MAHATMA GANDHI UNIVERSITY

PRIYADARSINI HILLS

KOTTAYAM-686560

RESTRUCTURED SYLLABUS (2012)

FOR

M Sc PROGRAM

IN

OR & CA
(Operations Research and Computer Application)

MAHATMA GANDHI UNIVERSITY
KOTTAYAM

REGULATIONS FOR CREDIT AND SEMESTER SYSTEM

Duration

The duration of PG program shall be 4 semesters. The duration of each semester shall be 90 working days. Odd semesters extend from June to October and even semesters from December to April. There will be one month semester breaks each in November and May. A student may be permitted to complete the program, on valid reasons, with in a period of 8 continuous semesters from the date of commencement of the first semester of the programs.

Program Structure

The program includes two types of courses namely Program Core courses and Program Elective Courses. In the first semester there will be five theory core courses. There will be four core courses and one practical course per semester for the second and third semesters. In the fourth semester the colleges can choose 4 electives that will suit the needs of students there, from the electives specified in the syllabus. There shall also be a Program Project with dissertation to be undertaken by all students. The total teaching work load of this program has to be shared 50:50 basis by the departments of Statistics and Computer Science.

Viva Voce

Comprehensive Viva-voce shall be conducted at the end semester of the program and it shall cover questions from all courses in the program.

Project work

Project work shall be completed by working outside the regular teaching hours under the supervision of a teacher in the concerned department. There should be an internal assessment and external assessment for the project work. The external evaluation of the Project work is followed by presentation of work including dissertation and Viva-Voce.

Assignments:

Every student shall submit one assignment as an internal component for every course. The Topic for the assignment shall be allotted within the 6th week of instruction.

Seminar Lectures

Every PG student shall deliver one seminar lecture as an internal component for every course. The seminar lecture is expected to train the students in self-study, collection of relevant matter from the books and Internet resources, editing, document writing, typing and presentation.

Class Tests

Every student shall undergo at least two class tests as an internal component for every course. The weighted average shall be taken for awarding the grade for class tests.

Examinations

There shall be University examination at the end of each semester. Project evaluation and Viva - Voce shall be conducted at the end of the program only. Project evaluation and Viva-Voce shall be conducted by one external examiner and one internal examiner.

There shall be one end-semester examination of 3 hours duration in each lecture based course and practical course. The examinations for core courses which computers are essential should be conducted in the computer lab supervised by an external examiner appointed by the university.

Evaluation and Grading

Evaluation: The evaluation scheme for each course shall contain two parts; (a) internal evaluation and (b) external evaluation. 25% weightage shall be given to internal evaluation and the remaining 75% to external evaluation and the ratio and weightage between internal and external is 1:3. Both internal and external evaluation shall be carried out using direct grading system.

Internal evaluation: The internal evaluation shall be based on predetermined transparent system involving periodic written tests, assignments, seminars and attendance in respect of theory courses and based on written tests, lab skill/records/viva and attendance in respect of practical courses. The weightage assigned to various components for internal evaluation is as follows.

Components of Internal Evaluation

Component Weightage

i) Assignment	1
ii) Seminar	2
iii) Attendance	1
iv) Two Test Papers	2

Letter Grade	Performance	Grade Point (G)	Grade Range
A	Excellent	4	3.50 to 4.00
B	Very Good	3	2.50 to 3.49
C	Good	2	1.50 to 2.49

D	Average	1	0.50 to 1.49
E	Poor	0	0.0 to 0.49

Grades for Attendance

% of attendance	Grade
>90%	A
Between 85 and 90	B
Between 80 and below 85	C
Between 75 and below 80	D
< 75	E

Assignment

Components	Weight
Punctuality	1
Review	1
Content	2
Conclusion	1
Reference	1

Seminar

Components	Weights
Area / Topic selected	1
Review / Reference	1
Content	2
Presentation	2
Conclusion	1

Practical – Internal

Components	Weights
Attendance	1
Laboratory Involvement	2
Written / Lab Test	2
Record	2
Viva-voce / Quiz	1

Practical – External

Components	Weights
Design and Coding	2
Output	2
Record	2
Viva-voce	1

To ensure transparency of the evaluation process, the internal assessment grade awarded to the students in each course in a semester shall be published on the notice board at least one week before the commencement of external examination. There shall not be any chance for improvement for internal grade.

A separate minimum of C Grade for internal and external are required for a pass for a course. For a pass in a program a separate minimum grade C is required for all the courses and must score a minimum CGPA of 1.50 or an overall grade of C and above. Each course is evaluated by assigning a letter grade (A, B, C, D or E) to that course by the method of direct grading. The internal (weightage =1) and external (weightage =3) components of a course are separately graded and then combined to get the grade of the course after taking into account their weightages.

A student who fails to secure a minimum grade for a pass in a course will be permitted to write the examination along with the next batch. There will be no supplementary examination.

Attendance
The minimum requirement of aggregate attendance during a semester for appearing for the end semester examination shall be 75%. A student who does not satisfy the requirements of attendance shall not be permitted to take the end Semester examinations.

Promotion
A student who registers for the end semester examination shall be promoted to the next semester.

Pattern of Questions
Questions shall be set to assess knowledge acquired, standard application of knowledge, application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge. The question setter shall ensure that questions covering all skills are set. He/She shall also submit a detailed scheme of evaluation along with the question paper. A question paper shall be a judicious mix of short answer type, short essay type / problem solving type and long essay type questions.

