



**GULBARGA UNIVERSITY, KALABURAGI**

**DEPARTMENT OF COMPUTER SCIENCE  
SYLLABUS FOR MASTER OF SCIENCE (M.Sc.)  
IN  
COMPUTER SCIENCE  
(CBCS SCHEME)**

**(REVISED SYLLABUS WITH EFFECT FROM ACADEMIC YEAR 2017-18 AND ONWARDS)**

**Approved by the BOS vide Resolution No. 4 dated 05-03-2017.**

**MASTER OF SCIENCE (M.Sc.) IN COMPUTER SCIENCE SYLLABUS**

**( CBCS Scheme)**

**(With effect from the academic year 2017-18 and onwards)**

Paper Code	Title of the Course	Semester	IA	Total	Duration of Theory / Practical Exam. Hrs.	L	T	P	Credits
<b>Fourth Semester HARD CORE</b>									
HCT 4.1	Web Design	80	20	100	03	4	0	0	4
HCT 4.2	Problem Solving using Python	80	20	100	03	4	0	0	4
<b>SOFT CORE [ANY ONE]</b>									
SCT 4.1	Digital Image Processing	80	20	100	03	4	0	0	4
SCT 4.2	Software Testing	80	20	100	03	4	0	0	4
SCT 4.3	Cloud Computing.	80	20	100	03	4	0	0	4
SCT 4.4	Cyber Security.	80	20	100	03	4	0	0	4
<b>PRACTICAL</b>									
HCP 4.1	Practical – I : Web Design Lab.	40	10	50	1.1/2	0	0	4	2
HCP 4.2	Practical – II : Python Lab.	40	10	50	1.1/2	0	0	4	2
<b>SOFT CORE [ANY ONE]</b>									
SCP 4.1	Practical – III (a) : DIP- Lab.	40	10	50	1.1/2	0	0	4	2
SCP 4.2	Practical – III (b) : Software Testing - Lab	40	10	50	1.1/2	0	0	4	2
SCP 4.3	Practical – III (c) : Cloud Computing- Lab.	40	10	50	1.1/2	0	0	4	2
SCP 4.4	Practical – III (d) : Cyber Security Lab.	40	10	50	1.1/2	0	0	4	2
HCMP 4.3	Major Project 90 for Project Evaluation (20 for Presentation + 10 for attending Conference/Seminar/Workshop + 60 for Project Report ),30 for Viva-voce Total 120 + IA 30 = 150 )	90+30=120	30	150	03	0	0	6	6
<b>TOTAL FOR FOURTH SEMESTER</b>		<b>480</b>	<b>120</b>	<b>600</b>					<b>24</b>
<b>L – Lecture, T – Tutorials, P – Practical's, 4 Credits of Theory = 4 Hours of Teaching Per Week, 2 Credits of Practical = 4hours Per Week</b>									

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**IV Semester:** ( With effect from the academic year 2017-2018 and onwards )

**Hard Core**

HCT 4.1 : Web Design

HCT 4.2 : Problem Solving using Python

**Soft Core ( Any One)**

SCT 4.1 : Digital Image Processing

SCT 4.2 : Software Testing

SCT 4.3 : Cloud Computing

SCT 4.4 : Cyber Security

**Practical Hard Core**

HCP 4.1 : Practical – I : Web Design Lab.

HCP 4.2 : Practical – II: Python Lab.

**Practical Soft Core (Any One )**

SCP 4.1 : Practical – III (a) : DIP Lab.

