PURBANCHAL UNIVERSITY

2020

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.

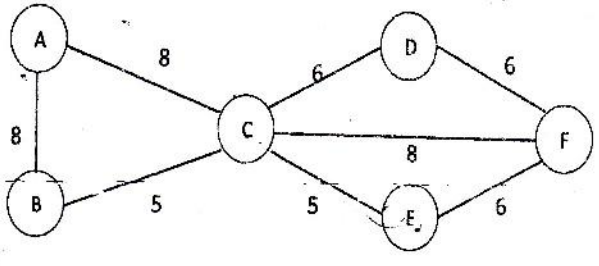
The figures in the margin indicate full marks.

Group A

Answer TWO questions. **2×16=32**

1. What are the three sequential steps of Divide-and-Conquer Algorithm? Trace the Binary Search for searching 46 in the array of {15, 18, 19, 21, 38, 46, 49, 52 } with required algorithm. Analyze its Big - O time complexity with recurrence relation of the algorithm. 4+8+4

2. Describe Greedy Method of problem solving with its advantages and disadvantages. List some of the problems solved with greedy algorithm. Write and analyze the algorithm for solving fractional Knapsack problem using greedy approach. Derive the Minimum Spanning Tree of the following graph using Prim's Algorithm. 4+7+5



3. When do we use Backtracking in algorithm? Give some real time applications of backtracking. With the problem statement, solve 4-Queens problem using backtracking. Define running time complexity of the algorithm to find its Big - O. 4+8+4

Contd. ...

Group B

Answer SIX questions. **6×8=48**

4. Describe in brief, the RAM Model of computation. What is Asymptotic Notation? Define Big-O Notation with example. 4+2+2

5. What is stack? Write algorithm to reverse a string using stack; with its running time complexity. 2+4+2

6. Define recurrence relation. Use Master Theorem to find the Big-O estimate of the following recurrences: 2+6

   (a) $T(n)=4T(n/2)+2$

   (b) $T(n) = 16T(n/2) + n^3$

   (c) $T(n) = T(n-1) + n$

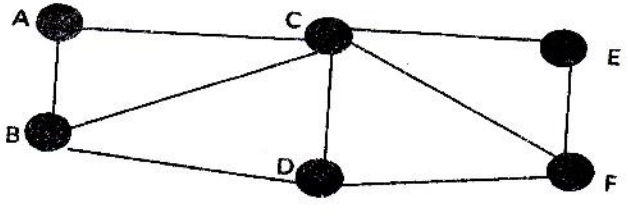
   (d) $T(n) = 8T(n/2) + 1000\ n^2$

7. Describe dynamic programming method of problem solving. Define 0/1 Knapsack problem. Trace 0/1 Knapsack with W={2,2,4,5}, V={3,7,2,9} and Weight Limit =10. 3+5

8. Explain P, NP and NP-Complete classes of problems with examples. Explain in brief, the approximation algorithm. 4+4

9. What is extended Euclidean Problem? Trace Euclidean algorithm to find the GCD for A=1220 and B=516. Describe complexity of the algorithm. 2+4+2

10. What are various graph representation techniques? Find the chromatic number of the following graph. 5+3



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

(a) Circular Queue

(b) Definition and characteristics of an algorithm

(c) Matrix chain multiplication

PURBANCHAL UNIVERSITY

2020

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. How you define e-Governance and e-Government? Discuss benefits and e-Government stages of development in brief.
2. What components would you consider while designing new e-Governance system? Discuss.
3. What is Public Private Partnership (PPP) in e-Governance? Discuss citizen-centric approach to e-Governance.

Group B

Answer SIX questions. **6×8=48**

4. Discuss importance of e-Governance architecture.
5. What are the challenge of e-government security? Describe different security standards in brief.
6. What is e-Readiness framework? Explain steps to e-Government readiness.
7. Analysis of current reality is essential for e-Governance system lifecycle. Justify.
8. "E-Governance has helped to reach unreached". Explain the statement with reference to major undertakings in Nepal.
9. Discuss management approaches of e-Government system. Describe emerging management issues for e-Government system.
10. "E-Governance is SMART governance". Justify.
11. Write short notes on any TWO: 2×4=8

    (a) GIDC Nepal (b) Interoperability (c) Legacy system

###

PURBANCHAL UNIVERSITY

2020

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. What are the different basis that are used to segment the market for the following products-1) laptop, 2) personal computer, or 3) color television.
2. Briefly explain the "new product planning process" and Describe how marketing strategies change during the product life cycle.
3. Define the consumer market, construct a simple model of consumer buying behavior, and discuss the characteristics affecting of consumer buying behaviors.

Group B

Answer SIX questions. **6×8=48**

4. Briefly explain the five marketing management philosophy.
5. Explain how changes in the demographic and economic environments affect marketing decisions.
6. What is marketing information system? Explain the components of marketing information system.
7. How does entrepreneur deals with competition? Explain.
8. How competitors are identified? Explain.
9. Discuss about the cost-based pricing and competition based pricing approaches of product.
10. Why, companies use distribution channels and discuss the functions these channels perform.

PURBANCHAL UNIVERSITY
2020

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. What is an integer linear programming problem. Solve the following integer programming problem using Gomory's cutting plane method.

