Annexure to Notification No.F(Pres-Syllabi.PG-CBCS)Acad/KU/14 dated 15-05-2014
Syllabus for MCA 1st to 6th semester

Choice based Credit System (CBCS)

Scheme and course structure for
MCA 4th semester effective from academic session 2015 and onwards

Semester-IV						
Course Code	Course name	Paper category	Hours / Week			Credits
			L	T	P	
MCA14401CR	Software Engineering	Core	3	0	0	3
MCA14402CR	Computer Graphics	Core	3	0	0	3
MCA14403CR	Lab for Software Engineering	Core	0	0	6	3
MCA14404CR	Lab for Computer Graphics	Core	0	0	6	3
MCA14405EA	Advanced Unix/Linux Programming	Elective (Allied)	3	0	0	3
MCA14406EA	Theory of Computation & Formal Languages	Elective (Allied)	3	0	0	3
MCA14407EA	Pervasive Computing	Elective (Allied)	3	0	0	3
MCA14408EA	Advanced Software Engineering	Elective (Allied)	3	0	0	3
MCA14409EA	Image processing	Elective (Allied)	3	0	0	3
MCA14410EA	Machine Learning	Elective (Allied)	3	0	0	3
MCA14411EO	Open elective (To be selected from outside department)	Elective (Open)	4	0	0	4
MCA14412EO	Open elective (Offered for students from outside department)	Elective (Open)	4	0	0	4
24 Credits=31 Contact Hours						

4th Semester

Core:

MCA14401-CR: Software Engineering
MCA14402-CR: Computer Graphics
MCA14403-CR: Lab for Software Engineering
MCA14404-CR: Lab for Computer Graphics

Electives: (any 4)

MCA14405-EA: Unix/Linux Programming
MCA14406-EA: Theory of Computation & Formal Languages
MCA14407-EA: Pervasive Computing
MCA14408-EA: Advanced Software Engineering
MCA14409-EA: Image processing
MCA14410-EA: Machine Learning
MCA14411-EO: Open elective (To be selected from outside department)
MCA14412-EO: Open elective(Offered for students from outside department)

Course No: MCA14401CR
Course Title: Software Engineering

Unit I
Concept of Software engineering, Evolving role of software, Concept of software, Software Characteristics, Software Components, Software Engineering Challenges (Scale, Quality Productivity, Consistency and Repeatability, Change), Software standard, Software Engineering approach. Software Process Models: Waterfall Model, Prototyping Model, Spiral Model, Incremental Model, Concurrent Development Model.

Unit II
Software Process and Project Metrics : Measures , Metrics and Indicators , Software measurement : Size -Oriented Metrics , Function - Oriented Metrics , Extended Function point metrics. Capability Maturity Model Integration (CMMI), Process Planning, Estimation, COCOMO Model, Risk Analysis & Management: Software risks, Risk identification, Risk monitoring and management. Software requirements: need for SRS, requirement process; Requirement specification (characteristics, components), Concept of Use Cases, Concept of validation

Unit III
Design Engineering: Function oriented design, Design principles, Coupling and Cohesion, Design Notations & Specifications, Structured Design Methodology; Object-Oriented Design, OO Concepts, Design Concepts, Design Methodology, Dynamic & Functional Modeling, Design Verification.

Unit IV
Software Quality Concepts: Quality, Quality control, Cost of quality; Software Quality Assurance (SQA), Formal approaches to SQA, Software Reliability: Measures of Reliability, Software safety, Quality Standards. Software Testing: Testing fundamentals, Black-Box Testing, White Box Testing, Regression Testing, Smoke Testing, Alpha Testing, Beta Testing, Recovery Testing, Security Testing, Stress testing, Performance testing.

