Deccan Education Society's

FERGUSSON COLLEGE, PUNE
(AUTONOMOUS)

SYLLABUS UNDER AUTONOMY

SECOND YEAR M.Sc. (Computer Science)
SEMESTER –III

SYLLABUS M.Sc. (Computer Science)
w.e.f. Academic Year 2017-2018

Deccan Education Society's
Fergusson College (Autonomous), Pune
Faculty of Science
Post Graduate Syllabus (Computer Science)
Second Year

Semester	Course Code	Title of the Course	Core / Elective	No. of Credits
III	CSC5301	Digital Image Processing	CORE	4
	CSC5302	Soft Computing	CORE	4
	CSC5303	Business Intelligence	CORE	4
	CSC5304	Mobile Computing	CORE	4
	CSC5305	Software Quality Assurance and Testing	Elective-1	4
	CSC5306	Unix : Internals and Programming	Elective-2	4
	CSC5307	Modeling and Simulation	Elective-3	4
	CSC5308	Practical –I (Based on DIP & MC)	PCORE	4
	CSC5309	Practical – II (Project)	PCORE	4
	CSC5310	Self-learning : Python Programming	CORE	2
Note : Students should choose one Elective subject out of the given three Electives				
IV	CSC5401	Industrial Training / Institutional Project	CORE	15
			TOTAL	**45**

Extra Credits

Semester	Course Code	Title of the Course	No. of Credits
III	XCS0007	Introduction to Cyber Security-III / Information security-III	1
	XSD0008	Skill Development-III	1
IV	XCS0009	Introduction to Cyber Security-IV / Information security-IV	1
	XSD0010	Skill Development-IV	1
		TOTAL	**4**

PAPER CODE: CSC5301
PAPER –I: Digital Image Processing
[Credits -4: No. of Lectures 48]
Prerequisites:

It is assumed that student learning this course have the following background:

- The fundamentals of digital image processing
- Image transform used in digital image processing
- Image enhancement techniques used in digital image processing
- Image restoration techniques and methods used in digital image processing
- Image compression and Segmentation used in digital image processing

Objectives:

- In this course we try to explore the algorithms and techniques involved in Digital Image Processing using computational tools like OpenCV and MATLAB etc. The course will comprise of comprehensive understanding of signals, signal processing, digital imagery and digital image processing.

	Title and Contents	No. of Lectures
Unit - I	**Introduction** What is Digital Image Processing? The origins of Digital Image Processing Examples of Fields that use Digital Image Processing Gamma-Ray Imaging X-Ray Imaging Imaging in the Ultraviolet Band Imaging in the Visible and Infrared Bands Imaging in the Microwave Band Imaging in the Radio Band Fundamental steps in Digital Image Processing Components of an Image Processing System	**3**
Unit - II	**Digital Image Fundamentals** Elements of Visual Perception Light and the Electromagnetic Spectrum Image sensing and Acquisition Image Sampling and Quantization Some Basic Relationships between Pixels An Introduction to the Mathematical Tools Used in Digital Image Processing Array versus Matrix Operations Linear versus Nonlinear Operations Arithmetic Operations Set and Logical Operations	**6**

Unit - III	**Intensity Transformation** Basic Intensity Transformation Functions Histogram Processing Histogram Equalization Histogram Matching Local Histogram Processing Fourier Transformation Sampled Functions Discrete Fourier Transform (DFT) of One variable Basics of Filtering in frequency domain Properties of 2-D Discrete Fourier Transform	**8**
Unit - IV	**Filtering in Spatial and Frequency Domain** Fundamentals of Spatial Filtering Image Smoothing Using Spatial Filters Image Sharpening Using Spatial Filter Basics of filtering in Frequency Domain Image Smoothing Using Frequency domain Filters Image Sharpening Using Frequency domain Filter Selective Filtering	**5**
Unit - V	**Image Restoration and Reconstruction** A Model of the Image Degradation / Restoration Process Noise Models Restoration in the Presence of Noise Only- Spatial Filtering Periodic Noise Reduction by Frequency Domain Filtering Bandreject Filters Bandpass Filters Notch Filters Estimating the Degradation Function Inverse Filtering Minimum Mean Square Error(Wiener) Filtering Geometric Mean Filter	**6**
Unit - VI	**Morphological Image Processing** Preliminaries Erosion and Dilation Opening and Closing The Hit-or-Miss Transformation Some Basic Morphological Algorithms Boundary Extraction Hole Filling Extraction of Connected Components Convex Hull Thinning Thickening Skeletons Pruning Morphological Reconstruction	**8**

