

Purbanchal University

Master in Computer Application (MCA) (Magh, 2070)

Year: II

Semester: III

Subject Code	Subject Name	Credit	Lecture	Tutorial	Lab	Total
MCA211	Optimization Technique	3	3	1	-	4
MCA212	Design & Analysis of Algorithm	3	3	1	-	4
MCA213	Software Project Management	3	3	1	-	4
MCA214	Marketing Management	3	3	1	-	4
MCA215	Elective-II	3				
MCA216	Project-II	3	-	-	4	4
Total Credits		18				

Electives for MCA215 (Elective-II):

Name of Elective-II	Lecture	Tutorial	Lab	Total
• e-Governance	3	1	-	4
• Remote Sensing	3	1	2	6
• Data Visualization	3	1	2	6
• Network Security & Cryptography	3	1	2	6
• Mobile Computing & WAP-Based Application	3	1	2	6
• Multimedia System	3	1	2	6

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Optimization Technique

Semester: III
Credit Hr: 3

Full Marks: 100
Internal: 20
Final Exam: 80

Course Objective: After completing this subject, students will be able to apply the concept of linear programming, duality theory, assignment method, queuing theory, etc. to solve real life business problems.

Course Contents:

1. **The Linear Programming Problem** [7 Hrs]
Introduction; Formulation of linear programming problem; Benefits and limitations of linear programming; Graphical solutions to linear programming problem; Standard LP form and its basic solutions; Simplex method; Artificial variable techniques: Two-phase method, Big-M method.
2. **Duality in Linear Programming** [6 Hrs]
Concept of duality; Fundamental properties of duality; duality and simplex method; Dual-simplex method.
3. **Transportation Problem** [7 Hrs]
Introduction; Mathematical formulation of transportation model; Transportation problem as a linear programming problem; Finding initial basic feasible solutions: North-West corner, Least-cost method, and Vogel's approximation methods; Moving towards optimality; Degeneracy.
4. **Assignment Problem** [7 Hrs]
Introduction; Mathematical formulation of assignment model; Solution of assignment problem; Multiple optimal solutions; Unbalanced assignment problem; Hungarian algorithm; Maximization in assignment model; Restrictions on assignment.
5. **Integer Linear Programming** [7 Hrs]
Introduction; Gomory's All - I.P.P. method; Construction of Gomory's constraints; Fractional Cut method - All integer; Fractional Cut method - Mixed integer; Branch and Bound method.
6. **Queuing Theory** [6 Hrs]
Introduction; Definition of terms in queuing model; Single infinite channels; Production model: Multi-channel service infinite queue, Finite population model.
7. **Project Management** [5 Hrs]
Introduction to CPM and PERT; Basic differences between CPM and PERT; CPM/PERT network components and precedence relationship; Critical path analysis: Forward pass method, Backward pass method.

Reference Books:

1. "Operation Research", Kanti Swarup, P.K. Gupta, Man Mohan, Sultan Chand & Sons
2. "Operation Research – An Introduction", Hamdy A. Taha, Prentice Hall of India
3. "Operation Research – Theory & Applications", J. K. Sharma, Macmillan

Question Pattern:

- Group-A: Long Answer-Type Questions: (Attempt 2 out of 3) [2×16=32]
Group-B: Short Answer-Type Questions: (Attempt 6 out of 8) [6×8=48]

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Design & Analysis of Algorithm

Semester: III
Credit Hr: 3

Full Marks: 100
Internal: 20
Final Exam: 80

Course Objective: After completing this subject, students will be able to explore techniques for the design and analysis of algorithms. This course covers the topics such as asymptotic analysis, divide and conquer, greedy, dynamic, backtracking, number theory and introduction to NP-Complete problems.