Max $Z = 4x_1 + 3x_2$
Subject to the constraints

$$x_1 + 2x_2 \leq 4$$
$$2x_1 + x_2 \leq 6$$
$$x_1, x_2 \geq 0, \text{ and are integers.}$$

2(a) Discuss the different attitude of customers in waiting line.

(b) A self service store employs one cashier at its counter. Nine customers arrive on an average of every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service rate find:

(i) Average number of customers in the system.

(ii) Average time a customer spends in system.

(iii) Probability of having more than 10 customers in the system.

(iv) Probability that a customer has to queue for more than 2 minutes.

3(a) Give the mathematical model of transportation problem. Find the initial basic feasible solution using Vogel's approximation method. Also find the optimal transportation cost.

	D_1	D_2	D_3	D_4	Supply
S_1	6	3	5	4	22
S_2	5	9	2	7	15
S_3	5	7	8	6	8
Demand	7	12	17	9	

Group B

Answer SIX questions. **6×8=48**

4. Solve the following LPP

$$\text{Minimize } Z = x_1 - 3x_2 + 2x_3$$
$$\text{Subject to the constraints}$$
$$3x_1 - 2x_2 + 3x_3 \leq 7$$
$$-2x_1 + 4x_2 \leq 12$$
$$-4x_1 + 3x_2 + 8x_3 \leq 10$$
$$x_1, x_2, x_3 \geq 0.$$

5. A firm makes two products X and Y and has a total production capacity of 9 tones per day, X and Y requiring the same production capacity. The firm has a permanent contract to supply atleast 2 tones of X and atleast 3 tones of Y per day to another company. Each tone of X requires 20 machine hrs of production time and each tones of Y requires 50 machine hrs of production time. The daily maximum possible number of machine hrs is 360. All the firm's output can be sold and the profit made is Rs. 80 per tone of X and Rs. 120 per tone of Y. It is required to determine the production schedule for maximum profit and to calculate this profit.

6. Write down the rules for converting any primal problem into its dual. Convert the given primal into its dual.

Maximize $Z = 8x_1 + 3x_2$
Subject to the constraints

$$x_1 - 6x_2 \geq 2$$
$$5x_1 + 7x_2 = -4$$
$$x_1, x_2 \geq 0$$

7. A company has team of four salesmen and there are four districts where the company wants to start its business. After taking into account the capabilities of salesmen and the name of districts, the company estimates that the profit per day in rupees for each salesman in each district is as below. Find the assignment of salesperson to various districts, which will yield maximum profit.

	D_1	D_2	D_3	D_4
S_1	16	10	14	11
S_2	14	11	15	15
S_3	15	15	13	12
S_4	13	12	14	15

8. A research and development department is developing a new power supply for a television set. It has broken the job down into the following for:

Job	Immediate Predecessors	Expected Time (days)
A	-	5
B	A	7
C	B	2
D	B	3
E	C	1
F	D	2
G	C	1
H	E, F	3
I	G, H	10

(a) Draw the network diagram of activities involved in the project and indicate the critical path.

(b) What is the minimum completion time for the project?

(c) Find the total float for each activity.

Contd. ...

9. Solve by dual simplex method:

$$\text{Minimize } Z = 3x_1 + x_2$$
$$\text{Subject to the constraints}$$
$$x_1 + x_2 \geq 5$$
$$2x_1 + 3x_2 \geq 2$$
$$x_1, x_2 \geq 0$$

10. Write short note on any TWO:

(a) Slack and surplus variable

(b) Dual simplex

(c) Benefits and limitations of LPP

ꝏ

PURBANCHAL UNIVERSITY

2020

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(a) Tabulate and discuss the project management activities that are carried out during software development. 8

(b) What do you mean by work breakdown structure and why is it constructed? Explain. 8

2. Draw network diagram for the following activities using CPM, calculate the project duration and determine the critical path. Also find the float for individual activity.

Activity	Predecessors	Duration
A	-	2
B	-	2
C	-	4
D	-	8
E	A, F	3
F	B	4
G	C, D, E	3
H	D, G	2
I	E	7
J	G	6

3(a) What is motivation and what are motivation theories? Explain. 8

(b) Explain the process of Risk Engineering with a neat diagram. 8

Contd. ...

Group B

Answer SIX questions. **6×8=48**

4. How does PERT handle the uncertainties during software development? Explain.

5. XYZ company is planning to reduce its labour cost by automating a critical task. The automation requires installation of new machine. The cost to purchase and install new machine is $20,000. The installation of machine can reduce annual labour cost by $7500. The life of the machine is 15 years. The salvage value of machine after fifteen years will be zero. The required rate of return of XYZ company is 25%. Should XYZ company purchase the machine?

6. What is a contract and what are its types? How is software contract negotiated?

7. Define software quality and software reliability. What do you mean by ISO?

8. What is the need of project monitoring and control? Explain some of the techniques of visualizing progress of the project.

9. What do you mean by software configuration management? Explain the functions of configuration management.

10. What is resource allocation? Differentiate between resource leveling and resource smoothening.

11. Write short notes on any TWO: 4+4
    (a) Project crashing
    (b) Benefit-cost ratio
    (c) Leadership styles