Suggested Readings:
ROGER S. PRESSMAN - Software Engineering - A Practitioner's Approach, Sixth edition,
Pankaj Jalote - An Integrated approach to Software Engineering, 3rd edition, Narosa Publication.
Sommmerville - Software Engineering. Pearson, 7/e , 2006.
Software Engineering SCHAUM'S Outlines, TMH.
JAMES F. PETERS Software Engineering – An Engineering Approach, Wiley& Sons

Course No: MCA14402CR
Course Title: Computer Graphics

Unit I

Introduction to Computer Graphics. Applications of Computer Graphics. Graphic Display Devices_ Raster, Refresh, Random. Display Buffer, Concept of Double Buffering and Segmentation of Display Buffer. Use of Lookup tables. OpenGL API.

Unit II

2-D Graphics. Cartesian and Homogeneous Coordinate Systems. Line drawing algorithms (Bressenhams and DDA). Circle and Ellipse Drawing Algorithms. 2-Dimensional Transformations.Concepts of Window & Viewport, Window to Viewport Transformations. Filling, Boundary and Floodfill algorithms.

Unit III:

Clipping, Line Clipping Algorithms (Cohen-Sutherland Algorithm), 3-D Graphics, Projections: perspective and parallel projection transformations. 3-Dimensional Transformations. Hidden Surface Removal Techniques, Z-Buffer Algorithm, Back Face Detection.

Unit IV

Curves and Surfaces, Splines, Spline specification, Interpolated & Approximated Splines. Bezier Splines, Bezier Curves, Cubic Bezier Curves, Bezier Surfaces. B-Splines curves and surfaces. Fractals - Fractal Generation Procedure.

Text Book : Hearn and Baker " Computer Graphics" 2nd Edition , Pearson Education.

Reference Books

1. W.M.Newman and Sproull. "Principles of interactive Computer Graphics" ,TMH
2.Steven Harrington." Computer Graphics a Programming Approach" McGraw Hill.
3. Plastock and Kelley. "Schaums outline of theory and problems of computer Graphics"
4. David F Frogers and J Alan Adams. "Procedural Elements of Computer Graphics" McGraw Hill
5. David F Rogers and J Alan Adams. "Mathematical Elements of Computer Graphics" McGraw Hill
6. James. D. Foley, A Vandam etal "Computer Graphics" Pearson.

MCA14403CR Lab for Software Engineering

MCA14404CR Lab for Computer Graphics

Course No: MCA14405EA
Course Title: UNIX/LINUX Programming

Unit I

Unix Basics: Introduction to Unix/Linux, Basic Commands, Text processing commands, data processing in Unix/Linux, Unix Administration – creating and managing users, managing printing.

Unit II

Introduction to Shell: Unix/Linux Shells, Shell variables, Environment variables. Arithmetic, Relational and Logical operators.
Programming with Shell: Shell Programming, Different Shell constructs, looping statements, decision statements, keywords, solving arithmetic expressions.

Unit III

GUI Development in Unix/Linux: Accessing Unix and Linux in GUI mode, Introduction to X Windows. Introduction to GUI development in Unix and Linux, Introduction to Qt as development tool. Introduction to various controls and forms in Qt. Designing simple forms in Qt, manipulating various controls in Qt.

Unit IV

Database Basics with Unix and Linux: Basics of Database, Introduction to MySQL, Basic commands of MySQL e.g. insert, delete, update etc. Connecting to database with Qt. Develop small application using Qt and MySQL.

References Books:

Kernighan and Pike, "The UNIX Programming Environment", Pearson Education.
Karnetkar, " UNIX Shell Programming", BPB.
Tackett & Burnett, "Using Linux- Special Edition(Que)", PHI.

Course No: MCA14406EA
Course Title: Theory of Computation & Formal Languages

Unit I
Basic concepts of theory of computation: Formal Languages and Grammars, Finite State Transducers, Finite-State Automata and Regular Languages, Limitations of Finite-Memory Programs.

Unit II
Recursive finite-domain programs, Recursion, Pushdown Transducers, Context-Free Languages, Limitations of Recursive Finite-Domain Programs

Unit III
Turing Machines. Programs and Turing Transducers, Universal Turing Transducers, Un-decidability.