Weight : Different types of questions shall be given different weights to quantify their range as follows

Sl. No.	Type of Questions	Weight	Number of questions to be answered
1	Short Answer type questions (not exceeding 1 page)	1	5 out of 8
2	Short essay / problem solving type questions (not exceeding 2 pages)	2	5 out of 8
3	Long Essay Type questions	5	3 out of 6

CURRICULUM DESIGN ABSTRACT

Semester I

OR1SC1 – Probability, Statistics and Estimation
OR1SC2- Linear Programming and Simulation
OR1SC3- Distribution Theory
OR1CC1- Object Oriented Programming with C++
OR1CC2- Introduction to Operating Systems

Semester II

OR2SC1- Non Linear Programming
OR2SC2- Stochastic Processes
OR2CC1- Java Programming
OR2CC2- Data Base Management Systems
OR2CC3- Practical for OR1CC1 and OR2CC1

Semester III

OR3SC1- Replacement, Reliability and Network Models
OR3SC2- Inventory Theory and Dynamic Programming
OR3CC1- Software Engineering
OR3CC2- Visual Programming – ASP.NET
OR3CC3- Practical for OR3CC2

Semester IV

OR4SE--   Elective 1
OR4SE--   Elective 2
OR4CE--   Elective 3
OR4CE--   Elective 4
Project
Viva-voce

List of Electives Offered

1. SE01: Multiple Criteria and Decision Making
2. SE02: Advanced Reliability Theory
3. SE03: Advanced Game Theory
4. SE04: Logistic management
5. SE05: Data Analytics Using SPSS
6. SE06: Quality Control and Assurance
7. SE07: Supply Chain Management
8. CE01: Computer Networks

9. CE02: Web Programming Using Java Script and PHP
10. CE03: Software Testing and Quality Assurance
11. CE04: Data Mining and Warehousing
12. CE05: Graphics and Multimedia
13. CE06: 4GL and 5GL Systems

Mahatma Gandhi University, Kottayam, Kerala

Revised Syllabus of M.Sc. OR & CA Program
Under Credit and Semester System (CSS) 2012

Semester	Course	Teaching Hrs.		Credit	Total Credits
		Theory	Practicals		
I	OR1SC1	5	-	4	
	OR1SC2	5	-	4	
	OR1SC3	5	-	4	19
	OR1CC1	5	-	3	
	OR1CC2	5	-	4	
II	OR2SC1	5	-	4	
	OR2SC2	5	-	4	
	OR2CC1	5	-	4	19
	OR2CC2	5	-	4	
	OR2CC3	--	5	3	
III	OR3SC1	5	-	4	
	OR3SC2	5	-	4	
	OR3CC1	5	-	4	19
	OR3CC2	5	-	4	
	OR3CC3	--	5	3	
IV	OR4SE--	8	--	4	
	OR4SE--	7	--	4	
	OR4CE--	5	--	4	23
	OR4CE--	5	--	4	
	OR4CP	--	--	4	
	OR4CV	--	--	3	

Total credits for the programme-80 credits

Distribution of Workload

Department	Hours per Week				Total per week
	Semester1	Semester 2	Semester3	Semester 4	
Statistics	15	10	10	15	25
Comp. Science	10	15	15	10	25
Total	25	25	25	25	50

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SYLLABI OF COURSES OFFERED

OR1SC1 : PROBABILITY, STATISTICS AND ESTIMATION

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Pre-requisites: Calculus and Linear Algebra

Random experiments, Probability spaces, Elementary theorems, Conditional probabilities, Independent events.

Probabilistic modeling and random variables, cdf and pdf of random variables; standard discrete and continuous models.

MGF and Characteristic functions, multivariate distributions; transformations, Covariance and correlation, Random variable sequences, inequalities.

MMS, MLE and linear Estimation, multivariate normal distribution.
Sampling distribution; interval Estimation and Tests of hypotheses.

Books
1. Yannis Viniotis, "Probability and Random Processes for Electrical Engineers", Mc-Graw Hill International Edition, 1998
2. William R. Dillon and Mathew Goldstein**, "**Multivariate Analysis: Methods and applications", John Wiley and Sons, 1984

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OR1SC2 : LINEAR PROGRAMMING AND SIMULATION

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Convex sets, Extreme points, Convex and concave functions, properties - Linear Programming Problems: Formulation, Graphical solution, Fundamental properties of solutions - Simplex Method- Big-M Method - Two phase Method - Revised Simplex Method. Duality - Primal and Dual LPP problems – Properties - Dual Simplex Method - Sensitivity analysis - Discrete changes in cost vector in requirement vector – Coefficient-matrix

Parametric programming - Parameterization of cost vector and requirement vector. Transportation Problem - Methods of generating Basic Feasible solution – Optimality - Modi method - Assignment Problem - Routing problems - Traveling Salesman problem.

Integer programming Problem - Gomory's method - Branch and bound. method. Linear Fractional programming – Variable transformation method - Updated objective function method - Bounded variable technique.

Simulation - Nature and need for simulation - Monte Carlo method - generation of pseudo random numbers by mid-square method, congruence multiplier method - Test for randomness - generating random variables for known probability distributions - Uniform, Exponential, Erlangian, Poisson, Normal Distributions - Applications to simple problems in Operations Research.

Books:
1. F.S.Hillier & G.J. Lieberman, "Introduction to Mathematical programming", McGraw-Hill International Edition.
2. H.A.Taha- "Operations Research: An Introduction", 6thEdition, Macmillan

OR1SC3: DISTRIBUTION THEORY

Quick review of basic concepts in distribution theory:- generating functions and properties, pgf, mgf, cumulant generating function and characteristic functions, factorial moments and recurrence relation, Discrete Distributions:- Power series, Binomial, Geometric, Poisson, Negative binomial and Hyper geometric.