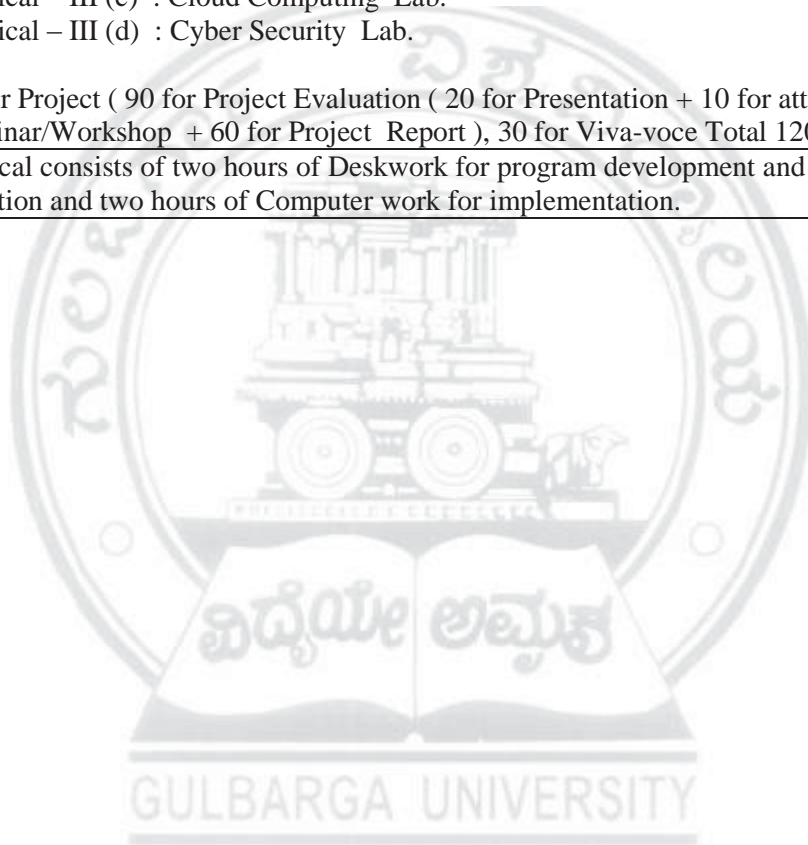
SCP 4.2 : Practical – III (b) : Software Testing Lab.

SCP 4.3 : Practical – III (c) : Cloud Computing Lab.

SCP 4.4 : Practical – III (d) : Cyber Security Lab.

HCMP 4.3 : Major Project ( 90 for Project Evaluation ( 20 for Presentation + 10 for attending Conferences/Seminar/Workshop + 60 for Project Report ), 30 for Viva-voce Total 120 + IA 30 = 150 )

**Note:** Each Practical consists of two hours of Deskwork for program development and Documentation and two hours of Computer work for implementation.



**M.Sc. IV SEMESTER  
HARD CORE  
HCT 4.1 : WEB DESIGN**

**Teaching: 4 Hrs./ Week**

**Max Marks: 80, Cont. Assessments: 20**

**Credits: 04**

**Total Teaching Hrs: 64**

**Preamble:**

- To study the use of HTML in web design environment
- To learn and implement HTML, XML Language and CSS.
- To understand the JAVA Script programming language and Basics, Origins, uses of Perl.

**Unit I**

16Hrs

Variables in the Web Design Environment: HTML and XML Languages, Web Browsers, Coding for multiple screen resolutions, Bandwidth concerns. Web Site Design Principles: Design for the medium, Design the whole website, Design for the user, Design for the screen, Planning the Site, Planning site navigation, Creating page templates, web typography- type design principles, controlling typography with the <FONT> element and Cascading Style Sheets, styling with CSS, Graphics and Color, HTML frames, publishing and maintaining websites.

**Unit II**

16Hrs

Client-Server interaction, web document transport and HTTP, Browser architecture, CGI technology for dynamic web documents, Java technology for active web documents.

Introduction to XML: Introduction, Syntax, Document structure, Document type definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.

**Unit III**

16Hrs

JAVA Script: The JAVA Script programming language, Creating JavaScript source file, Hiding Java Script from incompatible browsers, variables, functions, objects and events, data types and operators, decision making with control structures and statements, windows and frames, working with forms in JavaScript, using JavaScript with CSS styles, cookies and security. Introduction to document object model, debugging JavaScript, server side JavaScript. Database connectivity, working with Java Applets and embedded data.

**Unit IV**

16Hrs

The Basics of Perl, Origins and uses of Perl, Scalars and their operations, Assignment statements and simple input and output, Control statements, Fundamentals of arrays, Hashes, References, Functions, Pattern matching, File input and output.

**References:**

1. Douglas E Comer, Computer Networks and Internet, Pearson Education.
2. Joel Sklar., Principles of Web Design, Web Warrior series, Thomson Learning.
3. Deitel, Deitel, and Nieto, Internet & World Wide Web-How to Program, PHI.
4. Don Gosselin, JavaScript, Web Warrior Series,3/e, Thomson Learning.
5. Douglas E. Comer, Internetworking With TCP/IP, Vol. II: Design, Implementation, And Internals, 3/E, PHI.
6. Kate Kalata, Internet Programming with VBScript and JavaScript, Thomson Learning.

## HCT 4.2 : PROBLEM SOLVING USING PYTHON

Teaching: 4 Hrs./ Week

Credits: 04

Max Marks: 80, Cont. Assessments: 20

Total Teaching Hrs: 64

### Preamble:

- To learn the fundamentals of python scripting.
- To understand the system, modules, packages and regular expressions.
- To acquire the knowledge on Classes , Objects, Inheritance and GUI Programming.