Unit IV
Introduction to resource-bounded computation, Time and Space, A Time Hierarchy, Nondeterministic Polynomial Time, some *NP*-Complete Problems

Text Book:
Hopcroft, J., and Ullman, J. (1979), "Introduction to Automata Theory, Languages and Computation", Pearson Education.
P. Linz, "*Introduction to Formal Languages and Automata*", 3rd edition, 2000, Jones and Barlett, PWS Publishing Company.

Suggested Readings:

Eiton Gurarri : *Introduction to Theory of computation*, Computer Science press
2. Hopcroft J, R. Motwani, and J. Ullman, "*Introduction to Automata Theory, Languages and Computation*, 3rd Ed. 2006, Pearson Education.

Course No: MCA14407EA
Course Title: Pervasive Computing

Unit I

Technologies : Past, Present, Future , Pervasive Computing , The pervasive computing market, m-Business , Conclusions and Challenges , Future , Application Examples , Device Technology: Hardware , Human-machine interfaces , Biometrics , Operating Systems , Java for Pervasive devices ,Device Connectivity : Protocols , Security , Device Management , Web Application Concepts : History of World wide Web . World wide Web Architecture , Protocols , Transcoding , Client Authentication via the Internet.

Unit II

WAP : Introduction , Components of the WAP architecture , WAP infrastructure , WAP Security Issues , Wireless Markup Language , WAP push , Products , i-mode , Voice Technology : Basics of Speech Recognition , voice standards , speech applications , speech and pervasive computing , security, Personal Digital assistants : History , Device Categories , PDA Operating Systems , Device Characteristics , Software Components , Standards , Mobile Applications , PDA browsers.

Unit III

Architecture : Server Side Programming in Java : J2EE and overview , Servlets, Enterprise Java Beans , Java Server Pages , Extensible Markup Language , Web services , Model-View-Controller Pattern, Pervasive web application architecture : Background , scalability and availability , Development of pervasive computing web applications , Pervasive application architecture.

Unit IV

Example Application: Introduction, User Interface overview, Architecture, Implementation. Access from PCs: Smart Card-based authentication via the Internet, Ordering goods , Access via WAP : WAP functionality , Implementation , Access from Personal Digital Assistants: Extending the example application to personal digital assistants. Implementation for synchronized devices, for intermittently connected devices, for connected devices. Access via voice: Extending the example application to voice access, Implementation.

Reference Books :

Jochen Burkhardt, Dr. Horst Henn , Stefan Hepper , Klaus Rintdorff, Thomas schack " Pervasive Computing " Technology and Architecture of Mobile Internet Applications , Pearson Education.

Course No: MCA14408EA
Course Title: Advanced Software Engineering

UNIT I-TESTING BASICS and TEST CASE DESIGN

Software Testing Techniques Classification. Test case design strategies. Evaluating test adequacy criteria. White Box Testing: Static white box testing, dynamic white box testing. Structural Testing - Control Flow Testing and its techniques. Data Flow Testing and its techniques. Mutation testing and its techniques. Automated code coverage analysis. Test Adequacy Criteria, Additional white box test design approaches. Black Box Testing: Static black box testing, dynamic black box testing, Functional testing and its techniques, Random testing and its techniques. Additional black box test design approaches, Black box testing and COTS.

UNIT II- SOFTWARE TESTING EXECUTION AND TESTING TOOLS

Unit test – Unit test planning – Designing the unit tests – The class as a testable unit – The test harness – Running the unit tests and recording results – Integration tests – Designing integration tests – Integration test planning – System test – The different types – Regression testing – Alpha, beta and acceptance tests.

UNIT III-SOFTWARE RELIABILITY

Introduction to Software Reliability: Basic Concepts, Software Reliability , Hardware Reliability, System Reliability, Software Reliability metrics, Operational Profile, Reliability Modeling, General Model Characteristics, Execution Time Component , Calendar Time Component , Calendar Time to Execution Time Relationship, Markovian Models: Poisson Type Models, Binomial Type Models, Poisson Type Models versus Binomial Type Models, Numerical examples.