Continuous Distributions:- Rectangular, Exponential, Weibull, Beta, Gamma, Pareto, Normal, Lognormal, Cauchy, Laplace, Logistic.

Functions of Random variables and their distributions using transformations of variables techniques. Distributions of sums, products and ratios of independent r.v.s, compound, truncated and mixture distributions.

Sampling distributions:- Chi-square, t and F distributions (central only) Order statistics and their distributions:- joint and marginal distributions of sample median, range and mid – range (Exponential, Uniform, Logistic)

Text Books:

1. Hogg R.V and Craig A.T (1989) Introduction to Mathematical Statistics, Macmillian publishing company.
2. Arnold B.C, Balakrishnan N and Nagaraja H.N (1992) A first Course in Order Statistics.
3. Gupta S.C and Kapoor V.K (2000) Fundamentals of Mathematical Statistics, S. Chand & Co, New Delhi.

Reference Books:
1. Johnson N.L, Kotz S and Kemp A.W (1992) Univariate discrete distributions, John Wiley.
2. Johnson N.L, Kotz S and Balakrishnan N (1991) Continuous Univariate distributions I & II, John Wiley.
3. Kotz S, Balakrishnan N and Johnson N.L (2000) Continuous Multivariate distributions, John Wiley and sons.
4. Rohatgi V.K (1988) An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
5. Mukhopadhaya P (1996) Mathematical Statistics, The New Central Book Agency.

OR1CC1 - OBJECT ORIENTED PROGRAMMING WITH C++

Object Oriented Approach

Principles of object oriented programming, Benefits of object oriented programming application of object oriented programming.

Beginning with C++: Basic program construction, pre-processor directives, input & output statements, variables, basic data types, user data types

Operators-

Arithmetic operators, Assignment Operators, Logical operators, Conditional operators, Manipulators, Type conversion Control Statements, Looping Statements, Decision Making Statements.

Functions in C++

Function declaration, definition and calling a function, Passing arguments to functions

Returning values from functions, overloaded functions, Inline functions, Friend and Virtual functions

Classes and Objects

Structure of a Class, Defining a Class, C++ Objects, Objects as function arguments, Returning objects from functions.

Arrays

Defining arrays, Initializing arrays, Accessing array elements, Multidimensional Arrays, Passing arrays to functions, Array of objects, Array of Strings.

constructors and Destructors Parameterized constructors, Multiple constructors in a class, Constructors with default arguments, Dynamic Constructors, Copy Constructor, Destructors.

Operator Overloading

Defining Operator Overloading, Overloading Unary and Binary operators as member and friend functions, Manipulation of string using operators.

Inheritance

Derived and Base Class, Defining Derived Classes, Levels of Inheritance Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Public and Private Inheritance, Virtual base classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes.

Pointers: Address and Pointers, Pointers and Arrays, Pointer and Functions, Pointers and Strings, Memory management, Pointers to Objects, this pointer, pointers to pointers, virtual functions, Friend functions, Static functions, Polymorphism.

Managing Console I/O Operations, C++ Streams, C++ Stream classes, Unformatted I/O operations, Formatted I/O operations, Managing Output with manipulators.

Working with files

File stream classes, Opening and closing a file, file modes, File pointers and their manipulations, Sequential Input and output operations, Error handling during file operations, command line arguments, overloading the extraction and insertion operators,

Templates: Class templates, Function templates, Exception handling.

Reference:
1. Object Oriented programming in Turbo C++ - Robert Lafore (Galgotia Publications)
2. Object Oriented programming with C++ - E Balaguruswamy (Tata McGraw-Hill Limited)

OR1CC2 - INTRODUCTION TO OPERATING SYSTEMS

Fundamentals of Computers: Computer definition, Types of Computer, Logical Organization of a Digital Computer, Memory: Main Memory: RAM, ROM and Cache, Secondary Memory: Magnetic type, Floppy disk, Hard disk, Compact disk, Input devices, Output devices, Operating system: Definition, functions of an operating system, GUI and CUI
Introduction: What is an operating system, History of operating systems, Operating system concepts, System calls, **Processes:** Introduction to process, Inter process communication

Input/output: Principles of I/O Hardware, Principles of I/O software, Deadlocks Block devices, RAM Disks, Clocks, Terminals, Interrupts and exceptions, System calls, Managing I/O Devices, Disk Caches.

Memory Management: Basic Memory Management swapping, Virtual memory, Page replacement algorithms, Design issues for paging systems, Segmentation.

File Systems: Files, Directory, File systems implementation, Security, Protection Mechanisms, File system layout, Disk Data Structures, Internal representation of files, Buffer Cache.
Multiprocessor Systems: Problem of Multiprocessor systems, Solutions with master and slave processors, Solution with semaphores,

Prescribed Text
1. Operating systems, Design and Implementation, Author: Andrew S. Tarenbam and Albert Woodhll (EEE)
2. Silberschatz, Galvin, Gagne: Operating System Concepts,(John Wiley & Sons, Inc.)

OR2SC1 - NON LINEAR PROGRAMMING

Unimodal and Convex functions, Hessian Matrix, Positive definite and Negative definite matrices - One dimensional optimization - Newton's Method- Fibonacci Method- Golden Section Method - Quadratic Interpolation Method.

Multi-dimensional unconstrained optimization - Univariate Method - Neider and Meads Method, Conjugate Directions and Conjugate Gradient – Fletcher-Reeves Method – Davidson-Fletcher- Powell Method.

