**SHIVAJI UNIVERISTY, KOLHAPUR-416 004.**
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**शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४.**

दुरध्वनी : (ईपीएबीएक्स) २६९०५७१ (विस्तारित क्र. ५०९३, ५०९४) तार : युनिशिवाजी
फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३. e-mail : bos@unishivaji.ac.in

★★★★★B+
Accredited By NAAC

SU/BOS/Sci./BCS./4918                                      Date :  22 August, 2007

To,

**The Principals**
 **of the concerned affiliated Colleges.**
**( Conducted B.C.S. Courses)**

          Sub. : <u>The revised syllabi in B.C.S. Part – III.</u>

**Sir/Madam,**

          With reference to the subject mentioned above, I am directed to inform you that the University authorities have accepted and given approval to the revised syllabus of B.C.S.-III.

          The revised syllabus will come into force from the Academic year 2007-2008 i.e. June, 2007 onwards.

          It is informed that the above syllabus is available on university website www.unshivaji.ac.in ON LINE SYLLABUS Link.

          You are, therefore, requested to consider the same and bring this to the notice of all teachers and students concerned.

          I am directed to bring to your notice that there were minor correction in the said syllabus.  Accordingly a correated copy is sent herewith for kind information.

          Thanking you,

                                                  Yours faithfully,

                                                  **I/c. Registrar**
**Enclosed : As above.**                          **Board of Studies Section**

**Copy f.w.cs. to:**

1.       **Dr.T.B.Jagtap, Dean, Faculty of Science**
2.       **Dr. M.S.Chaudhary, Chairman Ad-hoc Board in Computer Science.**

**Copy to:**

3.       **Appointment Section**
4.       **B.Sc. Exam. Section**
5.       **Affiliation Section**
6.       **External Section**
7.       **Eligibility Section**

# SHIVAJI UNIVERSITY, KOLHAPUR

## T.Y.B.C.S. Syllabus
## Implemented from 2007- 2008

**Course Structure:**

The entire T.Y.B.C.S. shall consist of 9 courses (6 Theory + 3 Practical). Each theory course consists of about 100 periods (4 periods per week) and each practical course consist of not less than 16 experiments, work load being not less than 4 periods (3 hours) per week, per course.

Out of six theory courses five courses are compulsory. Student shall offer one of the electives as 6th course. Presently only two electives are included. The list is to be updated every year.

**Note**:
1. All theory papers will be of 100 marks. Each laboratory course will be of 100 marks.
2. **Work Load:**
   a) Theory: Four lectures per theory course per week.
   b) Lab course: Four periods (3 hours) per week for a Lab course per batch.

**Course Titles:**

Paper – I      : Operating System: Case study of Linux
Paper – II    : Visual Basic .NET Programming
Paper – III   : Computer Networks
Paper – IV   : Software Engineering
Paper – V    : Java Programming

Paper – VI   :  Elective:

        Elective – I: Automata theory and its application to compiler construction .
        Elective - II: E-Commerce

Lab Course – I           : Operating System: Case study of Linux
Lab Course – II          : Visual Basic Programming and Java Programming
Lab Course – III         :  Project

# Paper – I : Operating System: Case study of Linux

## Section – I

**1. Introduction to Operating system**     **3**

     Monitors, buffering, and spooling
     Multiprogramming, time-sharing, and real time systems
     I/O, memory and CPU protection

**2. Functions of operating system**     **6**
     Services to the user programs
     System call concepts: BIOS and DOS interrupts

**3. File systems**     **8**
     Types of files, structure of a disk, block operations, access methods, allocation methods, directory structure
     File system, file system in UNIX (i-node concept), file protection in UNIX

**4. Scheduling**     **8**
     Scheduling Algorithms: first come first, shortest job first, preemptive algorithm with examples

**5. Memory management**     **12**
     Relocation, swapping: overlapping, partitioning and segmentation
     Paging: Page overlaps, demand paging and page replacement algorithm
     Virtual Memory

**6. I/O scheduling**     **6**
     First come first, shortest seeking first, elevator algorithm
     Comparison of algorithms

**7. Resource allocation**     **5**
     Deadlocks: prevention, avoidance, detection and recovery

**8. Concurrent processing**     **6**
     Fork and join, process and process states, semaphores

## Section – II

**9. Linux overview**     **2**
     History and evolution, the kernel and shell, Linux file system

**10. Linux desktop**     **8**
     Various user interfaces of Linux, using GNOME desktop, KDE desktop
     Study of vi editor (input and command modes)