Unit - VII	**Image Segmentation** Fundamentals Point, Line, and Edge Detection Background Detection of Isolated Points Line Detection Edge Models Basic Edge Detection Edge Linking and Boundary Detection Thresholding Foundation Basic Global Thresholding Optimum Global Thresholding Using Otsu's Method Using Image Smoothing to Improve Global Thresholding Using Edges to Improve Global Thresholding Region-Based Segmentation	**7**
Unit - VIII	**Representation and Description** Representation Boundary (Border) Following Chain Codes Polygonal Approximations Using Minimum-Perimeter Polygons Other Polygonal Approximation Approaches Signatures Boundary Segments Skeletons Boundary Descriptors Some Simple Descriptors Shape Numbers Fourier Descriptors Regional Descriptors Some Simple Descriptors Topological Descriptors Texture	**5**

References:

1. Gonzalez, R. C. and Woods, R. E. [2002/2008], Digital Image Processing, 3rd ed., Prentice Hall
2. Sonka, M., Hlavac, V., Boyle, R. [1999]. Image Processing, Analysis and Machine Vision (2nd edition), PWS Publishing, or (3rd edition) Thompson Engineering, 2007
3. Gonzalez, R. C., Woods, R. E., and Eddins, S. L. [2009]. Digital Image Processing Using MATLAB, 2nd ed., Gatesmark Publishing, Knoxville, TN.

PAPER CODE: CSC5302
PAPER –II: Soft Computing
[Credits -4: No. of Lectures 48]
Prerequisites:

- Probability
- First Order Predicate Logic
- Classical Logic
- Calculus

Objectives:

- To understand the concepts of how an intelligent system work and its brief development process.

	Title and Contents	No. of Lectures
Unit - I	**Introduction to Fuzzy Logic** The Illusion: Ignoring Uncertainty and accuracy, Uncertainty and information, Fuzzy set and membership, Chance versus Fuzziness. Classical Sets, Fuzzy Sets, Cartesian Product, Crisp Relations, Fuzzy relations, Tolerance and equivalence Relations, Fuzzy Tolerance and equivalence Relations, Value assignments, Other Forms of the Composition Operations, Features of the membership Function, various forms, Fuzzification, Defuzzification to Crisp set, λ-Cuts for fuzzy Relations, Defuzzification to Scalars, Fuzzy Logic, Approximate Reasoning, Other forms of implication operations, Natural Language, Linguistic Hedges, Fuzzy (Ruled-Based) system, Graphical technique of inference, Membership value assignment-Intuition, Inference.	**16**
Unit - II	**Fuzzy System and Classification** Fuzzy System Simulation- Fuzzy Relation, Equations, Nonlinear Simulation Using Fuzzy Systems, Fuzzy Associative Memories. Fuzzy Classification- Classification by Equivalence Relations, Cluster Analysis, Cluster Validity, c-Means Clustering, Hard c-Means, Fuzzy c-Means, Classification Metric, Hardening the Fuzzy c-Partition, Similarity Relations from Clustering. Fuzzy Arithmetic and Extension Principle- Extension Principle, Fuzzy Arithmetic, Interval Analysis in Arithmetic, Approximate Methods of Extension.	**12**

Unit - III	**Neural Network** Neural networks: Artificial Neural Network: Definition, Advantages of Neural Networks \ Application Scope of Neural Networks. Fundamental Concept: Artificial Neural Network, Biological Neural Network, Brain vs. Computer-Comparison Between Biological Neuron and Artificial Neuron. Artificial Neurons, Neural Networks and Architectures: Neuron Abstraction, Neuron Single Functions, Mathematical Preliminaries, Neural Networks Defined, Back propagation, Architectures: Feedforward and Feedback, Salient Properties of Neural Networks. Geometry of Binary Threshold Neurons and Their Networks: Pattern Recognition and Data Classification, Convex Sets, Convex Hulls and Linear Separability, Space of Boolean Functions, Binary Neurons are Pattern Dichotomizers, Non-linearly Separable Problems, Capacity of a Simple Threshold Logic Neuron, Revisiting the XOR Problem, Multilayer Networks, How Many Hidden Nodes are Enough? Learning and Memory: An Anecodatal Introduction, Long Term Memory, The Behavioral Approach to Learning, The Molecular Problem of Memory, Learning Algorithms, Error Correction and Gradient Descent Rules, Learning Objective for TLNs, Pattern Space and Weight Space. Linear Seperabilty, Hebb Network , Perceptron Network. α- Least Mean Square Learning, MSE Error Surface and Its Geometry, Steepest Descent Search with Exact Gradient Information, μ-LMS: Approximate Gradient Descent, Application of LMS TO Noise Cancelation	**18**
Unit - IV	**Genetic Algorithms** A Gentle Introduction to Genetic Algorithms: What are Genetic Algorithm?, Robustance of Traditional Optimization and Search Methods, The Goals of Optimization, How are Genetic Algorithms Different from Traditional Methods?, A simple Genetic Algorithm, Genetic Algorithms at Work—a Simulation by hand, Grist for the Search Mill—Important Similarities, Similarity Templates (Schemata), Learning the Lingo.	**2**