Multi dimensional constrained optimization - Lagrange multiplier method - Kuhn-Tucker Conditions - Modified Hookes and Jeeves Method - Interior and Exterior Penalty Function Method.

Quadratic Programming – Wolfe's Method - Beales Method - Geometric Programming Polynomials - Calculus Method - Arithmetic Geometric Inequality Method.

Separable programming - Piecewise linear Approximation Method - Case studies in Non linear Programming.

Books:
1. S.S. Rao, "Optimization: Theory and Applications" 2nd Edition, Wiley Eastern
2. Bazaara, Shetty and Sherali "Non-linear Programming: Theory and Algorithms", Wiley

OR2SC2 - STOCHASTIC PROCESSES

Concept of a stochastic process, the Markov property, Chapman-Kolmogorov equations, the method of spectral decomposition, the method of generating functions stationary distribution, Markov chain with rewards, Absorbing Markov chain, the number of transitions, Multi-chain models

Classification of states, recurrence, transience and class-properties, criterion for transience, ergodicity and stationary distribution, applications, Branching process, the generating function, moments, limiting properties, total population size.

The Poisson process, the counting process, the point process, the poisson process definitions, additive process, properties, generalizations of poisson process, compound poisson process, pure birth process, Yule-furry process, pure death process, linear death process, birth and death process.

Random walk model, simple random walk, first passage times in a random walk, gambler's ruin problem, probability of ultimate ruin, duration of a game, the reflection principle and ballot problem, applications for the ballot problem.

Renewal process, discrete renewal process, renewal function, modified renewal function, renewal process in continuous time, asymptotic properties, residual life time, modified renewal process, renewal reward process.

Text book: Bhat BR (2000) Stochastic models, Analysis and Applications. New Age International (P) Limited, Publishers Bangalore.

Reference:
1. Karlin, S and Taylor H. (1975) A first course in Stochastic processes
2. Ross Sheldon M. (1983) Stochastic Processes. J. Wiley N.Y.
3. Ross Sheldon M. (1989) Introduction to Probability Models. Academic Press. N.Y.
4. J. Medhi: Stochastic Process: Second Edition 1994 New age International

OR2CC1 - JAVA PROGAMMING

<u>Overview of java</u>
Introduction to Java language, data types, operators& control statements, arrays, introduction to classes- class fundamentals, consructors, overloading constructers, static, finalize, final& Garbage collection, interfaces. Inheritance- multilevel hierarchy and method overriding , Abstract classes and super classes.

Introduction to pakages, importing pakages, interfases, implementing & applying interfases, exception handling fundamentals& exception types, multiple catch closes and nested try, throw, throws, finally, Java, built in exception, multithreaded programming, Java thread model, thread priorities, synchronization and messaging, creating a thread – implementing a thread, extending thread, multithreading,exploring Java packages, Java lang, simple type wrappers- number, integer, long, float, double, Boolean, Java io, Java AWT(window fundamentals- component, container, panel,frame, canvas, layout manegers- flow layout, borderlayout, grid layout, standard controls- button, labels, choice, check box, text, lists, menu bars and menus, dialog boxes, image& graphics), Java string, Java util.

Intoduction to HTML& JAVA Applets
Applets, Applet classes, elements of HTML- title,head, body,Meta data, links,tablets, controls from, button, select, label, input- including an applet, including an image.

Text Books:

1. Complete Reference JAVA2- Patrick Naughton
2. HTML, DHTML,Java Script, Perl CGI-Ivan Bayross

OR2CC2 -DATABASE MANAGEMENT SYSTEM(DBMS)

Introduction: purpose of dB Systems. View of Data. Data Models. Database Language, Transaction Management, Storage Management, Database Admission, Database users.
E-R Model: Basic Concepts, Design Issues, Mapping Constraints, Keys, E-R Diagrams, Weak Entity Sets, Extended ER Features, Design of an E-R dB Schema, Reduction of man E-R Schema to Tables.

Relational Model: Structure of Relational dB, Relational Algebra, Tuple Relational Relational Calculus, Extended Relational- Algebra, Operation, Modification of the dB.
SQL: Basic Structure, Set Operations, Aggregate functions, Null Values, Nested Sub queries, Derived Relations, Views, Modification of the DB, Joined Relations, Data Definition Language.

Integrity Constraints, Domain Constraints, Referential Integrity, Assertion, Triggers, Functional Dependencies, Relational Db Design, Decomposition, Normalisation IN, 2N, 3N, Domain- key Normal Form.

Object Oriented dB,, New dB Applications, Object Oriented Data Model, Object Oriented Languages persistent Programming Language, persistent C+ + Systems.

Orient Relational Db Nested Relations, Complex types & Object Orientation, Querying with Complex Types, Creation of Complex values & Objects, Comparison of Object- Oriented & Object- Relational dB.

Parallel dB

Introduction I/O Parallelism, Intraquery parallelism, Distributed dB, Distributed data storage, Network Transparency, Distributed Query processing, Distributed Transaction Model, Decision. Support System, Data Analysis, Data Mining, Data Warehousing, Multimedia dB

Text Book:
1. Database System Concepts Author: Abraham Silberschatz, Henry F.Korth, S. Sudarshan.(Mc Graw Hill Publications)

OR3SC1 - REPLACEMENT, RELIABILITY AND NETWORK MODELS

Single Commodity Static flows - the basic maximum flow problem - Variations of the maximum flow problem - Flows in graphs with gains – Multi-commodity flows.