### UNIT I

16Hrs

Introduction ,program structure, output function, variables, constants, data types, type operators and expressions, control structures, input function . Data structures – str, list, tuple, dict, set.

### UNIT II

16Hrs

List, dict, set and generator-comprehensions. User defined functions - variable number of arguments, default parameters, key value pairs as arguments, Data Storage, Data formatting.

### UNIT III

16Hrs

Modules, Packages and Programs, Systems, Regular Expressions, File Handling, Errors and Exception Handling.

### UNIT IV

16Hrs

Classes , Objects, Inheritance, Testing and debugging, GUI Programming, Relational databases, Web Untangled, Concurrency and Networks.

### References:

1. Bill Lubanovic, Introducing Python- Modern Computing in Simple Packages, O'Reilly Publication
2. Allen Downey, Jeffrey Elkner, Chris Meyers, How to Think Like a Scientist –Learning with Python, Green Tea Press, 2002, First Edition.
3. Charles Dierbach, Introduction to Computer Science Using Python, Wiley Publication.
4. Magnus Lie Hetland, Beginning Python, From Novice to Professional, - Second Edition, APress Publication
5. Allen B. Downey, Think Python-How to think like a computer scientist, first Edition, O'Reilly Publication.

## SOFT CORE(ANY ONE)

### SCT 4.1 : DIGITAL IMAGE PROCESSING

Teaching: 4 Hrs./ Week

Credits: 04

Max Marks: 80, Cont. Assessments: 20

Total Teaching Hrs: 64

#### Preamble:

- To develop a theoretical foundation of fundamental Digital Image Processing concepts.
- To explore the image processing techniques.

#### UNIT I

16Hrs

Elements of Digital Image Processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, Brightness, Contrast, Hue, Saturation, Mach band effect, Color image fundamentals - RGB, HSI models, Image sampling, Quantization, dither, Two dimensional mathematical preliminaries, 2D transforms - DFT, DCT, KLT, SVD.

#### UNIT II

16Hrs

Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contra harmonic mean filters, Homomorphic filtering, Color image enhancement.

#### UNIT III

16Hrs

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

#### UNIT IV

16Hrs

Edge detection, Edge linking via Hough transform, Thresholding, Region based segmentation Region growing Region splitting and Merging Segmentation by morphological watersheds basic concepts, Dam construction, Watershed segmentation algorithm, Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

#### References:

1. Rafael C. Gonzalez, Richard E. Woods, , Digital Image Processing', Pearson, Second Edition, 2004
2. Anil K. Jain, , Fundamentals of Digital Image Processing', Pearson 2002.
3. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.
4. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, ' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.
5. D.E. Dudgeon and R.M. Mersereau, , Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
6. William K. Pratt, , Digital Image Processing', John Wiley, New York, 2002
7. Milan Sonka et al, 'IMAGE PROCESSING, ANALYSIS AND MACHINE VISION', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999.

## SCT 4.2: SOFTWARE TESTING

Teaching: 4 Hrs./ Week

Credits: 04

Max Marks: 80, Cont. Assessments: 20

Total Teaching Hrs: 64

### Preamble :

- To study the testing fundamentals and testing design strategies.
- To expose the criteria for test cases.
- To learn the levels of testing and test planning concepts.

### UNIT I

16Hrs

Testing Fundamentals: Introduction, Basic Definitions of Errors, Defects, Failures, Test Cases, Test, Test Oracle, Test Bed, Software Quality, Software Quality Assurance Group, Reviews and Software Testing Principles, Software Development Life cycle Models, The Tester's Role in a Software Development Organization. Introduction to Testing Design Strategies, Test Case Design Strategies, Using the Black Box Approach to Test Case Design, Equivalence Class Partitioning, Other Black Box Test Design Approaches Cause-and-Effect Graphing, State Transition Testing, Error Guessing, Black Box Testing and Commercial Off-the-Shelf Components (COTS).

### UNIT II

16Hrs

The Need for Levels of Testing, Levels of Testing and Software Development Paradigms, Unit Test: Functions, Procedures, Classes, and Methods as Units, Unit Test: The Need for Preparation, Unit Test Planning, Testing and Debugging Goals and Policies, Test Planning, Test Plan Components, Test Plan Attachments.

### UNIT III

16Hrs

Integration tests, Designing integration tests, Integration test planning, Scenario testing, Defect Bash elimination system testing, Acceptance testing, Performance testing, Regression testing, Internationalization testing, Ad-hoc testing, Alpha, Beta tests, Testing Object Oriented Systems.

