PURBANCHAL UNIVERSITY
2019

Master of Computer Application (M. C. A.)/Third Semester/*Final*

Time: 03:00 hrs.   Full Marks: 80 /Pass Marks: 32

MCA212: Design & Analysis of Algorithm *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer TWO questions.   2×16=32

1. What is Divide and Conquer approach of problem solving? Describe with its steps (parts). Explain the recursive approach of binary search with its pseudocode algorithm. Write the recurrence relation of the algorithm and find its big-O Notation. Trace the searching of 29 in the array: 5, 7, 9, 14, 21, 29, 33, 46, 64, 71 using binary search.   4+6+3+3

2. What is greedy algorithm? Discuss some examples of the problems solved using greedy algorithm. What is activity selection problem? Select a maximum size subset of following mutually compatible activities using greedy approach and analyze the time complexity of the algorithm.   2+4+2+8

Activities (ai)	al	a2	a3	a4	aS	a6	a7	a8
Start (s$_i$)	1	0	1	4	2	5	3	4
Finish (f$_i$)	3	4	2	6	9	8	5	5

3. What is dynamic programming? How is divide and conquer different from dynamic programming? Give example. Define travelling salesman problem. Design and analyze the travelling salesman problem using dynamic programming.   2+5+2+7

Group B

Answer SIX questions.   6×8=48

4. How different asymptotic notations in algorithm analysis can be defined ? Describe RAM model of computation in brief.   5+3

5. What is a linked list data structure? Explain with algorithm how to implement two stacks in one array A of size n, such that neither stack overflows unless the total number of elements in both the stacks together is n. The PUSH and POP operations should run in O(1) time.

2+6

6. What is binary tree? How it is implemented using a linked list? Write an algorithm for quick sort.

1+1+4

7. Using the master method, compute Big-O characterization for the following recurrences:

8

a. $T(n)=2T(n/2)+n^3$

b. $T(n)=25T(n/5)+5n^2$

c. $T(n)=9T(n/4)+n^2$

d. $T(n)=3T(n/3)+n$

8. When do we use backtracking? With some real time applications of Graph Coloring, explain the algorithm to color the vertices of n nodes graph with in colors. Analyze time complexity of the algorithm.

2+6

9. Explain extended Euclidean theorem. Trace the Euclidean Algorithm for a=259 and b=70. Give the algorithm and analyze it. 2+6

10. Define P, NP and NP-Complete classes of problems. Devise the proof sketch of "Vector Cover problem is NP-Complete". 3+5

11. Write short note on any TWO:

2×4=8

(a) Characteristics of algorithm
(b) Prim's algorithm
(c) 0/1 Knapsack problem using dynamic programming.

Master of Computer Application (M. C. A.)/Third Semester/*Final*

Time: 03:00 hrs.   Full Marks: 80 /Pass Marks: 32

MCA215; E-Governance (Elective-II) *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer TWO questions.   **2×16=32**

1. Differentiate e-Governance and e-Government. How will e-government help to improve economic condition of Nepal? Explain Development stages of e-Government.   2+6+8

2. What is data centers? Why e-Government architecture and interoperability frameworks are needed for e-Government infrastructure development? Explain with an example.   4+12

3. What are challenges to implement e-Government system? Explain c-Government security architecture.   6+10

Group B

Answer SIX questions.   **6×8=48**

4. Explain the necessity of PPP in e-Government. Describe citizen-centric approach to e-Government adoption.   4+4

5. Define e-Readiness and e-Readiness framework. Explain different steps for e - Readiness framework.   4+4

6. Explain management approaches of c-Government system. Describe managing issues for e-Government system   5+3

7. Define e-Government system life-cycle. Mention design of new e-Government system.   2+6

8. Show comparative analysis of e-Government development in India and China.   8

9. What perspectives, theories, conceptual frameworks, and methods seem particularly useful for the study of the developmental processes and organization of digital government? 8

10. Write short notes on any TWO: 4+4
    (a) GIDC
    (b) Managing public data in e-government
    (c) Cyber laws in Nepal.

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Master of Computer Application (M.C.A.)/Third Semester/*Final*

Time: 03:00 hrs.   Full Marks: 80 /Pass Marks: 32

MCA214: Marketing Management *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer TWO questions.   **2×16=32**

1. Difference between brand building and brand equity. Suggest marketing strategies for the newly introduced 'roobot cleaner', based on the product life cycle concept.

2. Distinguish between 'Push' strategy and 'Pull' strategy in the developing a marketing communication programme and suggest the promotion tools for the launch of new electronic products in any metropolitan city of Nepal.

3. How do you segment and position following products?

    (a) Organic food

    (b) Samsung Galaxy S 10 Android Smart Phone.

    (c) High specific Laptop

Group B

Answer SIX questions.   **6×8=48**

4. Explain with examples of new product pricing strategies.

5. Describe the marketing concept and discuss why this concept is the most important principle in doing business of our time. Give exam les in your answer.

