	C
50 - 59	C+
60 – 69	B
70 - 79	B+
80 - 89	A
90 – 100	A+

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Equivalence of Old Courses with New Courses

TYBSc Computer Science (To be implemented from 2010-11)

Old Course	New Course
Systems Programming & Operation Systems	Systems Programming & Operation Systems
Theoretical Computer Science & Compiler Construction	Theoretical Computer Science & Compiler Construction
Computer Networks and Network Administration	Computer Networks-I & II
Server Databases & Application Development	Web Development and PHP programming
Programming in Java & Advanced Java	Programming in Java-I & II
Software Engineering	Object Oriented Software Engineering & Business Applications