References:

1.Timothy Ross , Fuzzy Logic With Engineering Applications, 3rd Edition, Wiley Publication
2. Satish Kumar ,Neural Networks, Tata McGraw Hill
3. Deepa &Shivanandan , Introduction to Soft Computing, Wiley Publication
4. David E.Goldberg, Genetic Algorithms in Search Optimization and Machine Learning, Pearson Education

PAPER CODE: CSC5303
PAPER –III: Business Intelligence
[Credits - 4: No. of Lectures 48]

Prerequisites:

- Relational database concepts, database design and entity-relationship (E-R) modeling, data normalization, and Structured Query Language (SQL).
- Data Mining techniques

Objectives:

- Understand the role of BI in enterprise performance management and decision support.
- Understand the applications of data mining and intelligent systems in managerial work.
- Understand data warehousing and online analytical processing (OLAP) concepts, including dimensional modeling, star and snowflake schemas, attribute hierarchies, metrics, and cubes.
- Learn data analysis and reporting using available BI software.

	Title and Contents	No. of Lectures
Unit - I	**Introduction to Business Intelligence** Definition and History of BI, Transaction processing versus analytical processing, BI implementation , Major tools and techniques of BI	**6**
Unit - II	**Data warehousing** Definition and concepts, , Data warehouse architecture, ETL process, data warehouse development, Top down vs. Bottom up, Data Mart vs. EDW, Implementation issues, Real-time data warehousing	**10**
Unit - III	**Business performance management** Key performance indicators and operational metrics, Balanced scorecard , Six Sigma, Dashboards and scorecards	**8**
Unit - IV	**Data Mining for Business Intelligence** Data mining process, Data mining methods, ANN for Data Mining	**8**

Unit - V	**Text, and Web mining for Business Intelligence** Text mining Applications, Process and Tools, Web content, structure and usage mining	**8**
Unit - VI	**BI implementation , Integration and emerging trends** Implementing BI, BI Application Life Cycle , Connecting BI to Enterprise systems, Ondemand BI, Issues of legality, privacy and Ethics, Emerging topics in BI, Social Networking and BI, RFID and BI	**8**

References:

1. EfraimTurban, Ramesh Sharda, Dursun Delen, and David King , Business Intelligence: A Managerial Approach, 2nd Edition, PEARSON 2012, ISBN-10: 0-13-610066-X, ISBN-13: 978-0-13-610066-9
2. Simon Miller and William Hutchinson , Oracle Business Intelligence Applications, McGraw Hill Education 2013, ISBN-10: 93-5134-153-4,ISBN-13: 978-93-5134-153-6

PAPER CODE: CSC5304
PAPER - IV: Mobile Computing
[Credits - 4: No. of Lectures 48]
Prerequisites:

- Concepts of multiplexing and modulation
- Concepts of Networking
- Conversant with OS internals
- Familiar with event handling
- Web browsers
- Create and Compile Java Programs
- Brief History of wireless communication

Objectives:

- To familiarize the students with the buzz words and technology of mobile communication
- Understand the GSM architecture
- Understand the issues relating to Wireless applications

	Title and Contents	No. of Lectures
Unit - I	**Introduction to Mobile Computing** Introduction and need for Mobile computing Mobility and portability Mobile and Wireless devices Applications Brief History of wireless communication	**1**
Unit - II	**Wireless Transmission** General Concepts of multiplexing and modulation Spread Spectrum Cellular Systems	**3**
Unit - III	**Medium Access Control Layer** Why specialized MAC? hidden and exposed terminals near and far terminals General Concepts and comparison of SDMA, FDMA, TDMA , CDMA	**4**
Unit - IV	**Mobile IP** Goals, assumptions and requirements Entities and terminologies Agent Discovery Registration Tunneling and encapsulation Optimization	**7**