Network simplex method - Network approach to transportation problems - critical path method - Resource leveling - Time/cost trade off – Compression and decompression - PERT network - probabilistic aspect of PERT - practical problems - Formulation and solution.

Equipment replacement policies in deterministic and Stochastic cases - replacement models for unbounded horizons and uncertain cost-replacement in anticipation of failure -group replacement policy.

Basic concepts - Failure density - Failure rate analysis-hazard functions - hazard models - Normal, Exponential, Poisson, Hyper - exponential, Erlang, gamma and Weibull distributions – Reliability of systems - Series parallel, K-out-of-n-system- perfect and imperfect switches.

Simulation and Reliability Predictions - Maintenance- preventive and corrective –

Maintainability Equation – Availability - Maintainability trade-off - Reliability improvement

and allocation.

Books:
1. Kennington. J and Helgason R,"Algorithms for Network Programming", 1st Edition 1981, John Wiley.
2. Ford, L.R & Fulkerson, D.R, "Flows in Networks", Princeton University Press

OR3SC2 - INVENTORY THEORY AND DYNAMIC PROGRAMMING

Objective: To learn how to control inventory costs and applications of Dynamic

programming

Pre-requisite: Knowledge of Calculus

Inventory control - Different variables involved. Single item deterministic- Economic lot size

models with uniform rate, finite & infinite production rates, with or without shortage-

Multiitem models with one constant.

Deterministic models with price-breaks- AII units discount model and incremental discount

model. Probabilistic single period profit maximization models with uniform demand,

instantaneous demand, with or without setup cost.

Dynamic inventory models, Multi-echelon problems. Integrated approach to production

inventory and to maintenance problems. Feed back control in inventory management.

Dynamic programming - Bellman's principle of optimality, characteristics of a dynamic

programming problem. Solutions of simple classical problems with single constraint.

Solution to Linear Programming problem and Integer Programming problem using Dynamic

programming approach.

Applications of dynamic programming-The shortest path through a network, production

planning, inventory problems, investment planning, cargo loading and Knapsack problems.

1. Starr and Miller, "Inventory control Theory and Practice", 1st Edition, 1985, PHI
2. Taha H.A, "Operations Research: An Introduction", 6th Edition, 1996, Macmillan.
3. Robert E. Larson and John L.Casti, "Principles of Dynamic Programming", Vol-I and II, 1st edition, 1982, Marcel Dekker.

OR3CC1 - SOFTWARE ENGINEERING, UML & CASE STUDY

Computer – based System Engineering, Emergent System Properties, System & Other environment, System Modelling, The System Engineering process, System Procurement, Software Process, Software Process Models, Process iteration, Software Specification, Software Design & implementation, Software Validation, Evolution & Automated Process Support, Project Management, Management Activities, Project Planning, Project Scheduling, Risk Management.

Software Requirement

Functional & Non-functional requirement, User requirement, System requirement, Software requirement document.

Requirements engineering process. Feasibility Studies, Requirement elicitation & Analysis, Requirement Validation & Management System Models, Context Models, Behavioural Models, Data Models, Object

Architectural Design: System Structuring, Control Models, Modular Decomposition, Domain-specific architectures, Object & Object Classes, An object oriented design process, Design evolution.

Verification & Validation: Verification & Validation Planning, S/W inspections, Automated Static Analysis, Defect testing, Integration testing, Object-Oriented testing, Testing workbenches, Reliability Validation.

 Management: Limits of thinking, Group working, Cheering & Keeping people, People Capability Maturity Model, Productivity, Estimation techniques, Algorithmic cost modelling, Project duration & Staffing, Quality assurance & Standard Quality Planning, Quality Control, Process & Product Quality, Process analysis & Modelling.

UML: UML Views, Static View, Use Case view, Interaction View, State Machine View, Activity View, Physical View, Model Management View, Extensibility Construction, Connections among views.

Text Book:

1. Software Engineering 6th Edition Author: Ian Sommeaville (Pearson Education)
2. The UML Reference Manual. Author: Ivar Jacobson Grady Booch (Addision Wesley)

OR3CC2 - VISUAL PROGRAMMING - ASP.NET

HTML Basics: Introduction to Internet, Applications, Web designing, web browser, web pages, home page, web site, web servers, www. Concepts of hypertext, hypermedia, versions of HTML, elements of HTML, syntax, sections of HTML, building & executing html documents, Various tags of HTML: Headings & Title, Text-level elements, Changing Colors font, size using FONT> Tag, Text alignment & paragraph Creating links with <A Href> tag, Inserting image using <IMG> tag, Creating Table with <TABLE> tag, rowspan, colspan attributes. <FRAMESET> & <FRAME> tag, <FORM> tag, creating text boxes, buttons, checkboxes, radio buttons, hidden control, password, lists & dropdown list, textarea. Submitting a form, get & post method. ASP & HTML forms.

ASP.NET Controls: Overview of dynamic web page, introduction & features of ASP.NET, understanding ASP.NET controls, applications, web servers, installation of IIS. Web forms, web form controls, server controls, client controls, adding controls to web form, buttons, text box, labels, checkbox, radio buttons, list box. Adding controls at runtime,

Running a web application, creating a multiform web project, Form validation: client side and server side validation, Validation controls: required field comparison range, Calendar control, Ad rotator control, Internet Explorer control.

ADO.NET: Overview of ADO.NET, from ADO to ADO.NET, ADO.NET architecture, Accessing data using data adapters and datasets, using command and data reader, binding data to data bind controls, displaying data in data grid.