Course Contents:

- 1. Introduction:** Definition of an algorithm, characteristics of an algorithm, asymptotic notations, RAM model, common mathematical functions, introduction to algorithm design and analysis. **[3 Hrs]**
- 2. Elementary Data Structures:** Stacks, queues, tree, binary tree, linked list, graph, graph representations. **[4 Hrs]**
- 3. Divide and Conquer:** The general method, binary search, finding the maximum and minimum, merge sort, quick sort, selection in worst case linear time. **[7 Hrs]**
- 4. The Greedy Method:** The general method, Knapsack problem, job sequencing, minimum cost spanning tree: Prim's algorithm, Kruskal algorithm, single source shortest paths. **[6 Hrs]**
- 5. Dynamic Programming:** The general method, 0/1 Knapsack problem, matrix chain multiplication, multistage graph, all pairs shortest paths, Traveling Salesman Problem. **[7 Hrs]**
- 6. Backtracking:** The general method, the 8-Queens problem, graph coloring, Knapsack problem. **[6 Hrs]**
- 7. Number-Theoretic Algorithms:** Elementary number-theoretic notions, greatest common divisor, modular arithmetic, solving modular linear equations, the Chinese remainder theorem. **[6 Hrs]**
- 8. NP-Completeness:** Introduction to NP-complete problems, classes P and NP, Cook's theorem, coping intractability by approximation algorithms. **[6 Hrs]**

Reference Books:

- "Introduction to Algorithms", Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Prentice Hall of India
- "Fundamental of Computer Algorithms", Ellis Horowitz, Sartaj Sahani, Sanguthevar Rajasekaran, Galgotia
- "Algorithms in C++", R. Sedgewick, Addison-Wesley

Question Pattern:

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Software Project Management

Semester: III
Credit Hr: 3

Full Marks: 100
Internal: 20
Final Exam: 80

Course Objective: After accomplishing this course, students will be able to apply software project management techniques.

Course Contents:

- 1. Introduction to Software Project Management [4 Hrs]**
Introduction, projects and software projects, problems with software projects, project phases and life cycle, management and management control, stakeholders, an overview of project planning.
- 2. Project Analysis [8 Hrs]**
Introduction, strategic assessment, technical assessment, economic analysis: Present worth, future worth, annual worth, internal rate of return (IRR) method, benefit-cost ratio analysis, including uniform gradient cash flow and comparison of mutually exclusive alternatives.
- 3. Project Planning and Scheduling [8 Hrs]**
Objectives of activity planning, Work breakdown structure, Bar chart, Network planning model: Critical path method (CPM), Program evaluation and review technique (PERT), Precedence diagramming method (PDM), Shortening project duration, Identifying critical activities.
- 4. Risk Management [3 Hrs]**
Introduction, nature and identification of risk, risk analysis, evaluation of risk to the schedule using Z-values.
- 5. Resource Allocation [3 Hrs]**
Identifying resource requirements, resource allocation, resource smoothing and resource balancing.
- 6. Monitoring and Control [4 Hrs]**
Introduction, collecting data, visualizing progress, cost monitoring, earned value analysis, project control.
- 7. Managing Contracts [3 Hrs]**
Introduction, types of contract, negotiating a software contract, principles of software contract management.
- 8. Organization Behavior and Personnel Management [5 Hrs]**
Understanding behavior, recruitment, selection, training, motivation and motivation theories, leadership and leadership styles, becoming a team, working in groups, decision making, organizational structures.
- 9. Software Quality Management [4 Hrs]**
Introduction, software reliability, software quality management system, ISO 9000.
- 10. Software Configuration Management [3 Hrs]**
Introduction, need, basic configuration, management function, baseline, configuration management responsibilities.