	Reverse Tunneling IPv6 IP micro-mobility support – Cellular IP, Hawaii, Hierarchical, mobile IPv6 Mobile Routing : Destination sequence distance Vector, Dynamic Source Routing, Alternative Metrics, Adhoc Routing Protocols -Flat, Hierarchical, Geographic-position-assisted	
Unit - V	**Mobile TCP** Traditional TCP Congestion Control, Slow start, Fast retransmit / Fast recovery Implications on mobility Classical TCP improvements Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit / Fast recovery, Transmission / Timeout freezing, Selective Retransmission, Transaction oriented TCP TCP over 2.5/3G wireless networks	**4**
Unit - VI	**GSM** Mobile Services (Bearer, Tele-and-supplementary services) System Architecture Radio subsystem Network and switching subsystem Operation subsystem Protocols Localization and calling Handover Value Added Services SMS: Architecture, Mobile Originated and Mobile Terminated procedures Cell Broadcast Service: Architecture, Message Transfer Procedure MMS: Architecture, Protocol framework, Message Transfer Procedure Location Services: Logical Reference Model, Control Procedures, Network Architecture, determination of Location Information, Location based services GPRS	**7**
Unit - VII	**3G mobile networks** UMTS System architecture, radio interface UTRAN - Architecture, Functions of RNC, Core network	**8**

	Handover Hard and soft handover	
Unit - VIII	**Wireless Application Protocol** Architecture Wireless datagram protocol Wireless transport layer security Wireless transaction protocol Wireless session protocol Wireless application environment WAP Push Architecture, protocols	**4**
Unit - IX	**Introduction to Android Operating System& Programming** Overview and evolution of Android Features of Android Android architecture Components of an Android Application, Manifest file Android Activity and Service Lifecycle UI Designing (layout desiginig) All components (e.g Button , Slider, Image view, Toast) Event Handling	**10**

References:

1. Jochen Schiller , Mobile Communications, Pearson Education, 2nd Edition,
2. Wei-Meng Lee, Beginning Android Application Development, Wiley India
3. Nishit Narang and Sumit Kasera, Mobile Networks GSM and HSCSD, TataMcGrawHill
4. Mark Murphy, Beginning Android 3, APress , ISBN 9788132203568
5. The Android Developers Guide [http://developer.android.com/guide/index.html]

PAPER CODE: CSC5305

PAPER -V: Software Quality Assurance and Testing

[Credits - 4: No. of Lectures 48]

Prerequisites:

- Basic concepts of software testing

Objectives:

- To enable student to learn Software Quality Assurance good practices with the help of various techniques, Strategies and tools.

	Title and Contents	No. of Lectures
Unit - I	**An introduction to Software Life Cycle from QA Engineer's Perspective** Development of a software and role of a QA . Various tools and techniques used by the IT industry for testing	**2**
Unit - II	**Software quality** Definition Software errors, software faults and software failures Software quality assurance – definition and objectives Software quality assurance vs. software quality control The objectives of SQA activities	**4**
Unit - III	**Pre-project SQA Components** Contract Review Development and Quality Plan	**4**
Unit - IV	**SQA components in Project life cycle activities assessment** Verification and Validation Various types of Reviews Inspections Walkthrough Software testing Impact of CASE Tools	**10**
Unit - V	**SQA Infrastructure Components** Procedures and procedure manuals Templates and Checklists Staff training Corrective and preventive actions Documentation control	**8**

Unit - VI	**Software Quality Factors** Mccall's Quality Model Product, Process quality metrics	**3**
Unit - VII	**Standardization** ISO 9001 and ISO 9000-3 SEI-CMM, IEEE 1012 standard ISO/IEC 12207 standard	**4**
Unit - VIII	**Configuration Management** Change control Release and version control Software configuration management audit	**4**
Unit - IX	**Quality Improvement Technique** Pareto Diagrams Cause-Effect Diagrams Scatter Diagrams Run Charts	**4**
Unit - X	**Quality Costs** Quality Cost Measurement Utilizing Quality Costs for Decision-Making	**3**
Unit - XI	**Case Studies**	**2**

References:

1. Danial Galin, Software Quality Assurance from theory to implementation
2. Edwin Bennatan, Software Project management-
3. Roger S. Pressman, Software Engineering, TMH,7Th Ed.
4. Nina Godbole, Software Quality Assurance : Principles and Practices
5. Project Management Body of Knowledge – PMI
6. Donna C. S., Summers -Quality, 5th ed., Prentice-Hall, 2010.
7. Dale H., Besterfield -Total Quality Management, Prentice Hall, 2003.
8. John Wiley. J.F.Peters, Software engineering: An Engineering approach,
9. www.softwarecertifications.org

PAPER CODE: CSC5306

PAPER - V: Elective-II –Unix : Internals and Programming

[Credits - 4: No. of Lectures 48]

Prerequisites:

- Working knowledge of C programming.
- Basic Computer Architecture concepts.
- Basic algorithms and data structure concepts.

