



West Bengal State Council of Technical Education

(A Statutory Body under West Bengal Act XXI of 1995)

Kolkata Karigori Bhavan, 2nd Floor, 110 S. N. Banerjee Road, Kolkata - 700 013.

DETAIL SYLLABI OF THE DIFFERENT COURSES OFFER IN INFORMATION TECHNOLOGY, PART -III, SECOND SEMESTER



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| PROPOSED CURRICULAR STRUCTURE FOR PART – 3 (3RD YEAR) OF THE FULL- TIME DIPLOMA COURSE IN INFORMATION TECHNOLOGY | | | | | | | | | | | |
|--|--|-----------|-----------|----|-----------|-------------------|-----------|------------|------------|------------|-------------|
| WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION | | | | | | | | | | | |
| TEACHING AND EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES | | | | | | | | | | | |
| SEMESTER:SIXTH | | | | | | BRANCH:IT | | | | | |
| SL.No. | SUBJECT | CREDITS | PERIODS | | | Evaluation Scheme | | | | | |
| | | | L | TU | PR | INTERNAL SCHEME | | | ESE | PR | TOTAL MARKS |
| | | | | | | TA | CT | Total | | | |
| 1 | Industrial Management | 3 | 3 | | | 10 | 20 | 30 | 70 | | 100 |
| 2 | Advanced Java Programming | 3+2 | 3 | | 4 | 10 | 20 | 30 | 70 | 100 | 200 |
| 3 | Systems Programming | 3+2 | 3 | | 3 | 10 | 20 | 30 | 70 | 50 | 150 |
| 4 | ELECTIVE – II (Any One) | | | | | | | | | | |
| | Digital Image Processing | 3+1 | 3 | | 3 | 10 | 20 | 30 | 70 | 50 | 150 |
| | Numerical Methods | 3+1 | 3 | | 3 | 10 | 20 | 30 | 70 | 50 | 150 |
| | Software Testing | 3+1 | 3 | | 3 | 10 | 20 | 30 | 70 | 50 | 150 |
| 5 | Project (Phase-II) | 6 | | | 6 | | | | | 100 | 100 |
| 6 | Professional Practice-IV(Seminar Work) | 2 | | | 3 | | | | | 50 | 50 |
| 7 | General Viva Voce | 3 | | | | | | | | 50 | 50 |
| Total | | 28 | 12 | | 19 | 40 | 80 | 120 | 280 | 400 | 800 |
| STUDENT CONTACT HOURS PER WEEK: 31 HRS. | | | | | | | | | | | |
| Theory and Practical Periods of 60 minutes each. | | | | | | | | | | | |
| L-Lecture, TU-Tutorials, PR-Practical, TA-Teachers Assessment, CT-Class Test, ESE-End Semester Examination. | | | | | | | | | | | |



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Format for Syllabus

| | | | |
|--|--|---|--------------|
| Name of the Course: Advanced Java Programming | | | |
| Course Code: AJVPG | | Semester: Sixth | |
| Duration: Six Months | | Maximum Marks: 200 | |
| Teaching Scheme: | | Examination Scheme: | |
| Theory: 03 hrs./week | | Class Test : 20 Marks | |
| Tutorial: 00 hrs./week | | Teachers Assessment: 10 Marks | |
| Practical: 04 hrs./week | | End Semester Exam. : 70 Marks | |
| Credit : 3+2 | | Practical / Sessional : 50 (Internal) +50 (External) | |
| Aim: | | | |
| Sl. No. | | | |
| 1. | To learn how to design web based application. | | |
| 2. | To catch approach of Object Oriented Programming for building software. | | |
| 3. | | | |
| Objective: | | | |
| Sl. No. | Students will able to: | | |
| 1. | Create network based applications. | | |
| 2. | Create business applications. | | |
| 3. | Implement Server side programming. | | |
| 4. | Develop dynamic software components. | | |
| 5. | Develop database application. | | |
| 6. | Design and develop powerful GUI based components. | | |
| 7. | Create Animation using Applet, Thread and AWT controls. | | |
| 8. | Make best use of facilities that computer systems offer them for solving problems. | | |
| 9. | | | |
| Pre-Requisite: | | | |
| Sl. No. | | | |
| 1. | Basic knowledge of programming. | | |
| 2. | Knowledge of C & C++ and JAVA languages. | | |
| 3. | Familiar with object oriented programming. | | |
| Unit No | Contents (Theory) | Hrs./Unit | Marks |
| Unit: 1 | Introduction the Advanced Web Technology: (AWT) 1.1 Working with Windows and AWT AWT classes Windows Fundamentals Working with frame windows Creating a frame window in applet Creating windowed program Display information within with in a window 1.2 Working with graphics Working with color Setting the paint mode Working with Fonts Managing text output using Font Metrics Exploring text & graphics 1.3 Using AWT Controls, Layout Managers and Menus | 10 | |