6. Discuss about the consumer buyer decision process.

7. What is marketing research? Explain the Database marketing.

8. Discuss on strategic and tactical plan in marketing.

9. Highlight the importance of competitor's analysis? How do you analyze competitor of your business?

10. Describe various functions of distribution channel with examples.

11. Explain the marketing management philosophies.

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Master of Computer Application (M.C.A.)/Third Semester/*Final*
Time: 03:00 hrs.   Full Marks: 80 /Pass Marks: 32
MCA211: Optimization Techniques *(New Course)/*
        Optimization Techniques *(Old Course)*

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A
Answer TWO questions.   2×16=32

1. A project consists of nine activities whose time estimates and other characteristics are given below.

    (i) Draw a PERT network for the project.

    (ii) Determine the critical path and the expected project completion time.

Activity	Predecessors	Time	Estimates	Weeks
		Optimistic	Most likely	Pessimistic
A	--	2	4	6
B	-	6	6	6
C		6	12	24
D	A	2	5	8
E	A	11	14	23
F	B,D	8	10	12
G	B,D	3	6	9
H	C,F	9	15	27
I	E	4	10	16

2. Solve the following LP using Simplex Method.

    Maximize $z = 5x + 7x_2$
    Subject to the constraints $2x_1 + x_2 \leq 6$
    $3x_1 + 4x_2 \leq 12$
    $x_1, x_2 \geq 0$

3. Obtain an optimal solution for the following assignment problem.

	A	B	C	D	E
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	15

Group B

Answer SIX questions. $6 \times 8 = 48$

4. Solve the following LP problem using graphical problem
   Maximize $z = 2x_1 + 3x_2$ subject to the constraints.

   $2x_1 + x_2 \leq 6$

   $x_1 + 2x_2 \leq 8$

   $x_1 - x_2 \leq 1$

   $x_1 \leq 2$

   $x_1, x_2 \geq 0$

5. In a super market, handled by one cashier, customers expected
   to arrive 6 in an hour. The cashier takes 6 minutes to handle a
   customer. Find

   (i)   The probability that the customer need not wait.

   (ii) Expected number of customers waiting for the cashier.

   (iii) The average time spent by the customer in the supermarket

6. Discuss the rules for converting any primal problem into its dual.
   Convert the following primal problem into its dual

   Maximize $z = 10x_1 + 15x_2$ subject the constraints

   $5x_1 + 7x_2 \geq 80$

   $6x_1 + 11x_2 \geq 100$

   $x_1, x_2 \geq 0$

7. Solve the following using dual simplex method. Mimize $z = 2x_1 +$
   x_2 subject the constraints.

$3x1 + x2 \geq 3$

$4x1 + 3x2 \geq 6$

$x1 + 2x2 \geq 3$

$x1, x2 \geq 0$

8. Find the initial solution of the following transportation using vogel's approximation technique. Find the optimal solution if the initial solution is not the optimal one.

	D1	D2	D3	a_j
S1	2	7	4	5
S2	3	3	1	8
S3	5	4	7	7
S4	1	6	2	14
b_j	7	9	18	

9. Solve the following LPP using Gomory's cutting plane method.

Max z=xl + 4×2 subject to the constraints

$2x1 + 4x2 <= 7$

$10x1 + 3x2 <= 14$

xI, x2>=O and are integers.

10. Solve the following problem using Big-M method

Minimize: Z = 0.4x1 + 0.5x2

Subject To constraints

$0.3x1 + 0.1x2 <= 2.7$

$0.5x1 + 0.5x2 = 6 0$

$6x1 + 0.4x2 >= 6$

xl, x2 >= 0

11. Write short note on any TWO: 2×4=8

(a) Benefits and limitations of linear program.

(b) Forward and backword pass method.

(c) Artifical variasle technique.

Master of Computer Application (M.C.A.)/Third Semester/*Final*

Time: 03:00 hrs.   Full Marks: 80 /Pass Marks: 32

MCA213: Software Project Management *(New Course)/*
Software Project Management *(Old Course)*

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer TWO questions.   2×16=32

1.   Consider the following information:

Activity	Duration Week	Predecessors
A	3	-
B	4	-
C	4	A
D	5	A
E	6	B
F	7	C,D
G	2	D,E
H	4	E
I	1	F,G,H

(a) Draw network diagram using CPM.

(b) Determine critical path.

(c) Calculate project duration.

2.   What is project analysis? Explain cost-benefit analysis. Consider the following cash flow ($) estimates for three projects, where negative values represent expenditure and positive values represent income, and rank the three projects in order of financial desirability using:

(i) Net profit

(ii) Payback period

(iii) Return on investment

Year	Project I	Project II	Project III
0	-10,000	-20,000	-20,000
1	5,000	8,000	6,000
2	5,000	5,000	9,000
3	4,000	4,000	5,000
4	4,000	6,000	7,000
5	2,000	5,000	8,000

3. What do you mean by risk management and risk analysis? Explain how do you evaluate risk to the project schedule using values.

Group B

Answer SIX questions.   6×8=48

4. Why do you think software project management is challenging? Explain with necessary examples.

5. What is a contract? Explain different types of contract.

6. Distinguish between resource smoothing and resource balancing.

7. How slip chart, ball chart and timeline chart can be used in project monitoring and control.

8. List and explain the factors of software quality.

9. Who are the stakeholders in software project management? What are the problems with software projects?

10. Briefly explain the concept of Software Configuratio Management with respect to change control and version control.

11. Write short notes on any TWO: 4+4
    (a) Crashing
    (b) Leadership styles
    (c) Maslow's Hierarchy of needs