Objectives:

- Understand the concepts related to shell & writing your own shell script.
- Understand the concepts underlying in the design and implementation of Operating Systems.
- Course maintains a delicate balance between theory and practical applications. In fact, most Units start with the theory and then switches focus on how the concepts are implemented in a C program.
- Course describes the programming interface to the Unix/Linux system - the system call interface. It is intended for anyone writing C programs that run under Unix/Linux.

	Title and Contents	No. of Lectures
Unit - I	**Introduction to UNIX/Linux Kernel** System Structure, User Perspective, Assumptions about Hardware, Architecture of UNIX Operating System. Concepts of Linux Programming- Files and the File system, Processes, Users and Groups, Permissions, Signals, Inter-process Communication	**3**
Unit - II	**Shell Programming** Shell and Types of Shell Shell commands Environment Variables & Shell Meta characters Operators & Statements used in shell script (Decision, Loop Control Statements)	**3**
Unit - III	**Internal representation of buffers & files** Buffer headers, structure of the buffer pool, Scenarios for retrieval of a buffer, reading and writing disk blocks, Inodes , Structure of regular file, directories, conversion of path name to inode ,super blocks.	**4**

Unit - IV	**Files and Directory I/O** open, read, write, lseek, close, pipes, dup , creat, file sharing, atomic operations, dup2, sync, fsync, and fdatasync, fcntl, /dev/fd, stat, fstat, lstat, file types, Set-User-ID and Set-Group-ID, file access permissions, ownership of new files and directories, access function, umask function, chmod and fchmod, sticky bit, chown, fchown, and lchown, file size, file truncation, file systems, link, unlink, remove, and rename functions, symbolic links, symlink and readlink functions, file times, utime, mkdir and rmdir, reading directories, chdir, fchdir, and getcwd, device special files Scatter/Gather I/O, Mapping Files into Memory, Advice for Normal File I/O, I/O Schedulers and I/O Performance, Directories, Copying and Moving files, Device Nodes, Out-of-Band Communication	**13**
Unit - V	**Process Environment, Process Control and Process Relationships** Process states and transitions, layout of system memory, the context of a process, saving the context of a process, sleep, process creation, signals, process termination, awaiting process termination, invoking other programs, the user id of a process, changing the size of the process, The Shell, Process Scheduling. Process termination, environment list, memory layout of a C program, shared libraries, environment variables, setjmp and longjmp, getrlimit and setrlimit, process identifiers, fork, vfork, exit, wait and waitpid, waitid, wait3 and wait4, race conditions, exec, changing user IDs and group IDs,system function, user identification, process times. The Process ID, Running a New Process, Terminating a Process, Waiting for Terminated Child Processes, Users and Groups, Daemons, Process Scheduling, Yielding the Processor, Process Priorities, Processor Affinity.	**14**
Unit - VI	**Memory Management** The Process Address Space, Allocating Dynamic Memory, Managing Data Segment, Anonymous Memory Mappings, Advanced Memory Allocation, Debugging Memory Allocations, Stack-Based Allocations, Choosing a Memory Allocation Mechanism, Manipulating Memory, Locking Memory, Opportunistic Allocation Swapping, Demand Paging, Hybrid system with swapping and	**6**

	demand paging	
Unit - VII	**Signal Handling** Signal concepts, signal function, unreliable signals, interrupted system calls, reentrant functions, SIGCLD semantics, reliable-signal technology, kill and raise, alarm and pause, signal sets, sigprocmask, sigpending, sigsetjmp and siglongjmp, sigsuspend, abort, system function revisited, sleep. Signal Concepts, Basic Signal Management, Sending a Signal, Reentrancy, Signal Sets, Blocking Signals, Advanced Signal Management, Sending a Signal with a Payload.	**5**

References:

1. Richard Stevens, Advanced Programming in the UNIX Environment, Addison-Wesley
2. Maurice J. Bach, The Design of the UNIX Operating System, PHI
3. Robert Love, Linux System Programming, O'Reilly
4. Y. P. Kanetkar, UNIX Shell Programming, BPB

PAPER CODE: CSC5307

PAPER - V: Elective-III – Modelling and Simulation

[Credits - 4: No. of Lectures 48]

Prerequisites:

- The course assumes a previous knowledge of probability and statistics.
- Basic concepts of network topologies.