Web Services: Introduction, State management, view state, session state,

application state, service description language, building & consuming a web service. Web application development.

References:
1. The Completer Reference ASP.NET – Mathew Macdonald (TMH)
2. Professional ASP.NET – Wrox publication
3. VB.NET Programming Black Book – Steven Holzner (Dreamtech pub.)
4. Introduction to .NET framework – Wrox publication.
5. ASP.NET Unleashed - bpb publication.
6. Learn HTML in a weekend – Steven E. Callihan (TMH)
7. Using HTML – Lee Anne Philips (PHI)

SE01 - MULTIPLE CRITERIA DECISION MAKING

Pre-requisite: Operations Research methods, Linear Programming and Non-linear Programming.

Multiple Criteria Decision Making: Basic concepts, static and dynamic optimization, problem formulation, pareto optimality, efficient set, classification of methods.

Utility function method, weighting methods, Graphical Method using weights, Bounded Objective Method, Lexicographic Method, Multi- objective simplex methods by Zelency and Philips.

Linear Goal Programming- deviation variables, Pre-emptive priorities, Graphical Method, Modified Simplex Method, Branch and Bound Method and Cutting Plane Method for integer Goal programming models, Non-Linear Goal Programming- Simplex based Method- Pattern Search Method.

Group Decision Making, Dynamic Programming approach to multi objective Network Problems, Multi objective transportation problem, Genetic Algorithms. Real-time problems based on student background.

Books:
1. Ralph E. Steur, "Multiple Criteria Optimization Theory, Computation and Application", 1985, John Wiley.
2. J.P. Ignizio, "Goal Programming and Extensions", 1976, Heath Lexington Books.

SE02 –ADVANCED RELIABILITY THEORY

Reliability concepts and measures, components and systems, coherent systems, reliability of coherent systems, series and parallel systems, K out of N system and its reliability, bounds on system reliability.

Life distributions, survival function, hazard function, residual life time, survival fonction of residual life time, mean residual life function, one-one correspondence of these fuctions, common life distributions, exponential, weibull, gamma, makeham, pareto, releigh, lognormal, proportional hasard models and their characteristics.

Notion of aging, IFR, IFRA, DMRC, NBU, NBUE classes and their rules, exponential distribution and its aging property, aging properties of common life distributions, classes under formation of coherent structures, convolutions and mixtures of these cases.

Test for exponentiability against positive aging based time on test- statistics, Hollender Proschan statistics, Deshpande (IFRA) statistics, unbiasdness and symptotic toa symptotic relative efficiency.

Type –1, Type-11 and random censuring schemes, likelihood fuctions based on these sampling schemes. Estimation and testing based on these schemes for various parametric models. Kaplan- Myres estimates of the distribution functon.

References:
1. Barlow and proschan: Statistical theory of reliability and life testing.
2. Lawles: Statistical models and methods for lift time data.
3. Sinha, S.K: Reliability and life testing
4. Zachs: Introduction to reliability analysis, probability models and statistical methods.

SE03 - ADVANCED GAME THEORY

Introducton to games, the fundamental theorem of rectangular games, the solution of rectangular games (chapter 1,2& 3 of text)

A method of approximating the value of games in extensive from (chapter 4&5 of text 1)

Games in extensive from-general theory, games with infinitely many strategies (chapter 6&7 of text 1)

The Fundamental theorem of continuous games, separable games (chapter 10&11 of text 1)

Solutions of n- person games, Games with zero sum restrictions (chapter 10&17 of text 1)

Text Book:

1. J.C.C. Mckinsey: Introduction to the theory of games, McGraw hill

REFERENCE:
1. Game Theory: Leon A. Petrosjan and Nikoly. A Zenkovirz, World Scientific
2. Introduction to Game Theory, peter Morris, Springer Verlag
3. Game Theory: Mathematical models of conflict, A J. Jones, Horwood Publishing Ltd, England
4. An Introduction to Linear Programming and Game Theory, Paul.R. thic, John Wiley and Sons.

SE04 - LOGISTICS MANAGEMENT

Logistics - Definition – concepts- activities - functions.

Transportation - warehousing, order processing, information handling and procurement.

Materials management functions and control, inventory - Management in logistics system, inventory decision-making, MRP, MRP in systems, multi-echelons.

Distribution Management, Outbound logistics, Facility location, Classical location problems, Strategic planning models for location analysis, location models, multi objective analysis of location models, Overview Of Vehicle Routing Problems, Integrated Models Of Location And Routing, direct shipment, warehousing, cross-docking; push vs. pull systems.

Transportation decisions (mode, selection, fleet size), market channel structure. Logistics Customer Service, Modelling logistics systems, Simulation of logistic systems, cost effective distribution strategies, Value of information in logistics, E- logistics, risk-pooling effect, International and global issues in logistics, Integrated functional activities in logistics, Role of government in international logistics, Principal characteristics of logistics in various countries and regions.

Logistics in different industries: Third party, and fourth party logistics, Airline Schedule Planning, Railway Networks, Postal services, the maritime industries, health

Books
1. Martin Christopher, "Logistics and Supply Chain Management", Prentice Hall, 1998.
2. David. Bloomberg, Stephen LeMay, Joe Hanna, "Logistics", Prentice Hall 2002

SE05 - DATA ANALYTICS using SPSS

General Linear Regression Model, Estimation for β, Error Estimation, Residual Analysis. Tests of significance - ANOVA, 't' test, Forward, Backward, Sequential, Stepwise, All possible subsets, Dummy Regression, Logistic Regression, Multi-collinearity.