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| | | | |
|---------|---|-----------|--|
| | <p>Control Fundamentals</p> <p>Labels</p> <p>Using Buttons</p> <p>Applying Check Boxes</p> <p>Checkbox Group</p> <p>Choice Controls</p> <p>Using Lists</p> <p>Managing scroll Bars</p> <p>Using a Text Field</p> <p>Using a Text Area</p> <p>Understanding Layout Managers</p> <p>Menu Bars and Menu</p> <p>Dialog Boxes</p> <p>File Dialog</p> <p>Handling events by Extending AWT Components</p> <p>Exploring the Controls, Menus, and Layout Managers</p> | | |
| Unit: 2 | <p>Networking:</p> <p>2.1 Basics</p> <p>Socket overview, client/server, reserved sockets, proxy servers,internet addressing.</p> <p>2.2 Java & the Net</p> <p>The networking classes & interfaces</p> <p>2.3 Inet address</p> <p>Factory methods, instance method</p> <p>2.4 TCP/IP Client Sockets</p> <p>What is URL</p> <p>Format</p> <p>2.5 URL connection</p> <p>2.6 TCI/IP Server Sockets</p> <p>2.7 Data grams</p> <p>Data gram packets, Data gram server & client</p> | 10 | |
| Unit: 3 | <p>The Tour of Swing</p> <p>4.1 J applet, Icons and Labels ,Text Fields, Buttons</p> <p>Combo Boxes Tabbed Panes, Scroll Panes.</p> <p>4.2 Trees, Tables, Exploring the Swings.</p> | 08 | |
| Unit: 4 | <p>Servlets</p> <p>5.1 Background, The Life Cycle Of a Servlet, The Java Servlet Development Kit, The Simple Servlet, The Servlet API</p> <p>5.2 The Javax Servlet Package, Reading Servlet Parameters Reading Initialization Parameters</p> <p>The Javax. Servlet. http package, Handling HTTP Requests and responses</p> <p>5.3 Using Cookies, Session Tracking, Security Issues</p> <p>Exploring Servlet. System model, principle necessary</p> | 07 | |
| Unit: 5 | <p>JavaBeans Component : Bean Writing Process, Using Beans to build an Application, Beans Property Type</p> | 05 | |
| Unit: 6 | <p>Security- Class Loader, Byte code Verification, Security Managers and</p> | 05 | |



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| | | | |
|--------------|---|-----------|--|
| | Permissions, User Authentication, Digital Signatures, Code Signing, Encryption. | | |
| Total | | 45 | |

Contents (Practical)

| Sl. No. | Skills to be developed |
|---------|---|
| 1. | <p>Intellectual Skills:</p> <p>Use of programming language constructs in program implementation.</p> <p>To be able to apply different logics to solve given problem.</p> <p>To be able to write program using different implementations for the same problem</p> <p>Study different types of errors as syntax semantic, fatal, linker & logical</p> <p>Debugging of programs</p> <p>Understanding different steps to develop program such as</p> <p>Problem definition</p> <p>Analysis</p> <p>Design of logic</p> <p>Coding</p> <p>Testing</p> <p>Maintenance (Modifications, error corrections, making changes etc.)</p> |
| 2. | <p>Motor Skills:</p> <p>Proper handling of Computer System.</p> |

List of Practical:

| Sr. No. | Practical |
|---------|---|
| 1 | Write a program to design a form using components textbox, text field, checkbox, buttons, list and handle various events related to each component. |
| 2 | Write a program to design a calculator using Java components and handle various events related to each component and apply proper layout to it. |
| 3 | Write a program to demonstrate use of Grid Layout. |
| 4 | Write a program to demonstrate use of Flow Layout. |
| 5 | Write a program to demonstrate use of Card Layout. |
| 6 | Write a program to demonstrate use of Border Layout. |
| 7 | Write a program to display any string using available Font and with every mouse click change the size and / style of the string. Make use of Font and Font metrics class and their methods. |
| 8 | Write a program to create a menu bar with various menu items and sub menu items. Also create a checkable menu item. On clicking a menu Item display a suitable Dialog box. |
| 9 | Write a program to increase the font size of a font displayed when the value of thumb in scrollbar increases at the same time it decreases the size of the font when the value of font decreases. |
| 10 | Write a program to retrieve hostname using methods in Inet Address class. |
| 11 | Write a program that demonstrates TCP/IP based communication between client and server. |
| 12 | Write a program that demonstrates UDP based communication between client and server. |
| 13 | Write a program to demonstrate use of URL and URL Connection class for communication. |
| 14 | Write a program to design a form using basic swing components. |
| 15 | Write a program to demonstrate the use of scroll panes in Swing. |
| 16 | Write Java Program to map Directory tree. |
| 17 | Write a Java program to demonstrate the use of Tables. |
| 18 | Write a servlet for demonstrating the generic servlet class. |
| 19 | Write a servlet for demonstrating the generic servlet class. |



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| | |
|----|---|
| 20 | Write a servlet to demonstrate the Http Servlet class using do Get (). |
| 21 | Write a servlet to demonstrate the Http Servlet class using do Post (). |
| 22 | Write a servlet to demonstrate the cookie. |

Text Books:

| Name of Authors | Title of the Book | Edition | Name of the Publisher |
|---------------------------------|--|---------|-----------------------|
| Horstmann, Cornell | Core Java Vol II | | PEARSON |
| Savaliya | Advance Java Technology | | Dreamtech |
| Debasish Jana | Java and Object Oriented Programming Paradigm | | PHI |
| Geary / Horstmann | Core Java Server Faces, 3e | | Pearson |
| De Jonge | Essential App Engine: Building High-Performance Java Apps with Google App Engine | | Pearson |
| Hall | Core Servlets and Java Server Pages Volume II: Advanced Technologies 2e | | Pearson |
| Hall | Core Servlets and JavaServer Pages: Volume I: Core Technologies, 2e | | |
| Kogent | Java Server Programming Java EE6 | | Dreamtech |
| C. Darby, J. Griffin and others | Beginning Java Networking | 2nd | Wrox |
| Mahesh P. Matha | JSP and Servlets | | PHI |
| | | | |
| | | | |

Reference Books:

| Name of Authors | Title of the Book | Edition | Name of the Publisher |
|-----------------|--------------------------------|---------|--------------------------------|
| Herbert Schildt | JAVA 2: The Complete Reference | | Tata Mc-Graw Hill Pub. Co. Ltd |
| Harold | Java Network Programming | | SPD |
| | | | |

Suggested list of Laboratory Experiments:

| Sl. No. | Laboratory Experiments |
|---------|---|
| 1. | Design employee information form and perform the validations. |
| 2. | Program for user login using JSP. |
| 3. | Program for client server communication. |
| 4. | |