### UNIT IV

16Hrs

Usability & Accessibility Testing, Configuration testing, Compatibility testing, Testing the Documentation, Website testing, Automated testing & Test tools, Bug bashes & Beta testing, Career as a Software Tester.

### References:

1. Illene Burnstein, "Practical Software Testing", Springer Internal Edition.
2. Srinivasan Desikan and Gopaldaswamy Ramesh, "Software Testing-Principles and Practices", Pearson Education, 2006.
3. Ron Patton, "Software Testing", Sams Publishing, Pearson Education.
4. Roger S.Pressman, Software Engineering-A Practitioners Apporach, McGraw-Hill /7e
6. Ian Sommerville, Software engineering, Pearson education Asia, 9th edition.
7. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997
8. K.V.K. K. Prasad, "Software Testing Tools", Dreamtech Press.

## SCT 4.3: CLOUD COMPUTING

Teaching: 4 Hrs./ Week

Credits: 04

Max Marks: 80, Cont. Assessments: 20

Total Teaching Hrs: 64

### Preamble:

- To learn the basics of cloud computing, its models and Services.
- To compare and contrast programming for cloud and their applications
- To explain Cloud Resource Virtualization and Task Scheduling algorithms.

### Unit I

16Hrs

Introduction, Cloud Infrastructure: Cloud computing, Cloud computing delivery models and services, Ethical issues, Cloud vulnerabilities, Cloud computing at Amazon, Cloud computing the Google perspective, Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Cloud storage diversity and vendor lock-in, Energy use and ecological impact, Service level agreements, User experience and software licensing.

### Unit II

16Hrs

Cloud Computing: Application Paradigms, Challenges of cloud computing, Architectural styles of cloud computing, Workflows: Coordination of multiple activities, Coordination based on a state machine model: The Zookeeper, The Map Reduce programming model, A case study: The Grep, The Web application, Cloud for science and engineering, High-performance computing on a cloud, Cloud computing for Biology research, Social computing, digital content and cloud computing.

### Unit III

16Hrs

Cloud Resource Virtualization: Virtualization, Layering and virtualization, Virtual machine monitors, Virtual Machines, Performance and Security Isolation, Full virtualization and paravirtualization, Hardware support for virtualization, Case Study: Xen a VMM based paravirtualization, Optimization of network virtualization, vBlades, Performance comparison of virtual machines, The dark side of virtualization.

### Unit IV

16Hrs

Cloud Resource Management and Scheduling: Policies and mechanisms for resource management, Application of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utilitybased model for cloud-based Web services, Resourcing bundling: Combinatorial auctions for cloud resources, Scheduling algorithms for computing clouds, Fair queuing, Start-time fair queuing, Borrowed virtual time, Cloud scheduling subject to deadlines, Scheduling MapReduce applications subject to deadlines, Resource management and dynamic scaling.

### References:

1. Dan C Marinescu: Cloud Computing Theory and Practice. Elsevier(MK) 2013.
2. Rajkumar Buyya , James Broberg, Andrzej Goscinski: Cloud Computing Principles and Paradigms, Willey 2014.
3. John W Rittinghouse, James F Ransome:Cloud Computing Implementation, Management and Security, CRC Press 2013



## SCT 4.4: CYBER SECURITY

Teaching: 4 Hrs./ Week

Credits: 04

Max Marks: 80, Cont. Assessments: 20

Total Teaching Hrs: 64

### Preamble:

- To study the need and purpose of cyber security
- To understand the issues those are specific to amendment rights.
- To have knowledge on copy right issues of software's.
- To understand ethical laws of computer for different countries.

### UNIT I

16Hrs

Introduction-Cyber Security and its problem-Intervention Strategies: Redundancy, Diversity and Autarchy, Private ordering solutions, Regulation and Jurisdiction for global Cyber security, Copy Right-source of risks, Pirates, Internet Infringement, Fair Use, postings, criminal liability, First Amendments, Data Loss.

### UNIT II

16Hrs

Copy Right-Source of risks, Pirates, Internet Infringement, Fair Use, postings, Criminal Liability, First Amendments, Losing Data, Trademarks, Defamation, Privacy-Common Law Privacy, Constitutional law, Federal Statutes, Anonymity, Technology expanding privacy rights.

### UNIT III

16Hrs

Duty of Care, Criminal Liability, Procedural issues, Electronic Contracts and Digital Signatures, Misappropriation of information, Civil Rights, Tax, Evidence.