**11. Linux commands**     **12**
     The shell interface, checking logging sessions – id, who
     General Purpose Utilities – cal, date, echo, bc, passwd, who
     File management commands – cat, cp, rm, mv, wc, cmp, gzip, gunzip
     Directory management commands – pwd, cd, mkdir, rmdir, ls
     Checking directories and permissions – pwd, home, cd, ls
     Using shell environment variables

**12. Pattern matching**                                                                6

      Utilities: find, grep and regular expressions

**13. Shell programming**                                                            18

      Creating a script, making a script executable

      Shell syntax: variables, conditions, program controls: if-elif, for, while, until, case List: AND list, OR list, Functions: function definitions, function return,

      Built-in shell commands: break, continue, echo, eval, exec, exit, export, expr, printf, return, set, shift, trap, unset

**<u>Books Recommended :</u>**

- Operation System by :- Peterson, Silbershatz
- Unix Operating system by :- Bach
- Modern operating system by :- Tanebaum
- Advanced MS-DOS Programming by Ray Dunken
- UNIX Systems V by :  Morgan , McGilton
- Linux Programming – WILEY – dreamtech
- Red Hat Linux Bible - WILEY – dreamtech

# Paper – II:  Visual Basic .NET Programming

## <u>Section – I</u>

**1. Introduction**                                                                    12

      Visual Basic .NET IDE and its features, .NET framework, CLR

      Language basics: data type, operators, control statements: branching and looping

**2.  .NET Controls**                                                                14

      Forms, text boxes, labels, command button, radio button, option buttons, check boxes, list boxes and combo boxes, introduction to ActiveX controls

**3. Strings and Arrays**                                                            12

      Working with Arrays, array resizing, System.Array class, manipulation of string, string functions for comparison, concatenation, copy, replace, substring, length

## <u>Section – II</u>

**4. Working with Classes**                                                          14

      Classes, properties and methods, attaching a class with a form

      Inheritance: derived from existing classes, overriding methods from base class

**5. Exception Handling**                                                            10

      Types of errors, structured and unstructured exceptions

      Tracing Errors: breakpoints, watch, quickWatch, autos, locals, call stack.

**6. Database Access**                                                               14

      ADO.NET and it's Components, datasets, data adapters, server explorer, binding controls to database

      Case studies / Mini-projects                                              12

Books :

1) Visual Basic.NET Black Book – Steve Holzner
2) Visual Basic.NET Programming Bible – Bill Evjen
3) Pro ADO.NET with VB.NET – Sahil Mailk and Paul Dickinson

# Paper – III: Computer Networks

## Section – I

**1. Computer network**                                                        6

      User of a computer network, goal, application, network structure, network architecture
      ISO reference model: protocol hierarchies, services provided by different layers
      OSI Terminology, services primitives, connection oriented and connection less services

**2. Physical layer**                                                          12

      Data communication basics, bandwidth (Shannon & Nyquist Theorems)
      Transmission media: magnetic, twisted pair, coaxial cable, fiber optic line of data transmission, communication satellites
      Analog transmission: telephone system, modems, RS232C and RS- 449
      Digital Transmission: coding (Manchester, different Manchester), P-code modulation, x.21 digital Interface
      Digital transmission and switching: multiplexing (time and frequency division), circuit switching, packet Switching, hybrid switching
      ISDN- Integrated services, digital switching services, PSN inband signaling, architecture, pipe diagram (Data in digital PBX), terminal Handling

**3. Data link layer**                                                         12

      Design issues, error detection and correction, elementary protocols, unrestricted simplex, simplex protocol for noisy channel (with psuedocodes)
      Sliding window protocol: one bit sliding window protocol, protocol using go back n protocol using selective repeat

**4. Network layer**                                                           12

      Design issue, internal organization, virtual circuits and data
      congestion control algorithm

**5. Network sharing**                                                         7

      Pure and slotted ALOHA, CSMA / CD
      IEEE standards: concepts of 802, 802.5

## Section – II

**6. Components of LAN**                                                        5

      Types of servers, workstations, LAN cables, UTP, STP
      Network Adapters, LAN Software

**7. Sharing computer resources**                                              3

      Sharing files without LAN, Peer to peer networks
      Sharing Printers, CD-ROM Drivers , Fax Machines etc.