Suggested list of Assignments / Tutorial:

| Sl. No. | Topic on which tutorial is to be conducted |
|---------|---|
| 1. | Assignment on AWT, event controls, layout manager, menus. |
| 2. | Assignment on different JDBC connections in Java. |
| 3. | Assignment of servlet life cycle. |

Note:

| Sl. No. | |
|---------|---|
| 1. | Question Paper setting tips: End Semester Examination: Question should be made as per class weight and must cover whole syllabus. Objective Type: 20 marks (answered in one or two sentences.) Subjective type: 50 marks. To be set at least 8 question and to be answered 5 questions each carrying 10 marks |



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Format for Syllabus

| | | | |
|---|--|--|--------------|
| Name of the Course: System Programming | | | |
| Course Code: SP | | Semester: Sixth | |
| Duration: Six Months | | Maximum Marks: 150 | |
| Teaching Scheme: | | Examination Scheme: | |
| Theory: 03 hrs./week | | Class Test : 20 Marks | |
| Tutorial: 00 hrs./week | | Teachers Assessment: 10 Marks | |
| Practical: 03 hrs./week | | End Semester Exam. : 70 Marks | |
| Credit : 3+2 | | Practical / Sessional : 25 (Internal) +25 (External) | |
| Aim: | | | |
| Sl. No. | | | |
| 1. | To gain knowledge in mathematical models of programming languages (System Software). | | |
| 3. | To study techniques for development of system related applications and services. | | |
| 4. | It is the activity of programming system software. | | |
| 5. | It aims to produce software which provides services to the user. | | |
| 6. | To study techniques for development of system related applications and services. | | |
| Objective: | | | |
| Sl. No. | | | |
| 1. | Understand Automata, NFA, and DFA; convert a NFA to DFA and Vice-versa. | | |
| 2. | Understand the concept of regular Expression and CFG. | | |
| 3. | Understand various design aspect of the system software. | | |
| 4. | Develop software tools like editors and debuggers. | | |
| 5. | Develop various system software. | | |
| Pre-Requisite: | | | |
| Sl. No. | | | |
| 1. | Basic knowledge of Set Theory, Graph, Tree and Relation. | | |
| 2. | Knowledge of programming languages. | | |
| 3. | Knowledge of system tools available in computer system. | | |
| 4. | Knowledge of assembly language program. | | |
| Unit No | Contents (Theory) | Hrs./Unit | Marks |
| Unit: 1 | THE THEORY OF AUTOMATA 1.1 Definition of an Automaton, Definition of finite Automaton, Block diagram of finite Automaton, Transition system, Properties of Transition Functions, Acceptability of a string by Finite Automaton. 1.2 Definition of DFA and NFA, The equivalence of DFA and NFA, A theorem on | 03 | |



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| | | | |
|----------------|---|-----------|--|
| | equivalence of DFA and N DFA. (Including Applications) | | |
| Unit: 2 | FORMAL LANGUAGE Concept of a language, Definition of a grammar, Language generated by a grammar (definition with application). | 03 | |
| Unit: 3 | REGULAR SETS & REGULAR GRAMMAR 3.1 Definition of Regular expression and regular set, Identities of regular expressions, Arden's theorem (statement & application) 3.2 Relation between regular expression and finite automata, Transition system containing \wedge -mores (application), Conversion of Non-deterministic systems to deterministic system (application), Construction of finite automata equivalent to a regular expression (with application), Equivalence of two finite automata (application), Equivalence of two regular expressions; Pumping lemma (Statement & application) | 04 | |
| Unit: 4 | CONTEXT-FREE LANGUAGES Introduction – Definition – Derivation trees (Definitions & application) – Ambiguity in CFG. | 02 | |
| Unit: 5 | Features of System Programming 1.1 What is System Software 1.2 Components of System Software : Assemblers; Loaders; Macros; Compilers 1.3 Evolution of System Software 1.4 Foundations of system Programming. | 02 | |
| Unit: 6 | Assemblers 2.1 General design procedure 2.2 Design of the assembler - Statement of the problem; Data Structure; Format of databases; Algorithm; Look for modularity. 2.3 Table Processing: Searching and Sorting- Linear Search; Binary Search Sorting: Interchange sort; Shell sort; Bucket sort; Radix exchange sort; Address calculation sort; Comparisons of sort; Hash or Random entry searching | 05 | |
| Unit: 7 | Macro Language and Macro Processors 3.1 Macro Instructions 3.2 Features of a Macro facility - Macro Instruction Arguments; Conditional macro expansion; Macro call within Macros; Macro Instruction defining Macros. 3.3 Implementation - Implementation of restricted faculty : Two Pass Algorithm, A Single Pass Algorithm, Implementation of macro calls within Macros, Implementation within an assembler | 05 | |
| Unit:8 | Loaders 4.1 Loaders Schemes - "Compile and go" loaders; General Loader Schemes; Absolute Loaders; Subroutine linkages; Relocating loaders; Direct linking loaders; Other loaders scheme: Binders, Linking loaders Overlays, Dynamic Binders. 4.2 Design of Absolute loaders 4.3 Design of Direct Linking Loaders: Specification Problem; Specification of data structures; Format of database; Algorithm | 10 | |
| Unit 9: | Compilers 5.1 Statement of a problem - Recognizing basic elements; Recognizing Syntactic units and Interpreting meaning; Intermediate from: Arithmetic statements, Non-Arithmetic statement, Non-executable statements; Storage Allocation; Code Generation: Optimization(M/c independent), Optimization (M/c dependent); Assembly Phase; General Model of Compiler. | 11 | |



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| | | |
|--|-----------|--|
| 5.2 Phases of Compiler - Lexical Phase: Tasks, Databases, Algorithm; Syntax Phase: Databases, Algorithm; Interpretation Phase: Databases, Algorithm; Optimization: Databases, Algorithm; Storage Assignment: Databases, Algorithm; Code Generation: Databases, Algorithm; Assembly Phase: Databases, Algorithm; Passes of a Compiler | | |
| Total | 45 | |