Discriminant Analysis-Two group problem, Variable contribution, Violation of assumptions, Discrete and Logistic Discrimination, The k-group problem, multiple groups, Interpretation of Multiple group Discriminant Analysis solutions.

Principal Component Analysis-Extracting Principal Components, Graphing of Principal Components, Some sampling Distribution results, Component scores, Large sample Inferences, Monitoring Quality with principal Components.

Factor Analysis-Orthogonal Factor Model, Communalities, Factor Solutions and rotation.

Books
1. Richard A. Johnson and Dean W. Wichern, "Applied Multivariate Statistical Analysis", fifth Edition, Pearson Education, 2002.
2. William R. Dillon and Mathew Goldstein, "Multivariate Analysis: Methods and applications", John Wiley and Sons, 1984.

SE06 - QUALITY CONTROL AND ASSURANCE

Introduction to Quality Control- meaning of Quality and its improvement – Statistical methods for Quality improvement – Total Quality Management - methods and philosophy of statistical process control.

Control Charts for variables - control chart for X and R - Control chart for X and S - Control Charts for attributes - Control Charts for fraction defective- Control Chart for conformities- Control Chart for non - conformities.

Fundamentals of experimental design– factorial experiments for process design and improvement - fractional factorial experiments for process design and improvement. The Acceptance Sampling Problem- Single Sampling plans for attributes- double, multiple and sequential sampling- AOQL plans.

Taguchi principle - Taguchi approach to parameter design- improving robust parameter design-ISO9000 standard history-ISO9000 series (what, why and how) – elements of ISO9000 standards.

Books:
1. Montgomery, Douglas C. "Introduction to Statistical Quality Control", 3rd edition, 1996, John Wiley.
2. Juran J.M. and Gryna F.M. "Juran's Quality Control Handbook", 4th edition, 1988, McGraw Hill.

SE07 - SUPPLY CHAIN MANAGEMENT

Fundamentals of Supply Chain Management, Supply chain networks, Integrated supply chain planning, Decision phases in s supply chain, Supply chain models and modeling systems.

Supply chain planning: Strategic, operational and tactical, Supply chain strategies, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain.

Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply, Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability. Supply Chain Inventory Management.

Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multi-echelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models. Role of transportation in a supply chain: direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Decisions in a supply chain, Mathematical Foundations of distribution management, Supply chain facility layout and capacity planning.

Strategic Cost Management in Supply Chain. The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction

Books

1. David Simchi-Levi, Philip Kaminsky, and Edith Simchi-Levi, "Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies", 2nd Edition, McGraw-Hill, 2003.
2. Christopher, M. "Logistics and Supply Chain Management: Strategies for Reducing Costs and Improving Services". London: Financial Times/Pitman.

CE01 - COMPUTER NETWORKS

Introduction to networks – topology – LAN, MAN, WAN, Client-server model concepts – transmission media – guided, unguided – transmission impairments. Digital & analog signals, Concepts of ISO/OSI reference model (detailed study not required), TCP/IP reference model – comparison.

Network Layer – Internet addressing – IP address – Class A, Class B, Class C ;Loop back address IPV6– subnetting – subnet masking – address mapping – ARP, RARP, DHCP, ICMP, IGMP – DNS – networking & internetworking devices – NIC, hub, switch, bridge, router, gateway .

Routing – routing algorithms – static & dynamic – shortest path routing, flooding, distance vector routing, link state routing.
Transport layer protocols – TCP, UDP, SCTP – protocols, uses, services.

Application layer – email – SMTP, POP, IMAP, FTP, HTTP, TELNET – CSMA, CSMA/ CD – Ethernet – gigabit networks, wireless network – wireless LAN, Bluetooth, GSM – 3G, introduction to 4G – entertainment networks – satellite TV, DTH technology, VOD services, VoIP services.

Web security – SSL, TLS, SET – cryptography – encryption, RSA , DES – Digital signature – hacking – ethical hacking – uses – phishing – spoofing – cyber forensics.

References
1. Data communications & Networking, Behrouz A Forouzan, IV edition
2. Computer Networks, Andrew S Tanenbaum, V edition.
3. Data Communication by William Stallings

CE02 – WEB PROGRAMMING USING JAVA SCRIPT AND PHP

Java Script-

The advantages of Java Script, Writing Java Script in to HTML, Basic Programming Techniques, Data Types, Variables, Operators, Decision Control Statements, Loop Control Statements, Functions, Arrays, Dialog Boxes, Java Script Documents Object Model, The Window Object, Location Object, History Object, The Document Object, Link and Anchor Objects, Image and Area Objects, The Form Object, Text- Related Objects: Text Object, Password Object, Text area Object, Hidden Object.

Button Objects: Button Object, Submit Object, Reset Object, Checkbox Object, Radio Object, and Select Object, string Object, Date Object.

DHTML- Cascading Style Sheets

Font Attributes, Colour and Background Attributes, Text Attributes, Border Attributes, Margin Related Attributes, List Attributes, Class

Using the <SPAN>… </SPAN> tag, External style Sheets Using the <DIV> …….<DIV>tag, Using the <LAYER>……… </LAYER> tag.

VBScript-Data Types, Variables, Operaters, Decision Control Statements. Loop, Control Statements, Functions, Arrays, Dialog Boxes.

Introduction to MySql- features and advantages-data types-operators-DDL-DCL-DML commands-types and levels of privileges-Creating tables-adding data-displaying contents-update-definition-manipulating tables-aggregate functions-subqueries-cursors and control structures-connecting Mysql with php.