**8. Using file servers**                                                      5

      Components of file server, server hardware, server software, mapping drivers
      Ensuring server security and fixing failed Server
      Comparing server based LANs and peer to peer LANs

**9. Using Netware**                                                           5

      Using Netware, creating login script, files and attributes, printing
      Netware security, assign Netware users

**10. Using LINUX**      **4**

        Characteristics of LINUX Network Features, UNIX Based Networks
        Using TCP/IP Internet address and protocols

**11. Managing network**      **2**

        Basics of network management, using LAN , managing Protocol
        Using the general LAN Management

**12. Building WANs from LANs**      **7**

        Internetworking: Bridges and gateways
        Sharing distant resources

**Books Recommended**

- Computer Networking.     Tanenbaun.
- Introduction to barry Nawce (prentice Hall) Macmillan Publishing
- Client / Server Computing for Dummies: IDG Publishings
- The AB, of local area networking by Michael Dorich
- Data & communication by William Stallings

# Paper – IV: Software Engineering

## Section – I

**1. Introduction**      **6**

        The software crisis and Software engineering approach

**2. Software process**      **12**

        Software process, characteristics of software process, software development, software configuration management, project management, process management

**3. Software requirement analysis and specification**      **12**

        Problem analysis and software requirements, requirements specification, validation metrics

**4. Planning a software project**      **12**

        Cost estimation, project schedules, staffing and personnel planning, software configuration management plans, quality assurance plans, project monitoring plans, risk management

## Section – II

**5. Function oriented design**      **12**

        Design principles, module level concepts, design specification and notation, structured design methodology, verification metrics

**6. Object-Oriented Design**      **12**

        OO analysis and design: Concepts, design specifications and notation, design methodology, quality metrics, use of UML is recommended

**7. Detailed Design**      **10**

        Module specifications, detailed design, verification metrics

**8. Coding**:      **10**

        Programming practices, Verification and proof of a program

**9. Testing** 12

Testing fundamentals, functional testing, structural testing, testing object oriented programs, testing process, metrics- reliability Estimation

**Text Book**

An Integrated approach to Software Engineering – Narosa – Pankaj Jalote

**References:**

1. Software Engineering - R.S. Pressman
2. Software Engineering - Martin L. Shooman
3 Principles of Software Engineering Management – Glib T.( Add on Wesley)
4 Software Engineering Project Management – Thayer R.H.(IEEE, CS Press)

# Paper – V : Java Programming

## <u>Section – I</u>

**1. An Overview of Java** 4

Why Java?, JVM (The Java Virtual Machine), Java byte code
Java execution model, editions of Java, a Java program: source code, compile and execute, keywords, identifiers, variables, data types, operators, selection and iteration constructs in Java

**2. Classes, objects and methods** 8

Overview of classes and objects, writing a Java class, adding fields and methods, instantiating of an object, methods: definition, invoke, parameter passing and overloading methods, constructors: default constructors, parameterized constructor, overloading constructors, this keyword, garbage collection, finalize() method

**4. Inheritance** 12

An overview of inheritance and implementation, instantiating child objects, single versus multiple inheritance, method overriding, keywords: super and final, object class and its methods, interfaces: definition, user defined interfaces and their applications, implementing an interface, extending interfaces, packages: definition, CLASSPATH, import statement, access control and packages, an overview of java.io package: input and output  streams, writer and reader classes

**5. Polymorphism and Abstraction** 8

An overview of polymorphism, virtual methods, abstraction, abstract classes, abstract methods

### Section-II

**6. Exception handling**

Overview of exception handling, flow of control, throwable classes, catching exceptions, multiple catch blocks, throws keyword, throwing exception, finally keyword

**7. Multithreaded programming** 10

Main thread, creating a thread: implementing runnable, extending thread, creating multiple threads: using *isAlive()* and *join()*, thread priorities, synchronization, deadlock issues, suspending, resuming and stopping threads

**8. Introduction to AWT**      **8**

AWT classes, Windows fundamentals: component, container, panel, window, frame, canvas, working with frame windows: setting the windows dimensions, hiding and showing window, setting a window title, closing a frame window, creating a frame window in an applet, working with graphics: drawing lines, rectangles and circles

**9. Event Handling**      **10**

Delegation event model, event classes: action event class, mouse event class, key event class, sources of events, event listener interfaces: ActionListener interface, MouseListener interface, Mouse MotionListener interface, KeyListener interface

**References** :   1. The Complete Reference Java2 Tata Mcgraw-Hall
            2. Learning Java, Rich Raposa, WILEY- dreamtech India Pvt. Ltd.