Contents (Practical)

| Sl. No. | Skills to be developed |
|---------|---|
| 1. | Practical: Skills to be developed: 1. Programming skills 2. Design of assemblers 3. Logical Thinking |
| 2. | Motor Skills: Proper handling of Computer System. |

List of Practical

LIST OF SAMPLE PROBLEMS FOR Concept of System Programming LAB(for example)

01. Programming on sorting and searching techniques
a) Liner search, b) Binary search, c) Interchange sort d) Shell sort. e) Bucket sort. f) Radix exchange sort. g) Address calculation sort. h) Comparisons of sort. i) Hash or Random entry searching.
02. Write a program to calculate the number of whitespaces and new line character in a giver string.
03. Write a program to find whether a given string is an identifier or not.
04. Write a program to find whether a given string is a keyword or not.
05. Write a program to find whether a given string is a constant or not.
06. Write a program to check whether a string belongs to the grammar or not.
07. Write a program to implement a stack using a) array; b) linked-list.
08. Write a program to generate a parse tree.
09. Write a program to constructing a NFA from a Regular Expression.
10. Design a basic Assembler.
11. Design of various phases of Compiler.
12. Design of Loaders.
13. Design of Macro Processor.
14. Practice of Lex/Yacc of Compiler Writing.

** Lex And Yacc are two Linux Utility Tools.

Text Books:

| Name of Authors | Title of the Book | Edition | Name of the Publisher |
|-------------------------|---|---------|-----------------------|
| Mishra & Chandrasekaran | Theory of Computer Science (Automata, Languages and Computation)3 rd ed. | | PHI |
| Hopcroft | Introduction to Automata Theory, Languages, and Computation, 3e | | Pearson |
| Kandar | Introduction to Automata Theory, | | Pearson |



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| Formal Languages and Computation | | | |
|----------------------------------|---|---------|-------------------------------|
| Kinber | Theory of Computing: A Gentle Introduction | | Pearson |
| Krithivasan | Introduction to Formal Languages, Automata Theory and Computation | | Pearson |
| Moret | The Theory of Computation | | Pearson |
| Hopcroft | Introduction to Automata Theory, Languages, and Computation, 3e | | Pearson |
| C. Froberg | Introduction to Numerical Analysis | | Addison Wesley |
| Chattopadhyay | Compiler Design | | pHI |
| Shalini | System Software | | Scitech |
| chattopadhyay | System software | | pHI |
| Sadasivam | Compiler Design | | Scitech |
| Reference Books: | | | |
| Name of Authors | Title of the Book | Edition | Name of the Publisher |
| John J. Donovan | System Programming | | Tata McGraw-Hill Edition 2003 |
| Mr. Dhamdhere | System Programming and Operating System | | Tata McGraw-Hill Edition |

Suggested list of Laboratory Experiments:

| Sl. No. | Laboratory Experiments |
|---------|--|
| 1. | Take a simple piece of code and separate the tokens from it. |
| 2. | Program for simple macro processing. |
| 3. | Program for pass-I assembler. |

Suggested list of Assignments / Tutorial:

| Sl. No. | |
|---------|---|
| 1. | Different phases in compilations. |
| 2. | Macro processing in details. |
| 3. | Assignment of compiler, assemblers, macro, linkers and loaders. |

Note:

| Sl. No. | |
|---------|---|
| 1. | Question Paper setting tips: End Semester Examination: Question should be made as per class weight and must cover whole syllabus. Objective Type: 20 marks (answered in one or two sentences.) Subjective type: 50 marks. To be set at least 8 question and to be answered 5 questions each carrying 10 marks |



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Format for Syllabus

| | | | |
|---|---|---|--------------|
| Name of the Course: ELECTIVE-II (Digital Image Processing) | | | |
| Course Code: EC-II | | Semester: Sixth | |
| Duration: Six Months | | Maximum Marks: 150 | |
| Teaching Scheme: | | Examination Scheme: | |
| Theory: 03 hrs./week | | Class Test : 20 Marks | |
| Tutorial: 00 hrs./week | | Teachers Assessment: 10 Marks | |
| Practical: 03 hrs./week | | End Semester Exam. : 70 Marks | |
| Credit : 3+1 | | Practical / Sessional : 25 (Internal) +25 (External) | |
| Aim: | | | |
| Sl. No. | | | |
| 1. | Student should be able to do various image processing task | | |
| Objective: Student will be able to | | | |
| Sl. No. | | | |
| 1. | Understanding of digital image fundamentals. | | |
| 2. | Understanding of image digitization. | | |
| 3. | Understanding of image display hardware and software. | | |
| 4. | Ability to understand and apply image enhancement and restoration techniques. | | |
| 5. | Understanding of image encoding techniques. | | |
| 6. | Ability to apply compression techniques. | | |
| Pre-Requisite: | | | |
| Sl. No. | | | |
| 1. | Basic knowledge of Digital Image is helpful. | | |
| 2. | Basic knowledge of Color and graphics is helpful. | | |
| 3. | | | |
| Unit No | Contents (Theory) | Hrs./Unit | Marks |
| Unit: 1 | Basics of Image Processing 1.1 Overview & Nature of Image Processing 1.2 Digital Image Representation & types of Images 1.3 Steps in Image Processing. 1.4 Image Processing Applications 1.5 Components of Image Processing system. | 4 | |
| Unit: 2 | Digital Image Fundamentals 2.1 Elements of Visual Perception 2.2 Image Sensing and Acquisition 2.3 Image Sampling and Quantization. 2.4 Basic Relationships Between Pixels 2.5 Linear and non-linear operations. | 3 | |
| Unit: 3 | Image Enhancement in the Spatial Domain 3.1 Some Basic Gray Level Transformations, 3.2 Histogram Processing in details, 3.3 Enhancement Using Arithmetic/Logic Operations, 3.4 Basics of Spatial Filtering, | 10 | |