Introduction to php-advantages-features-php syntax-variables-variable variables-php tags and styles-data types, variables, operators-type casting-array operators-control structures-Arrays-sorting arrays-file functions-string functions-functions in php.

Object oriented-concepts in php- classes, objects,inheritance,overloading and overriding-interfaces- exception handling techniques- cookies and session control. Installing and configuring Apache & MySql.

Text Books

1) Web Enabled Commercial Application Development Using…. HTML, DHTML, Java Script, Perl CGI- Ivan Bayross(BPB Publications)
2) Luke Welling & Laura Thomson ,PHP and MYSQL Web Development –Third Edition,Pearson Education
    3) Begining PHP5,Apache ,MYSQL web development-2005 edition-wrox publication

CE03 : SOFTWARE TESTING AND QUALITY ASSURANCE

SOFTWARE TESTING TECHNIQUES: Software Testing Fundamentals, Psychology of testing - Testing economics, White box testing techniques, Black box testing techniques - Weyuker's adequacy axioms.

SOFTWARE TESTING STRATEGIES: SDLC and Testing, Strategic Approach to Software Testing, Unit Testing, Integration Testing, validation Testing, System Testing, The art of debugging, Testing Maturity Models TMM and TMMI.

TESTING OBJECT ORIENTED SOFTWARE: Challenges - Differences from testing non-OO Software - Class testing strategies - Class Modality - State-based Testing - Message Sequence Specification, Difference between design based and code testing, Interdependency Testing Models in OO software.

Introduction to Quality and Quality Control - Evolution of Quality Control - Quality assurance - Quality circles and Quality improvement teams - Benefits of Quality control- Quality and Reliability - Quality costs - Measuring Quality costs - Total Quality Management, Quality Metric Models - McCall s model, FURPS model and ISO 9126 model.

CMM Model and its stages - Introduction to PCMM, CMMI and Six Sigma concepts. Introduction to ISO 9000, ISO 9000 Part3 for software Quality.

TEXT BOOKS
1. Roger S. Pressman, Software Engineering. A Practitioners Approach , Fifth Edition, 2001
2. William E.Perry, *" Effective Methods for Software Testing (2nd Edition) "*, John Wiley & Sons, 2000.
3. Robert V.Binder, *" Testing Object-Oriented Systems: Models Patterns and Tools "*, Addison Wesley, 2000.
4.Rajneesh Kapur, Getting ISO 9000 in a software organization , By BPB Publications.
5.Allan C Gillies, Software Quality theory and management , Thompson learning.
6.Stephen H. Kan, Metrics and Models in Software Quality Engineering , Pearson Education.
REFERENCES
  1. Glenford J.Myers, *"The Art of Software Testing "*, John Wiley & Sons, 1997.

CE04: DATA MINING AND WAREHOUSING

Evolution of database technology Introduction to data warehousing and data mining - Differences between operational databases and data warehouses.

Data warehouse architecture & design, Hardware & Operational design, Tuning and testing.

Data mining: Data preprocessing, data mining primitives, languages & system architectures, concept description: characterization and comparison, Mining association rules, classification and prediction.

Cluster analysis, Applications and trends in data mining.

Introduction to Microsoft s OLE DB for Data mining, DBMiner.

TEXTBOOKS
1. Sam Anahory and Dennis Murray, Data Warehousing in the real world , Addison Wesley 1997.
2. Jiawei Han et, al., Data Mining: Concepts and Techniques , Morgan Kaufmaan series , 2000.
REFERENCES
1. Usama M.Fayyad, Gregory Piatetsky - Shapiro, Padhrai Smyth and Ramasamy Uthurusamy,
"Advances in Knowledge Discovery and Data Mining", The M.I.T Press, 1996.
2. Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", John Wiley & Sons Inc., 1998.
3. Sean Kelly, "Data Warehousing in Action", John Wiley & Sons Inc., 1997

CE05 - GRAPHICS AND MULTIMEDIA

Graphics: Display Devices – Interactive Input devices – Graphics – Bresenham's Line Drawing Algorithm – DDA Algorithm – Comparison of Line Drawing Algorithms – Circle Drawing Algorithm.

Two dimensional transformations – Scan Conversion Algorithms – Windowing – Clipping – Segmenting – Viewport Transformations.

Three dimensional transformations – Hidden Surface Elimination Algorithms – Multimedia: Multimedia Architecture – Multimedia File formats – Compression – Image Compression – Video Compression – Audio Compression – DVI Technology.

Video & Audio Codecs – Virtual Reality – GUI Design - Playback – Hypermedia Linking and Embedding.

Books
1. Donald Hearn, M. Pauline Baker, "Computer Graphics", 1992, PHI.
2. Fred T. Hofstterm, "Multimedia Literacy", 1995, Mc Graw Hill.

CE06 - 4GL AND 5GL SYSTEMS

Pre-requisites: Database Management Systems

4GL systems- Scope, Application and Method of Evaluation.
Program development with intelligent workstations- Distributed information services and Management - PC to mainframe links.

SQL dialects- Embedded SQL- QUEL- QBE Paradox QBE - Constraints. 4GL systems, Software development components and building blocks.

Data Communication Interface - Query Languages. Package Concepts and Componentsforms, report writers, utilities- Front end products.

Database programming - Case Studies in 4GL and 5GL.

Books
1. Simon Holloway, "Fourth Generation Systems: Their Scope and Method of Evaluation", 1985, Chapman and Hall
2. Dimitris N Chorafas, "Fourth and Fifth generation Programming Languages", 1986, Addison Wesley