# Paper – VI : (Elective – I ) Theoretical Computer Science and its application to Compiler Construction

## Section – I

**1. Finite automata and regular expression**      **18**

Preliminaries, regular expressions, regular languages / grammars
Finite state machines, finite automata with output, definition of Moore and Melay machine, finite automata with ε-moves, nondeterministic finite automata, equivalence of regular expression and finite automata

**2. Properties of regular sets**      **8**

Pumping Lemma for Regular set
Closure properties of regular sets
Minimizing finite automata (Myhill and Nerode Theorem)

**3. Context free grammars**      **12**

Types of grammar, regular grammar, equivalence of regular grammar and finite automata, context fee grammars: derivation trees, ambiguity, simplification of context free grammars: removing useless symbols and productions, Chomsky Normal Form, Grebach Normal Form

**4. Push down automata**      **8**

Introduction, definitions, acceptance by PDA, PDA and CFL

**5. Introduction to Turing Machine**

Basics of Turing machine with simple example for language recognition

## Section – II

**6. Compilers**      **3**

Phases of compiler and their grouping

**7. Scanning**      **8**

Functions of scanner, token: token type and value buffering, look ahead transition diagrams, hand coding of a scanner, regular expressions, finite automata and scanner generation – Lex

**8. Parsing**      **16**

Representation of grammars: BNF, syntax, graphs
Derivation, sentential forms, sentences, parse-tree, ambiguity, left recursion

Top-down parsing, recursive decent parsing conditions
Bottom up parsing / parser table construction
Parser generations e.g.- yacc

**References** : 1. Theory of computer science: E.V. Krishnamoorthy.
2. Elements of theory of computating by Harry R. Lewies & Christas H.
3. Theory of computer science by Milina & chandraselaran.
4. Theory of computation : by Kohen
5. Theory of computation by Kulkarni.
6. Introduction to automata theory, languages and computation –John E. Hopcroft
& Jeffery D. Ullmann
7. Compiler Construction - Dhamdere (Mc-Millan)
8. Compilers - Principles, Techniques and Tools - A.V. Aho, R. Shethi and J.D.
Ullman ( Addison wesley publishing company.)
9. Compiler Construction - Barret, Bates, Couch (Galgotia)

# Paper – VI : (Elective – II)     E-Commerce

### Section – I

**1. Internet basics and electronic communication**                                      **10**

Internet basics: Domains, networking, E-mail and internet technology, digital technology, hardware / software requirements for internet applications, IP addressing: structure of an IP address, overview of TCP/IP

**2. E-security**                                                                         **12**

Security issues, security threats, security breach, access control, firewall and proxy services, security issues, digital signature, electronic document cryptography, electronic cash, introduction to IT law

**3. E-commerce**                                                                         **8**

Meaning, objective, challenges and opportunities, basic models of E-commerce – business to business, business to customer, customer to business

**4. Electronic data interchange**                                                        **10**

Electronic data interchange: Concept of EDI, requirements, benefits, components of EDI and its applications

### Section – II

**5. Electronic payment system**                                                          **10**

Overview of electronic payment technology, electronic or digital cash, electronic cheques, online credit card-based systems, consumer legal and business issues

**6. Electronic commerce and banking**                                                    **10**

Changing dynamics in the banking industry, home banking: History, implementation approaches, open versus closed models, management issues in online banking, online customer services and support, technology and marketing strategies

**7. Electronic commerce and retailing**                                                  **8**

Changing retail industry dynamics, online retailing, mercantile models from the consumer's perspective, management challenges in online retailing .

**8. HTML**                                                                    **12**

Development of E-Commerce applications, study of state of art development tools, a few case studies.