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| | | | |
|--------------|--|-----------|--|
| | 3.5 Smoothing Spatial Filters, 3.6 Sharpening Spatial Filters, 3.7 Combining Spatial Enhancement Methods | | |
| Unit: 4 | Image Restoration. 4.1 A Model of the Image degradation/Restoration process, 4.2 Noise Modelling, 4.3 Image Restoration in the Presence of Noise Only–Spatial Filtering, <ul style="list-style-type: none">• Arithmetic mean filter• Geometric mean filter• Median filter 4.4 Image Restoration Techniques <ul style="list-style-type: none">• Inverse filter• Wiener Filter 4.5 Geometric Transformations | 10 | |
| Unit: 5 | Color Image Processing 5.1 Color image storage & processing 5.2 Color Models <ul style="list-style-type: none">• RGB, HSI, HSV, CMY, CMYK color models. 5.3 Pseudocolor Image Processing 5.4 Basics of Full-Color Image Processing 5.5 Color Transformations 5.6 Smoothing and Sharpening | 8 | |
| Unit: 6 | Image Compression 6.1 Fundamentals of image compression 6.2 Image Compression Models 6.3 Compression Algorithms 6.4 Error-Free/lossless Compression <ul style="list-style-type: none">• Run Length Coding• Huffman Coding• Shannon –Fano Coding• Bit-plane Coding 6.5 Lossy Compression <ul style="list-style-type: none">• Lossy Predictive Coding• Transform Coding 6.6 Image Compression Standards | 10 | |
| Total | | 45 | |

Practical:

Practical Content:

All of the experiment shall be performed using MATLAB

List of Experiments:

1. Image resizing, Image type conversion.
2. Extraction of color band, Creation of a synthetic image.
3. Image addition and Image complement.
4. Image geometric operations
5. Histogram operations, contrast stretching and gamma correction.
6. Image noise models
7. Spatial filtering
8. Implement the Wiener filter
9. Image segmentation



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10. Color image operation – color model transformation, contrast stretching, histogram manipulation etc.

***** Any type of Image processing task can be done. Some task may be performed without using the library function of MATLAB (i.e. by programming).**

Text Books:

| Name of Authors | Title of the Book | Edition | Name of the Publisher |
|-------------------|--|---------|-----------------------|
| Gonzalez | Digital Image Processing | | Pearson |
| Sridhar | Digital Image Processing | | Oxford |
| Joshi | Digital Image Processing—An Algorithmic Approach • | | PHI |
| Chanda & Majumdar | Digital Image Processing and Analysis, 2nd ed. • | | PHI |
| Castleman | Digital Image Processing | | Pearson |
| Annadurai | Fundamentals of Digital Image Processing | | Pearson |

Reference Books:

| Name of Authors | Title of the Book | Edition | Name of the Publisher |
|-----------------|---------------------------------------|---------|-----------------------|
| Gopi | Digital Image Processing using Matlab | | Scitech |
| Gonzalez | Digital Image Processing using Matlab | | TMH |

Note:

| Sl. No. | |
|---------|---|
| 1. | Question Paper setting tips: End Semester Examination: Question should be made as per class weight and must cover whole syllabus. Objective Type: 20 marks (answered in one or two sentences.) Subjective type: 50 marks. To be set at least 8 question and to be answered 5 questions each carrying 10 marks |

Format for Syllabus

| | |
|--|---|
| Name of the Course: ELECTIVE-II (Numerical Methods) | |
| Course Code: EC-II | Semester: Sixth |
| Duration: Six Months | Maximum Marks: 150 |
| Teaching Scheme: | Examination Scheme: |
| Theory: 03 hrs./week | Class Test : 20 Marks |
| Tutorial: 00 hrs./week | Teachers Assessment: 10 Marks |
| Practical: 03 hrs./week | End Semester Exam. : 70 Marks |
| Credit : 3+1 | Practical / Sessional : 25 (Internal) +25 (External) |
| Aim: | |
| Sl. No. | |
| 1. | This subject enhances the knowledge of students about numerical side of mathematical analysis. It also intends to teach methods and means for estimating the accuracy of numerical results. |
| Objective: Student will be able to | |
| Sl. No. | |
| 1. | Understand Error Handling |
| 2. | Understand Numerical methods of Polynomial Interpolation |
| 3. | Understand Numerical methods of Algebraic and Transcendental Equation. |
| 4. | Understand Numerical Differentiation & Integration |



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| Pre-Requisite: | | | |
|---|---|-----------|-------|
| Sl. No. | | | |
| 1. | Basic knowledge of Mathematics is helpful. | | |
| 2. | Basic knowledge of C programming is helpful. | | |
| 3. | | | |
| Unit No. | Contents (Theory) | Hrs./Unit | Marks |
| Unit: 1 | Error Handling 1.1 Approximation in Numerical Computation 1.2 Significant Figures 1.3 Absolute, Relative and Percentage Errors 1.4 Truncation and Round-off Errors 1.5 Accumulation and Propagation of Errors | 4 | |
| Unit: 2 | Polynomial Interpolation 2.1 Forward, Backward and Divided Difference Table 2.2 Newton's Forward and Backward Interpolation Formula 2.3 Newton's General Interpolation Formula with the remainder term 2.4 Lagrange's Interpolation Formula 2.5 Inverse Interpolation | 12 | |
| Unit: 3 | Solution of Algebraic and transcendental Equation 3.1 Method of Tabulation 3.2 Bisection Method 3.3 Newton-Raphson Method. | 8 | |
| Unit: 4 | Numerical Differentiation & Integration 4.1 Differentiation of Forward and Backward Formula 4.2 Trapezoidal rule 4.3 Simpson's 1/3 rule | 8 | |
| Unit: 5 | Numerical Solution of a System of Linear Equation 5.1 Gauss-Elimination Method 5.2 Matrix Inversion Method 5.3 Gauss-Jacobi Method 5.4 Gauss-Siedal Method | 9 | |
| Unit: 6 | Solution of Ordinary Differential Equation 6.1 Solution of first order Differential Equation by Euler's Method 6.2 Modified Euler's Method and Runge-Kutta Method | 4 | |
| Total | | 45 | |
| Practical: | | | |
| Practical Content: All of the experiment shall be performed using C or MATLAB | | | |
| List of Experiments: 01. Implementation of Forward, Backward and Divided Difference Table 02. Implementation of Newton's Forward and Backward Interpolation Formula 03. Implementation of Newton's General Interpolation Formula with the remainder term 04. Implementation of Lagrange's Interpolation Formula 05. Implementation of Inverse Interpolation 06. Implementation of Bisection Method 07. Implementation of Newton-Raphson Method 08. Implementation of Differentiation of Forward and Backward Formula 09. Implementation of Trapezoidal rule | | | |