Objectives:

- The purpose of this course is to provide students with an opportunity to develop skills in modeling and simulating a variety of problems.
- After learning the simulation techniques, the students are expected to be able to solve real world problems which cannot be solved strictly by mathematical approaches.

	Title and Contents	No. of Lectures
Unit - I	**Systems modeling** Concepts of continuous and discrete formalisms. Stepped and Event-based Time in Simulations. Sources and Propagation of Error.	**2**
Unit - II	**Types of Simulations** Graph or Network Transitions Based Simulations, Actor Based Simulations, Mesh Based Simulations, Hybrid Simulations, Framework for Simulation and Modeling,	**4**
Unit - III	**Modeling and simulators** Modeling formalisms and their simulators, Discrete time, continuous time, discrete event, Process based simulators. Hybrid systems and their simulators	**20**
Unit - IV	**Probability** Basic probability, Probability distributions, estimation, Testing of hypotheses	**8**
Unit - V	**Probability in modeling** Selecting input probability distributions, Models of arrival processes, Queues and Random Noise, Random number generators, their evaluation, Generating random variates from various distributions	**8**

Unit - VI	**Analyzing models** Output analysis, transient behavior, Steady state behavior of stochastic systems, Computing alternative systems, Variance reduction techniques. Sensitivity Analysis, Verification and Validation	**6**

References:

1. J., et.el., Discrete-Event System Simulation, Fourth Edition, Banks (2005), Publisher Pearson, ISBN-13: 9780131293427
2. A.M. and W.D. Kelton, Simulation Modeling and Analysis, Third Edition, by Law (2000), Publisher McGraw-Hill, ISBN-13: 978-0071165372
3. Kofman and Cellier Continuous System Simulation, Publisher Springer, ISBN-13: 9780387261027
4. B. Zeigler, H. Praehofer, T. Kim , Theory of modeling and Simulation, 2nd., Publisher Academic Press, 2000, ISBN-13: 978-0127784557

1. Ben Klemens, Modeling with Data: Tools and Techniques for Scientific Computing, Publisher: Princeton University Press 2008, ISBN-13: 9780691133140

PAPER CODE: CSC5308
PAPER-VI: Practical –I (Based on DIP & MC)

Practical Assignment based on

1. Digital Image Processing
2. Mobile Computing

Continuous Internal Assessment

1	Journal	10Marks
2	Viva	
	Digital Image Processing	10 Marks
	Mobile Computing	10 Marks
3	Internal test – for skill assessment	10 Marks
4	Attendance + Active participation	10 Marks
	Total	**50 Marks**

End Semester Assessment

1	Digital Image Processing	25 Marks
2	Mobile Computing	25 Marks
	Total	**50 Marks**

	PAPER CODE: CSC5308 **PAPER -VI: Lab Course - I (Based on DIP & MC)** **[Credits - 4: No. of Practicals 12]**
	Title of Experiment/ Practical
Digital Image Processing Assignments	
1. Fundamentals of Image Processing	
1.1	Design 128, 64, 32, 16, 8 and 4-level uniform quantizers and quantize the gray-level image, *Lena.pgm*. Compare the results by these six different quantizers.
1.2	Divide the image *lena.pgm* into blocks and each block has the size 4 x 4 pixels. Replace each block by the intensity of the (2,2) pixel within the block. The new image will be 1/4th the size in both dimensions. Display the down-sampled image
2. Filtering in Spatial Domain	
2.1	Apply power law transformation to the *city.pgm* image taking different values for gamma as 3, 4, and 5. (Different plots should be shown.)
2.2	Reduce the salt-and-pepper noise in the *circuit.pgm* image; submit your code and the output image. (First add a noise in image and then apply average and median filters)
3. Filtering in Frequency Domain	
3.1	Remove the noise from the input images *circuit1.pgm, circuit2.pgm, circuit3.pgm*, and *moon.pgm.* Submit your code and the output images.
3.2	By applying frequency domain filters, restore the original images from the inputs *degrade1.pgm, degrade2.pgm* and *degrade3.pgm*.
4. Morphological Image Processing	
4.1	Remove the noise from the input image *mimage.pgm*. Submit your code and the output image.
4.2	Extract the gradient parts from the input image *brain.pgm*. Perform edge detection and display the output of Canny, Sobel, Prewitt edge detection on different as well as in a same plot.
5. Segmentation and Object Recognition	
5.1	Extract the rice objects from the input image *rice.pgm*.
5.2	Perform the comparative analysis base on statistical parameters as Area and Centroid on two images.