**References**

1. Web Enabled Commercial Application Development Using HTML,DHTML, Java Script , Perl – Ivan Bayross
2. Electronic Commerce - Ravi Kalakota and Andrew Whinston PEARSONS
3. Beginning E-commerce - Matthew Reynolds Shroff Publihsers &Distributors
4. The E-Biz Primer How to design profitable websites and portals
   Alexis Leon and Mathews Leon
5. E-commerce - Deepak Goel  S. Chand
6. E-commerce , Business on the Net Kmalesh Agarwal McMillan
7. E-commerce , The Cutting Edge of Business Bajaj and Nag - Tata McGraw Hill
8. E-Commerce by S. Jaiswal – Galgotia Pub.
9. HTML4 Unleashed – Rick Dranell

## Nature of Theory Question Paper

1.  The question paper includes total 8 questions, 4 questions based on Section-I and 4 questions based on Section-II. Each question carries 20 marks.

2.  Student has to solve any 5 questions.

3.  Student has to solve at least 2 Questions from Section-I

4.  Student has to solve at least 2 Questions from Section-II

*Instructions on Theory Question Paper*

1.  Attempt **any five** questions.

2.  Attempt at least **two** questions from **Section-I**

3.  Attempt at least **two** questions from **Section-II**

4.  Figures to the **right** indicate **full** marks.

# Lab Course – I : Operating System and Linux

This course is based on Paper no – I and is for 100 marks. This includes the simulation of DOS commands using C language and Linux shell programming

## Experiment List

*Based on Operating System*

Simulation of DOS, Linux and text processing commands
Mouse handling using interrupts
Display and setting system time

*Based On Linux*

General purpose utilities, file management commands, directory related commands
Simple and advance programs using shell scripts

## Nature of Practical Question Paper

1.  There should be two sections.

2.  Section I should be based on Operating System.

3.  Section II should be based on Linux.

4.  Each Section includes three practical questions.

5.  Student has to solve any 3 practical questions.

6.  Student has to solve at least 1 Question from Section I

7.  Student has to solve at least 1 Question from Section II

8.  Each Question carries 25 marks

9.  10 marks for Certified Journal and 15 marks for Viva

10. The total time duration of the practical examination should be 4 hours.

## Lab Course – II     : Visual Basic.NET Programming and Java Programming

This course is based on Paper no – II and V for 100 marks. This includes the programs on Visual Basic and Java language as per the syllabus of Paper no – II and V

**Experiment List**

*Based on Visual Basic.NET Programming*

> Basic Study of Visual Studio.NET IDE
>
> Compiling Visual Basic.NET Programs
>
> Control Structures
>
> Using In-Built Functions
>
> Using Basic Controls
>
> Simple Applications Using Database

*Based On Java Programming*

> Editing and Compiling Java Applications
>
> Control Structures – Simple Applications
>
> Inheritance
>
>> Simple
>>
>> Multilevel
>>
>> Hierarchical
>>
>> Abstract Class
>>
>> Interfaces
>
> Exception Handling
>
> AWT – Controls and Event Handling

**Nature of Practical Question Paper**

1.  There should be two Sections.

2.  Section I should be based on Visual Basic.NET Programming

**11**

3. Section II should be based on Java Programming

4. Each Section includes three practical questions.

5. Student has to solve any 3 practical questions.

6. Student has to solve at least 1 Question from Section I

7. Student has to solve at least 1 Question from Section II

8. Each Question carries 25 marks

9. 10 marks for Certified Journal and 15 marks for Viva

10. The total time duration of the practical examination should be 4 hours.

*Instructions on Practical Question Paper of Lab Course I and Lab Course II*

1. Attempt **any three** questions.

2. Attempt at least **one** question from **Q.1** to **Q.3**

3. Attempt at least **one** questions from **Q.4** to **Q.6**

4. Each Question carries 25 marks

5. 10 marks for Certified Journal and 15 marks for Viva

# Lab Course – III : Project

This lab course is for 100 marks. In this paper, students in group of at most two work on software project. The Project is concerned with Visual Basic.NET and Database. At the end of the work, project report will be prepared with every aspect of software engineering is concerned. This project work is expected to follow all the professional guidelines for software development. Student should present the On-line demonstration at the time of project viva-voce.

The distribution of 100 marks will be as follows:

1) Documentation                                        50 marks
    Analysis, Design: Database, I/O and the process (use of UML is recommended)
2) Online Demonstration of Project and Viva         50 marks
                                                    -----------------
                                                      100 marks

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