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10. Implementation of Simpson's 1/3 rule
 11. Implementation of Gauss-Elimination Method
 12. Implementation of Matrix Inversion Method
 13. Implementation of Gauss-Jacobi Method
 14. Implementation of Gauss-Siedal Method
 15. Implementation of Euler's method
 16. Implementation of Runge-Kutta Method
- *** Any type of Image processing task can be done. Some task may be performed without using the library function of MATLAB (I,e. by programming).**

Text Books:

| Name of Authors | Title of the Book | Edition | Name of the Publisher |
|----------------------|---|---------|-----------------------|
| Babu Ram | Numerical Methods | | Pearson |
| Thandaraj | Computer-Oriented Numerical Methods with c language | | PHI |
| Sujata Sinha | Numerical and Statistical Methods with Programming in C | | Scitech |
| Bradie | A Friendly Introduction to Numerical Analysis | | Pearson |
| J. B. Scarborough | Numerical Mathematics Analysis | | Oxford |
| Dasgupta | Applied Mathematical Methods | | Pearson |
| Sastry | Introductory Methods of Numerical Analysis, 5th ed. • | | PHI |
| Jain, Iyengar & Jain | Numerical Methods (Problems & Solutions) | | |
| Gerald | Applied Numerical Analysis, 7e | | Pearson |
| C. Froberg | Introduction to Numerical Analysis | | Addison Wesley |

Reference Books:

| Name of Authors | Title of the Book | Edition | Name of the Publisher |
|-----------------|---|---------|-----------------------|
| Balagurusamy | Numerical Methods | | TMH |
| Fausett | Applied Numerical Analysis Using MATLAB, 2e | | Pearson |
| Aru Mugam | Numerical Methods | | Scitech |

Note:

| Sl. No. | |
|---------|---|
| 1. | Question Paper setting tips: End Semester Examination: Question should be made as per class weight and must cover whole syllabus. Objective Type: 20 marks (answered in one or two sentences. Subjective type: 50 marks. To be set at least 8 question and to be answered 5 questions each carrying 10 marks |



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Format for Syllabus

| | | | |
|---|---|----------------------------|--------------|
| Name of the Course: Elective-II (Software Testing) | | | |
| Course Code: EC-II | | Semester: Sixth | |
| Duration: Six Months | | Maximum Marks: 150 | |
| Teaching Scheme: | | Examination Scheme: | |
| Theory: 03 hrs./week | Class Test : 20 Marks | | |
| Tutorial: 00 hrs./week | Teachers Assessment: 10 Marks | | |
| Practical: 03 hrs./week | End Semester Exam. : 70 Marks | | |
| Credit : 3+1 | Practical / Sessional : 25 (Internal) +25 (External) | | |
| Aim: | | | |
| Sl. No. | | | |
| 1. | To study the process and methodology required to test the system under development or deployed system. | | |
| 2. | Meets the requirements that guided its design and development. | | |
| 3. | Software testing is an investigation conducted to provide stakeholders with information about the quality of the product or service under test | | |
| Objective: | | | |
| Sl. No. | Students will able to: | | |
| 1. | Understand the impact of software bugs and importance of software testing | | |
| 2. | Develop the skills necessary to find bugs in any types of software. | | |
| 3. | Learn how to effectively plan your tests, communicate the bugs you find, and measure your success as a software tester. | | |
| 4. | Use your new testing skills to test not just the software, but also the product specification the raw code, and even the user's manual. | | |
| 5. | Learn how to test software for compatibility, usability and cultural issues. | | |
| 6. | Discover how to improve your testing efficiency by automating your tests. | | |
| Pre-Requisite: | | | |
| Sl. No. | | | |
| 1. | Basic knowledge of software engineering | | |
| 2. | Idea of software development life cycle. | | |
| 3. | Programming convention and knowledge of programming. | | |
| | | | |
| Unit No. | Contents (Theory) | Hrs./Unit | Marks |
| Unit: 1 | Purpose of Testing 1.1 Software Testing Background Software Error Case Studies: - Disney Lion King, Intel Pentium Floating Point Division Bug, NASA Mars Polar Lander, Patriot Missile Defense System, Y2K Bug. What is Bug? Terms for software Failures, Software Bug: A Formal Definition, Why does Bug occur? , cost of bugs, What Exactly does a software tester do? What makes a good software tester? 1.2 Software Development Process Product Components: - What Effort Goes into a software product?, What | 05 | |