### UNIT IV

16Hrs

Ethics, Legal Developments, Late 1990 to 2000, Cyber security in Society, Security in cyber laws case. Studies, General Law and Cyber Law-A Swift Analysis.

### References:

1. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer-Verlag, 1997.
2. Mark F Grady, Fransesco Parisi, "The Law and Economics of Cyber Security", Cambridge University Press, 2006.
3. Michael T. Goodrich, Roberto Tamassia, "Introduction to Computer Security" Pearson Education.

## **PRACTICALS**

### **HCP 4.1 PRACTICAL-I :WEB DEESIGN LAB**

**Practical: 4 Hrs./ Week**  
**Max Marks: 40, Cont. Assessments: 10**

**Credits: 02**

Assignments related to web design studied in HCT 4.1: Web Design shall be implemented.

- HTML tags, Creating page templates, CSS, graphics and Color, HTML frames, DHTML.
- Use of HTTP.
- Client-Server Interaction.
- JavaScript control structures, functions, events, windows and frames, JavaScript frames and CSS, database connectivity.
- Basic perl programming.

### **HCP 4.2 PRACTICAL-II :PYTHON LAB**

**Practical: 4 hrs./ Week**  
**Max Marks: 40, Cont. Assessments: 10**

**Credits: 02**

Lab assignments shall be carried out to include the following:

- Basic python programming
- User defined functions
- Use of modules
- Use of classes, objects and inheritance
- GUI programming

### **SCP 4.1 PRACTICAL-III(a) :DIP LAB**

**Practical: 4 Hrs./ Week**  
**Max Marks: 40, Cont. Assessments: 10**

**Credits: 02**

Lab. Assignments shall be carried out to implement the techniques/methods studied using MATLAB / SCILAB studied in SCT4.1.

### **SCP 4.2 PRACTICAL-III(b) :SOFTWARE TESTING LAB**

**Practical: 4 hrs./ Week**  
**Max Marks: 40, Cont. Assessments: 10**

**Credits: 02**

Lab. Assignments shall be carried out to implement the techniques/methods studied in Paper SCT 4.2.

### **SCP 4.3 PRACTICAL-III(c) :CLOUD COMPUTING LAB**

**Practical: 4 hrs./ Week**  
**Max Marks: 40, Cont. Assessments: 10**

**Credits: 02**

Lab. Assignments shall be carried out to implement the techniques/methods studied in Paper SCT 4.3.

### **SCP 4.4 Practical-III(d) :CYBER SECURITY LAB**

**Practical: 4 hrs./ Week**  
**Max Marks: 40, Cont. Assessments: 10**

**Credits: 02**

Lab. Assignments shall be carried out to implement the techniques/methods studied in Paper SCT 4.4.

### **HCMP4.3: MAJOR PROJECT**

**Practical: 6 Hrs./Week**  
**Max Marks: 150**

**Credits: 06**

**HCMP4.3: Major Project ( 90 for Project Evaluation( 20 for Presentation + 10 for attending Conferences/ Workshop/Seminar + 60 for Project Report), 30 for Viva-voce Total 120 + IA 30 = 150 )**

- Each student shall carry out an individual project in the Lab.
- The Guide shall be concerned teacher in the department.
- The Project topic should be chosen in consultation with the guide.
- Student shall carry out the analysis and design work for the chosen problem statement and develop the s/w in the Lab.
- The student shall submit two copies of the dissertation documenting the project work carried out by him/her to the Chairman/Head of the Department at the end of the semester term.
- Refer Annexure-I for Project documentation details.

## ANNEXURE-I

### FORMAT OF THE PROJECT REPORT

1. Cover page as per format
2. Certificate of the project
3. Conference/Seminar/Workshop Attended Certificate
4. Acknowledgement
5. Index
6. Abstract of the project
7. Main Report
  - 7.1 Introduction
  - 7.2 Problem statement
  - 7.3 Literature survey
  - 7.4 System analysis & design
  - 7.5 Hardware & software Requirements
  - 7.6 ERD, DFD
  - 7.7 System Planning(Charts)
  - 7.8 Implementation
  - 7.9 Integration
  - 7.10 Testing
    - 7.10.1 Unit Testing
    - 7.10.2 Integration Testing
    - 7.10.3 Functional Testing
  - 7.11 Results & Discussion
  - 7.12 Advantages & Disadvantages
  - 7.13 Applications
  - 7.14 Future Scope
  - 7.15 Conclusion
  - 7.16 References
  - 7.17 Soft copy of the project on CD/Floppy

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