Mobile Computing Assignments	
1	Create 2 activities. On first activity accept user name and password. If username is admin and password is admin, show second activity and print "Welcome to the App", else show a message "Invalid User".
	Create an activity and add a button named "Camera". Clicking on the button it should open the camera app.
2	Create a Recipe App with facilities to list, view, add /delete recipes.
3	Create an activity to display the list of all applications installed on the device currently.
	Create a Game App (Tic-tac- toe/word games/ puzzle).
4	Create a simple alarm app. Allow to select a time and date. At that Time and date show a notification saying "alarm went off".
	Create a Google map application with the facility to show important cities annotation on Map.
5	Create a student registration form. Accept details from user like Name, Roll, email id, date of birth, address, blood group, etc. The form should be scrollable (use scroll view). Clicking on register button it should store the student info in shared preferences. After registration, go to another activity having "show data" button. Clicking on this button it should load all the information from shared preferences and display.

PAPER CODE: CSC5309
PAPER - VII: Practical - II (Project)

Objective:

The objective of project is to make the students understand Requirement analysis, design and implementation cycle. Any open problem statement can be taken for implementation. The system can be designed in any programming language implemented in any platform.

Project will be evaluated by project guide. Assessment will be done weekly in the respective batch. Evaluation will be on the basis of weekly progress of project work, progress report, oral, results and documentation and demonstration.

Student should fill the status of the project work on the progress report and get the Signature of project guide regularly. Progress report should sharply focus how much time you have spent on specific task. (The format of progress report is given as follow.) You should keep all signed progress report. Project will not be accepted if progress report is not submitted and all responsibility remains with student.

Project Progress Report

Roll No & Name of the student	
Title of the Project	
Project guide Name	

Sr.	From Date	To Date	Details of Project work	Project guide sign (with date)

Head,
Dept. of Computer Science

PAPER CODE: CSC5310
PAPER - VIII: Self-learning : Python Programming
[Credits - 2: No. of Lectures 24]

Prerequisites:

- Anyone who has a mature understanding of programming in an imperative language (e.g., Java, C/C++, or Pascal), of basic algorithms and data structures (e.g., sorting, searching, lists, stacks, and trees)

Objectives:

- To study python programming.
- To design the scripts in python.
- To design graphical user interface using python.

	Title and Contents	No. of Lectures
Unit - I	**Introduction to Python** Python identifiers and reserved words, Lines and indentation, multi-line statements, comments, print and raw_input()/input, command line arguments and processing command line arguments, standard data types basic, none, boolean (true & False), numbers, Python strings, data type conversion, Python basic operators (Arithmetic, comparision, assignment, bitwise logical), Python membership operators (in & not in), Python identity operators (is & is not), Operator precedence, Control Statements, Python loops Iterating by subsequence index, loop control statements (break, continue, pass) , Mathematical functions and constants (import math), Random number functions	**3**
Unit - II	**Python strings & Lists** Python Modules Concept, Slicing, escape characters, String special operations, String formatting operator, Triple quotes, \ Raw String, Unicode strings, Built-in String methods. Python Lists concept, creating and accessing elements, updating & deleting lists, basic list operations, reverse, Indexing, slicing and Matrices, Built-in List functions, filter(), map(), and reduce(), Using Lists as stacks and Queues,	**3**

	List comprehensions	
Unit - III	**Python tuples, sets and dictionary** Concept (immutable), creating & deleting tuples, accessing values in a tuple, updating tuples, delete tuple elements, basic tuple operations, Indexing, slicing and Matrices, Built-in tuple functions. Sets - Concept, operations. Dictionary Concept (mutable), creating and accessing values in a dictionary , updating dictionary, delete dictionary elements, properties of dictionary keys Built-in dictionary functions and methods.	**4**
Unit - IV	**Functions** Defining a function (def), calling a function, Function arguments - Pass by value, Keyword Arguments, default arguments, Scope of var - basic rules and Documentation Strings Variable Number of Arguments, Call by Reference, Order of arguments (positional, extra & keyword), Anonymous functions Recursion Treatment of Input and Output Arguments, Unpacking argument lists Lambda forms Function Objects Function ducktyping & polymorphism, generators (functions and expressions) and iterators, list comprehensions	**4**
Unit - V	**Working with Files and Directories** Creating files Operations on files (open, close, read, write), file object attributes, filepositions, Listing Files in a Directory, Testing File Types, Removing Files andDirectories Copying and Renaming Files Splitting Pathnames, Creating and Moving to Directories, Traversing Directory Trees	**4**
Unit - VI	**Python Classes / Objects** Object oriented programming and classes in Python - creating classes, instance objects, accessing members, data hiding (the double underscore prefix) Built-in class attributes Garbage collection, the constructor, overloading methods and operators Inheritance - implementing a subclass, overriding	**3**