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|---------|---|---|--|
| | <p>parts make up a software product? , Software Project Staff , Software Development Lifecycle Models :- Big-Bang Model , Code and fix Model, Waterfall model, Spiral Model</p> <p>1.3 The Realities of Software Testing</p> <p>Testing Axioms: - It's impossible to test a program completely, software testing is a risk-based exercises, testing can't show that bug don't exist, the more bug you find, the more bugs there are, the pesticide paradox.</p> | | |
| Unit: 2 | <p>Testing Fundamentals</p> <p>2.1 Examining the Specification</p> <p>Getting Started: - Black-Box and white-box Testing, Static and Dynamic Testing.</p> <p>Static Black Box Testing: - Testing the Specification.</p> <p>Performing a High Level Review of the Specification:- Pretend to be a customer, Research Existing Standards and guidelines , Review and test similar software</p> <p>Low Level Specification Test Techniques: - Specification Attributes Checklist, Specification Terminology Checklist.</p> <p>2.2 Testing the software with Blinders On</p> <p>Dynamic Black-Box Testing :Testing the software While, Blindfolded, Test-to-pass and Test-to-fail, Equivalences Partitioning ,</p> <p>Data Testing: - Boundary Condition, Sub-Boundary Conditions, default, empty, blank, Null, Zero and None, Invalid, Wrong, Incorrect and garbage data.</p> <p>State Testing: - Testing Software's Logic Flow, Testing States to Fail. Other Black Box Test</p> <p>Techniques :- Behave like a Dumb User, Look for bugs where you have already found them, follow experience, intuition and hunches</p> | 9 | |
| Unit: 3 | <p>Examining the Code</p> <p>3.1 Static White Box Testing:</p> <p>Examining the design and code,</p> <p>Formal Review: - Peer Review, Walkthroughs, Inspections. Coding Standards and Guidelines: - Examples of Programming Standards and Guidelines, Obtaining Standards. Generic Code Review Checklist:- Data Reference Errors, Data Declaration Errors, Computation Errors, Comparison Error, Control Flow Errors,</p> <p>Subroutine Parameter Errors, Input/Output Errors, Other checks.</p> <p>3.2 Testing the software with X-Ray Glasses</p> <p>Dynamic White Box Testing, Dynamic white box testing versus debugging,</p> <p>Testing the Pieces:- Unit and Integration Testing, An Example of Module Testing. Data Coverage: - Data Flow, Sub-Boundaries, Formula and Equations, Error Forcing. Code Coverage: - Program Statements and Line Coverage, Branch Coverage, Condition Coverage.</p> | 8 | |



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|---------|--|----|--|
| Unit: 4 | <p>Applying Your Testing Skills</p> <p>4.1 Configuration Testing An Overview of Configuration Testing: - Isolating Configuration Bugs, Sizing up the job. Approaching the Task: - Decide the Types of Hardware You will Need, Decide What Hardware Brands, Model, and Device Drivers are available. Decide which Hardware features, modes and options are possible. Pare Down the identified Hardware Configuration to a Manageable Set. Identify your Software's Unique Features that work with the Hardware Configurations. Design the test Cases to Run on each configuration. Execute the tests on each configuration. Rerun the tests until the results satisfy your team. Obtaining the hardware, Identify hardware standards, configuration testing other hardware.</p> <p>4.2 Compatibility Testing Compatibility Testing Overview, Platform and Application Versions, Backward and forward compatibility, the impact of testing multiple versions. Standards and Guidelines: - High-Level standards and Guidelines, Low- level standards and Guidelines, Data Sharing Compatibility.</p> | 04 | |
| Unit: 5 | <p>Foreign Language Testing Making the words and Pictures Make Sense , Translation Issues :- Text Expansion , ASCII , DBCS and Unicode , Hot Keys and shortcuts , Extended Characters , Computation on characters , Reading Left to Right and Right to Left , Text on Graphics, Keep the Text out of the code . Localization Issues: - Content, Data Formats. Configuration and Compatibility Issues: - Foreign platform configurations, Data Compatibility. How much should you Test?</p> | 02 | |
| Unit: 6 | <p>Usability Testing</p> <p>6.1 User Interface Testing: What makes a Good UI? , Follows standards or Guidelines, Intuitive, Consistent, Flexible, Comfortable, Correct, Useful. Testing for the Disabled: Accessibility Testing: - It's the Law, accessibility features in software.</p> <p>6.2 Testing the Documents Types of Software Documentation, The importance of documentation testing, what to look for when reviewing documentation, the realities of documentation testing.</p> <p>6.3 Web site Testing Web Page Fundamentals, Black-Box Testing: - Text, Hyperlinks, graphics, forms, object and other simple miscellaneous Functionality. Gray Box Testing, White Box Testing, Configuration and compatibility testing, Usability Testing, Introducing Automation.</p> | 06 | |
| Unit: 7 | <p>Supplementing Your Testing</p> <p>7.1Automation Testing and test tools The benefits of automation and tools, Test tools: - Viewers and Monitors, Drivers, Stubs, Stress and load tools, Interference injectors and noise</p> | 03 | |



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| | | | |
|--------------|---|-----------|--|
| | <p>generators, analysis tools. Software Test Automation: - Macro Recording and playback, programmed macros, Fully Programmable Automated Testing Tools. Random Testing: monkeys and gorillas, Dumb monkeys, Semi-smart monkeys, Smart Monkeys, Realities of using test tools and automation.</p> <p>7.2 Bug Bashes and Beta Testing Only as far as the eye can see, Test sharing, beta testing, outsourcing your testing.</p> | | |
| Unit:8 | <p>Working With Test documentation</p> <p>8.1 Planning your test effort : the goal of the test planning , test planning topics :- high level expectations , people , places , and things , definitions , Inter group Responsibilities , what will and won't be tested , test phases , test strategy , resource requirements , tester assignments , test schedule , test cases , bug reporting , Metrics and statistics , Risk and Issues.</p> <p>8.2 Writing and Tracking Test Cases The goal of test case Planning, Test case planning overview, test design, test cases, test procedures, test case organization & tracking.</p> <p>8.3 Reporting What you Find Getting your bugs fixed, isolating & reproducing bugs , Not all bugs are created equal , a bug's life cycle , bug tracking system :- The standard : The test incident Report , Manual Bug Reporting and Tracking , Automated bug reporting and tracking. -Measuring Your Success Using the information in the bug tracking database, Metrics that you'll use in your daily testing, Common Project level Metrics.</p> | 05 | |
| Unit 9 | <p>The Future</p> <p>9.1 Software Quality Assurance : Quality is free, testing and quality assurance in the workplace , software testing , Quality Assurance, other names for software testing groups, Test management and organizational structures, Capability Maturity Model (CMM), ISO 9000</p> <p>9.2 Your Careers As a Software Tester: Your job as a software tester, finding software testing position, gaining hands-on experience, Internet links, Professional Organizations.</p> | 03 | |
| Total | | 45 | |