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Reference Books:

1. "Software Project Management", Mike Cottrell, Bob Hughes, Inclination/Thomas Computer Press
2. "Introduction to Software Project Management & Quality Assurance", Darrel Ince, I. Sharp, M. Woodman, Tata McGraw Hill
3. "Software Project Management: A Unified Framework", Walker Royce, Addison-Wesley, An Imprint of Pearson Education
4. "Managing the Software Process", Watts S. Humphrey, Addison-Wesley, An Imprint of Pearson Education
5. "Engineering Economy", Willian G. Sullivan, James A. Bontadelli, Wkub M. Wicks, Pearson Education Asia
6. "Project Planning & Control with PERT & CPM", B. C. Punmia, K. K. Khandelwal, Laxmi Publications (P) Ltd.

Question Pattern:

Group-A: Long Answer-Type Questions: (Attempt 2 out of 3)

[2×16=32]

Group-B: Short Answer-Type Questions: (Attempt 6 out of 8)

[6×8=48]

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MARKETING MANAGEMENT

Semester: III
Credit Hr: 3

Full Marks: 100
Internal: 20
Final Exam: 80

Course Objective: The objective of the course is to increase the knowledge and enhance the skills to make relative to marketing decisions in the field of marketing by assessing and analyzing marketing opportunities and designing appropriate marketing strategies in a dynamic and competitive business environment.

Course Contents:

1. **Marketing in Changing World Environment** (4 Hrs)
Marketing management (meaning and tasks); marketing management philosophies; marketing mix components and decision areas in marketing; marketing environment (microenvironment and macroenvironment); challenges in 21st century; social and ethical issues of marketing management in the field of IT.
2. **Marketing Research and Marketing Information System** (3 Hrs)
Marketing research; marketing research process and areas; components of marketing information system; new development in IT; database marketing.
3. **Market Segmentation, Targeting and Positioning Strategy for Competitive Advantages** (5 Hrs)
Levels and patterns of market segmentation; segmentation of consumer and business markets; evaluation and selection of market segments; product positioning strategies, concept and application of unique selling proposition.
4. **Consumer Market Behavior and Customer Analysis** (3 Hrs)
Consumer buying behavior; buyer decision process; business buyer behavior and business buying process; customer value, costs and satisfaction; cost of lost customer and customer retention; customer relationship management.
5. **Dealing with Competition** (3 Hrs)
Identification and analysis of competitors.
6. **Market Analysis** (3 Hrs)
Market size; growth; profitability; cost structures; identification of key success factors.
7. **Product Policy and New Product Development** (5 Hrs)
Concept of product; classification of products; major product decisions (product line and product mix, branding, packaging and labeling); product life cycle strategies; new product development process; consumer adoption and diffusion of innovation processes; brand building and brand equity; service product management.
8. **Pricing Strategies** (3 Hrs)
Pricing policies and strategies; new product pricing; product mix pricing; price adjustment strategies; initiating and responding to price changes in the market.
9. **Distribution Channels and Physical Distribution Decisions** (3 Hrs)
Marketing channel decisions; channel designs and selection; channel behavior (channel role, power, and conflicts).
10. **Integrated Marketing Communication Strategies** (5 Hrs)
Communication objectives; development of effective communication; communication mix: advertising, personal selling, sales promotion, public relations, and direct marketing; selection of promotion strategies.

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11. Marketing Planning and Control

(5 Hrs)

Strategic and tactical marketing plans; planning tools: BCG and GE matrix and portfolio models; the planning process; feedback and control.

12. Paper Development and Presentation on Current Marketing Issues

(3 Hrs)

Reference Books:

1. "Marketing Management", Philip Kotler, Pearson Education
2. "Strategic Market Management", David A. Aaker, John Wiley & Sons
3. "The Oxford Textbook of Marketing", Keith Blois, Oxford University Press

Question Pattern:

Group-A: Long Answer-Type Questions: (Attempt 2 out of 3) [2×16=32]

Group-B: Short Answer-Type Questions: (Attempt 6 out of 8) [6×8=48]

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Project-I

Semester: II
Credit Hr: 3

Full Marks: 100
Internal: 60
Final Exam: 40

Course Objective: To design and complete the software project in any platform. On the completion of the project, students will be able to develop small scale software using the concepts of system analysis and design, software engineering and user interface design.