	methods, Recursive calls to methods, Class variables, class methods, and static methods	
Unit - VII	**Python regular expressions** Matching Vs searching, match & search functions, search & replace, option flags, RE patterns, non-greedy repetitions, grouping, back references, alternatives, anchors.	**1**
Unit - VIII	**GUI Programming** The simplest GUI program in Python Event-driven programming. Changing the layout. Getting input from the user. GUI Examples: Designing a GUI.	**2**

References:

1. Bruce J. Maclennan, Functional Programming: Practice and Theory
2. Greg Michaelson , An Introduction to Functional Programming Through Lambda Calculus (Dover Books on Mathematics) Paperback
3. Kenneth C. Louden, Programming Languages: Principles and Practice
4. E-Books : python_tutorial. pdf, python_book_01.pdf Mark Lutz , Learning Python, O'reilly

Note: The evaluation is for 50 Marks based on above concepts.

Deccan Education Society's

FERGUSSON COLLEGE, PUNE
(AUTONOMOUS)

SYLLABUS UNDER AUTONOMY

SECOND YEAR M.Sc. (Computer Science)
SEMESTER –IV

SYLLABUS M.Sc. (Computer science)
w.e.f. Academic Year 2017-2018

CSC5401: Full Time Industrial Training/Industrial Project (15 credits)

Total Credits: 15 **Duration : Minimum 4 months**

Objectives:

1. To make the students get an insight into the actual work culture of the I.T. industry.
2. To make the students aware of the skills and technologies needed to work in the I.T. industry.

The necessary details for Industrial Training course are as follows:
A student can complete Industrial Training Project (ITP) in any I.T. industry / academic institute / with a research project of a teacher / an expert funded by any funding agency for a minimum period of four months.

1. There will be a teacher coordinator for a group of 10 students. A teacher coordinator is responsible to :
   - Maintain a weekly status / progress report of the student.
   - Keep in touch with the reporting authorities from industry for each student.
   - Help the students to solve their difficulties.
   - Arrange the meeting and presentations as per requirement.
   - Guide each student for preparing final project report.
   - Keep complete documentation record for each student separately.
   - Internal assessment of each student for 50 marks

   The workload for this teacher coordinator is proposed as four hours per week.
   The workload for a teacher coordinator who is guiding 3 students doing their ITP in Fergusson College (Autonomous) Pune (no mentor from industry) is proposed as four hours per week.

2. **Guidelines for submitting the final project report**
   The student must include the project completion certificate issued by the respective industry/research institute/educational institute in the report. A student will submit three hard bound copies: Student Copy, Department copy, CoE copy of the work carried out during ITP.

3. **Scheme of Assessment :**

   - **Continuous Internal Assessment**
     Evaluation for internal 50 Marks will be done by the Internal Teacher Coordinator.

Description	**Marks**
Weekly Reports (Minimum 15)	30
Final Project Report writing	10
Presentation Demo	10

- **End Semester Assessment**

  Evaluation for external 50 Marks will be done by a panel of three consisting of One Industrial Expert, One Academic Expert (External from other college) and One Internal Examiner. Each examiner is expected to assess each student for 50 marks independently and average of the three scores is to be considered as the final ESE score (out of 50)

Description	**Marks**
Knowledge and Execution of the System	15
Final Project Report	15
Presentation	10
Viva	10

- The internal examiner(s) will be responsible for submitting the total marks out of 100 to examination section.

- The final grade (to be printed on the mark list) is to be calculated on the basis of UGC 10 point scale.

Marks	**Grade**	**Grade Point**
90 – 100	O: Outstanding	10
80-89	A+ : Excellent	9
70-79	A: Very Good	8
65-69	B+ : Good	7
60 - 64	B: Above Average	6
55-59	C+ : Average	5
50 -54	C: Below Average	4
45-49	D : Satisfactory	3
40-44	E:Pass	2
0 -39	F : Fail	0
	Absent	0

Note :- A student who has obtained Grade F will have to carry out this project once again for a complete semester (minimum four months).