Contents (Practical)

| Sl. No. | Skills to be developed |
|---------|---|
| 1. | <p>Practical: Skills to be developed: Intellectual skills: 1. Use installation procedure 2. Creation of GUI objects and their applications 3. Know various tools 4. Know Test procedures</p> |
| 2. | Motor Skills: |



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Proper handling of Computer System.

List of Practical:

LIST OF SAMPLE PROBLEMS FOR SOFTWARE TESTING LAB(for example)

01. Introduction To Software Testing Concepts.
- 02 Case Study:- Study any system specification and report bugs.
03. Write Test Cases For any Application (e.g. Railway Reservation Form).
04. Display "Hello World".
05. Write a program to demonstrate use of...
 - a) For ...Loop
 - b) Switch ... Case
 - c) Do...While
 - d) If...else
06. Automate Notepad Application.
07. Automate any installation procedure (e.g. WinZip)
- 08.. Automate Microsoft Word Application
 - a) Open Microsoft Word.
 - b) Type text (automatically).
 - c) Generate random file name.
 - d) Save file and close Microsoft Word.
09. Create GUI Objects.
10. Create any GUI Application e.g. Calculator.
11. Assignment for Web Testing (use any Web testing tools e.g. Selenium).
12. Assignment for any Bug Tracking Tool (e.g. Bugzilla, Bugit).
13. Assignment for any test management tool (e.g. Test Director).

All above Practical may be performed on **Windows or Linux Platform, using the tools mentioned below:-

| Sl .No | Testing Tools | Type of tools |
|--------|---------------|-------------------|
| 01 | Auto It | Free Ware |
| 02 | Rubby | Free Ware |
| 03 | Water | Free Ware |
| 04 | Sahi | Free Ware |
| 05 | Test Track | Licensed Software |
| 06 | Bugzilla | Licensed Software |

Text Books:

| Name of Authors | Title of the Book | Edition | Name of the Publisher |
|---|--|---------|-----------------------|
| Ron Patton | Software Testing | | SAMS Techmedia |
| Srinivasan Desikan Gopaldaswamy Ramesh | Software Testing : Principals and Practical | | Pearson Education |
| Nick Jenkins | A Software Testing Primer | | |
| Paul Ammann and Jeff Offutt | Introduction to Software Testing | | PEARSON |

Reference Books:

| Name of Authors | Title of the Book | Edition | Name of the Publisher |
|---|-------------------------------------|---------|-----------------------|
| C. Kaner, J. Bach, and B. Pettichord | Lessons Learned in Software Testing | | |



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| | | | |
|---|---|--|--|
| W. Lewis | Software Testing and Continuous Quality Improvement | | |
| Dorothy Graham , Erik van eenendaal , Isabel Evans , Rex Black. | Foundations of Software Testing | | |
| Suggested list of Laboratory Experiments: | | | |
| Sl. No. | Laboratory Experiments | | |
| 1. | Write different test cases for checking the login form. | | |
| 2. | Write the different test cases and execute the test cases on login form | | |
| 3. | Perform the load testing the university of Pune website. | | |
| Suggested list of Assignments / Tutorial: | | | |
| Sl. No. | Topic on which tutorial is to be conducted | | |
| 1. | Different methodologies of software testing | | |
| 2. | Develop a test plan for library management system. | | |
| 3. | Implement the test plan from the above assignment. | | |
| Note: | | | |
| Sl. No. | | | |
| 1. | Question Paper setting tips: End Semester Examination: Question should be made as per class weight and must cover whole syllabus. Objective Type: 20 marks (answered in one or two sentences. Subjective type: 50 marks. To be set at least 8 question and to be answered 5 questions each carrying 10 marks | | |

Format for Syllabus

| | |
|---|--|
| Name of the Course: Professional Practice-IV(Seminar Work) | |
| Course Code: | Semester: Sixth |
| Duration: 3 hrs/week For preparing their presentation. | Maximum Marks: 50 (Internal marks to be given at end of Sixth semester) |
| Credit: 2 | |
| Examination Scheme: | |
| 1. | Seminar on Project Work is intended to provide opportunity for students to present the Project Work/Modern development in Computer Science, in front of a technical gathering (Student / Teacher and others) with the help of different oral, aural and visual communication aids which they learnt through different courses in the diploma course. In the Seminar, students are not only expected to present their Project Work, but also to defend the same while answering questions arising out of their presentation. |

Format for Syllabus

| | |
|--|---|
| Name of the Course: General Viva - Voce | |
| Course Code: | Semester: Sixth |
| Duration: | Maximum Marks: 50 (to be given at end of Sixth semester) 25(internal) + 25(external) |
| | |



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| | |
|-----------|---|
| Credit: 3 | |
| | Examination Scheme: |
| 1. | The Final Viva-Voce Examination shall take place at the end of the Part – III Second Semester. It is to be taken by one External and one Internal Examiner. The External Examiner is to be from industry / engineering college / university / government organisation and he / she should give credit out of 25 marks; whereas, the Internal Examiner should normally be the Head of the Department and he / she should give credit of 25 marks. In the absence of the Head of the Department, any other lecturer will act as the Internal Examiner. |
| 3. | |
| 4. | |
| 5. | |