UNIT-IV SOFTWARE RELIABILITY Models

Specific Models: Finite and Infinite Poisson Type Models, Musa Basic Model versus Logarithmic Poisson Model. Numerical examples. Parameter Estimation: Maximum Likelihood Estimation versus Least Squares Estimation. Comparison of SRGMs: Comparison criteria, Calendar Time Modeling and its Estimation.

Text Book:

ROGER S. PRESSMAN - Software Engineering - A Practitioner's Approach, Sixth edition,
J.D. Musa, A. Iannino, K. Okumoto "Software Reliability: Measurement, Prediction and Application" Tata McGraw Hill
References:
PankajJalote - An Integrated approach to Software Engineering, 3rd edition, Narosa Publication.
Sommmerville - Software Engineering. Pearson , 7/e , 2006.
SCHAUM'S Outlines, TMH.
JAMES F. PETERS Software Engineering – An Engineering Approach, Wiley& Sons

Course No: MCA14409EA
Course Title: Image Processing

UNIT I
Introduction to discrete time signals and systems: Discrete time signals, Discrete time systems, Analysis of discrete time, Linear time-invariant systems [Both 1D and 2D].
Introduction to digital image processing: Digital Image representation, Fundamental steps in image processing. Elements of digital image processing systems, Applications of digital image processing

UNIT II
Image sensing and acquisition. Image sampling and quantization, imaging geometry.
Image transforms: Concepts of Spatial domain and Frequency domain Images, Fourier, Inverse Fourier, Fast Fourier [Both 1D and 2D].

UNIT III
Image Enhancement: Enhance in the spatial domain, some basic grey level transformations, Histogram processing, Enhancement using arithmetic/logic operations, Basics of spatial filtering, Smoothing of spatial filters, Sharpening spatial filters.
Enhancement in frequency domain: Smoothing frequency domain filters, Sharpening frequency domain filters, Homomorphic filtering.

UNIT IV
Image Restoration: Model of the image Degradation / Restoration process, Noise models, Restoration in the presence of noise only-spatial filtering, Linear, Position- invariant degradation, Estimating the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering, Constrained least squares filtering, Restoration by SVD.
Image segmentation: Detection of discontinuities, Edge linking and boundary detection, Thresholding based segmentation, Region based segmentation.
Image Compression models: Error criteria, Lossy compression, Loss-less compression.

Reference Books :
1) Digital image processing 2nd edition by Rafael C.Gonzalez,Richard E.Woods(Pearson edition) .
2)Fundamentals of digital image processing by A.K.Jain(Pearson edition) .
3)Fundamentals of digital image processing by Catlemrene(Pearson edition).
4)Image processing analysis and machine vision by Milan Sonka,Vaclahlavac,Roger Boyle.
5)Digital signal processing by John G.Proakis, G.Manolakin “, 4/e Pearson Education

Course No: MCA14410EA
Course Title: Machine Learning

Unit I
Euclidean Distance Classifier, Mahalanobis Classifier, Basic Sequential Algorithm Scheme, K-Means Algorithm, Fuzzy C-Means Clustering, Clustering with Gaussian probability Density Function.

Unit II
Review and extension of support vector machines, Principal Component Analysis, Projection of data to an optimal plane, Fisher Linear discriminant analysis, multiple discriminant analysis, Dimensionality reduction.

Unit III
Biometrics, algorithms for face recognition, algorithms for finger print recognition, algorithms for iris recognition, algorithms for speech recognition.

Unit IV
Review and extension of inductive learning algorithms, Hypothesis testing and evaluation, review and extension of evolutionary algorithms, emerging topics in machine learning, project work in machine learning.

Text Books :

1. *Machine Learning* by Tom M. Mitchel, McGraw-Hill publication
2. *Pattern Classification* by Duda and Hart. John Wiley publication

Course No.MCA14411EO Open Elective (to be selected from outside department)

Course No.MCA14412EO Open Elective (to be selected from outside department)