Course Contents:

There should be a total of 60 hours covering important features of any development platform that students choose. A software development project will be assigned to students in a group (2 to 3 members per group). A relevant topic shall be identified and instructed to each group. Students must develop the assigned software, submit written report, and give oral presentation.

General Procedure:

1. Topic Selection
2. Information Gathering
3. System Requirements and Specifications
4. Algorithms and Flowcharts
5. Coding
6. Implementation
7. Documentation

The project document shall include the following:

1. Technical description of the project
2. System aspect of the project
3. Project tasks and time-schedule
4. Project team members
5. Project supervisor
6. Implementation of the project

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Project-II

Semester: III
Credit Hr: 3

Full Marks: 100
Internal: 60
Final Exam: 40

Course Objective: To design and complete the software project in any platform. On the completion of the project, students will be able to develop small scale software using the concepts of system analysis and design, software engineering and user interface design.

Course Contents:

There should be a total of 60 hours covering important features of any development platform that students choose. A software development project will be assigned to students individually. A relevant topic shall be identified and instructed to each student. Students must develop the assigned software, submit written report, and give oral presentation.

General Procedure:

1. Topic Selection
2. Information Gathering
3. System Requirements and Specifications
4. Algorithms and Flowcharts
5. Coding
6. Implementation
7. Documentation

The project document shall include the following:

1. Technical description of the project
2. System aspect of the project
3. Project tasks and time-schedule
4. Project team members
5. Project supervisor
6. Implementation of the project

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e-Governance

Elective-II
Credit Hr: 3

Full Marks: 100
Internal: 20
Final Exam: 80

Course Objective: This course provides the implementation and management of e-Government from the technicalities of data flows and process mapping to the policies of e-government and also provide the case studies of different countries.

Course Contents:

1. **Introduction** (3 Hrs)
e-Government and e-Governance, e-Government as information system, benefits of e-Government, e-Government stages of development, online service delivery and electronic service delivery.
2. **Public-Private Partnership for e-Government** (4 Hrs)
PPP Forms, Issues in PPP for e-Government, citizen-centric approach to e-Government.
3. **ICT Infrastructure for e-Government** (3 Hrs)
Network infrastructure, computing Infrastructure, data centers, e-Government architecture, interoperability framework.
4. **e-Government Readiness** (4 Hrs)
e-Readiness framework, steps to e-Government readiness, issues in e-Government readiness.
5. **Security for e-Government** (5 Hrs)
Challenges of e-government security, an approach to security for e-Government, security management model, e-Government security architecture, security standards.
6. **Managing e-Government** (8 Hrs)
Approaches to management of e-Government systems, e-Government strategy, managing public data, managing issues for e-Government, emerging management issues for e-Government.
7. **Implementing e-Government** (8 Hrs)
e-Government system life cycle and project assessment, analysis of current reality, design of new e-Government system, e-Government risk assessment and mitigation, e-Government system construction, implementation and beyond, developing e-Government hybrids.
8. **Case Studies and Applications of e-government system** (10 Hrs)
 - Nepal: Cyber Laws, ICT development project, Government Integrated Data Center (GIDC), e-Government master plan, Human resource management software.
 - India: Community information centers, e-Procurement in the government of Andhra Pradesh, e-Suvida.
 - Other Countries: E-Government development in South Korea, e-Government in China, e-Government in Brazil, Sri Lanka, Singapore, USA.

Reference Books:

1. "Implementing & Managing e-Government", Richard Heeks
2. "e-Governance: Concepts & Case Studies", C. S. R. Prabhu, Prentice Hall of India
3. "e-Government", J. Satyanarayana, Prentice Hall of India

Question Pattern:

- Group-A: Long Answer-Type Questions: (Attempt 2 out of 3) [2×16=32]
Group-B: Short Answer-Type Questions: (Attempt 6 out of 8) [6×8=48]