

University of Asia Pacific

Department of Computer Science and Engineering

Program: B.Sc. in CSE

Mid Term Examination

Fall-2023

2nd year 2nd Semester

Course Code: CSE 207 Course Title: Algorithms

Credit: 3

Time: 1 Hour.

Full Mark: 20

There are Two Questions. Answer all of them. Part marks are shown in the margins.

1. a. Explain the role of the divide step in the divide and conquer strategy. Discuss how choosing an appropriate subproblem size impacts the efficiency and performance of the algorithm. [2] [CO1]
- b. Sort the following data in alphabetical order using merge sort and show the sorting steps in detail. [5] [CO2]
A, L, G, O, R, I, T, H, M
- c. Analyze the complexity of the 1(b) algorithm using the master method. [3] [CO3]
2. a. Suppose, you are attending the CSE tech conference at UAP, and as a participant, you are given a gift bag with a limited capacity. The goal is to maximize the total value of the items you collect while considering the limited space in your bag. [5] [CO2]

Available Items:

Item	A	B	C	D	E
Space	2 units	3 units	4 units	2 units	5 units
Value	\$5	\$8	\$10	\$4	\$12

Now, apply the dynamic programming approach to get the optimal combination of items for your gift bag to maximize the total value, considering the space capacity as 8 units.

- b. Consider two family members who are comparing their photo albums. Each album contains a sequence of photos, and they want to find the longest common sequence of photos that appears in both albums. Develop an algorithm to find the longest common sequence of photos they share. [5] [CO4]

University of Asia Pacific (UAP)
Department of Computer Science & Engineering

Mid Term Examination

Year: 2nd year 2nd semester

Semester: Fall 2023

Course no. CSE 209

Course title: Digital Logic & System Design

Credit: 4.0

Full Marks: 20

Time: 1 hour

Instructions:

1. There are **Three (3)** questions. Answer all of them. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|
| 1. a) Discuss the universality of NOR gate. | 2 | CO1 |
| b) Implement the following Boolean function with only NOR gate
$y = A'C + AB' + BC'$ | 2 | CO1 |
| c) Simplify the following function using K-map.
$F(A, B, C, D) = \sum(0, 1, 2, 5, 7, 8, 12, 13, 14, 15)$ | 3 | CO1 |
| 2. a) Design MOD 60 counter using IC # 74293. | 3 | CO5 |
| b) Design MOD 16 up/down counter using J-K flip-flop. You can use other logic gates, if necessary. | 4 | CO5 |
| 3. a) Consider a counter circuit that contains seven (7) JK FFs wired in the arrangement $Q_6 Q_5 Q_4 Q_3 Q_2 Q_1 Q_0$
(i) Determine the counter's MOD number.
(ii) Determine the output frequency in KHz when the input clock frequency is 64 MHz.
(iii) What is the range of counting states for this counter?
(iv) Assume a starting state (count) of 0100101. What will be the counter's state after 400 pulses? | 3 | CO3 |
| b) Design a logic circuit that follows the following requirements:
(i) Output X will equal to (C AND D) when A and B are the different.
(ii) X will remain HIGH when A and B are same. | 3 | CO3 |

University of Asia Pacific
Department of Computer Science and Engineering

Program: B.Sc. in CSE

Mid-Semester Examination

Fall-2023

2nd year 2nd Semester

Course Code: CSE 211

Course Title: Database Systems

Credit: 3.00

Time: 1.00 Hour.

Full Mark: 20

There are Two Questions. Answer all of them. Part marks are shown in the margins.

1. a. Discuss the two types of application architecture with an example of each:
- i. Two-tier
 - ii. Three-tier

[4] [CO1]

- b. The following relational schema forms a *university database* which is implemented in a relational database:

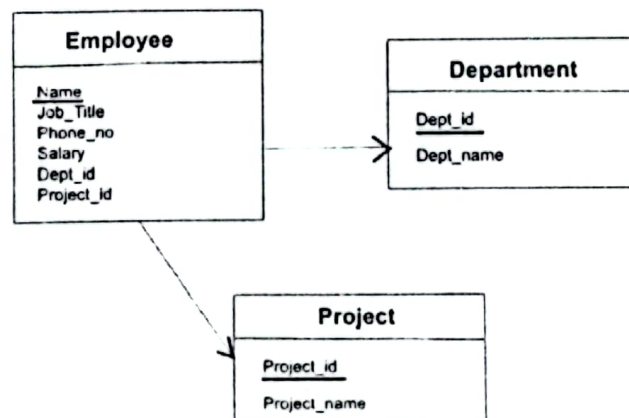
[3×2
=6] [CO2]

student (s_ID, s_name, semester, year, d_ID)
department (d_ID, d_name, floor)
course (c_code, c_title, d_ID, credits)

Construct (write down) the Relational Algebra for the following queries:

- a) The students' name from 2nd Year 2nd Semester.
- b) The department's name located on the 7th floor.
- c) The course code where the course title is Database Systems.

2. a.



[4] [CO2]

Construct (write down) the DDL for the above tables with necessary datatypes and constraints.

- b. The following relational schema form a university database which is implemented in a relational database:

[3×2 [CO2]
=6]

student (s_ID, s_name, semester, year, d_ID)
department (d_ID, d_name, floor)
course (c_code, c_title, d_ID, credits)

Construct (write down) the SQL for the following queries:

- i) The students' name where the department name starts with 'C' and ends with 'g' (using subquery).
- ii) The total number of courses for each department.
- iii) The student IDs for 2nd Year 2nd Semester or 2nd Year 1st Semester (using set operation).

University of Asia Pacific
Department of Basic Sciences and Humanities
Program: B.Sc. in CSE

Mid-Semester Examination

Fall-2023

2nd year 2nd Semester

Course code MTH 205

Course Title: Math IV: Differential
Equations and Laplace and Fourier
Transformation

Credit: 3.00

Time: 1.00 Hour

Full Marks: 20

There are three questions. Answer all of them. Part marks are shown in the margins.

1. a. Define exact differential equation. Find the solution of exact DE [4] CO1
$$(2x - y)dx = (x - y)dy.$$

b. By using separation of variables solve $\frac{dy}{dx} = (4x + y + 1)^2$. [3] CO1
2. a. Write down the standard form of first order linear DE. Using integrating factor solve $\frac{dy}{dx} + (1 + \frac{1}{x})y = \frac{1}{x}$. [3] CO1
b. Solve the homogeneous DE $(2xy + x^2)\frac{dy}{dx} = 3y^2 + 2xy$. [3] CO1
3. a. Define ordinary differential equation (ODE) with example. Find the order and degree of $[1 + (\frac{dy}{dx})^2]^{3/2} = k \frac{d^2y}{dx^2}$. [3] CO1
b. Solve the Bernoulli's equation $3\frac{dy}{dx} + 3\frac{y}{x} = 2x^4y^4$. [4] CO1

University of Asia Pacific
Department of Basic Sciences and Humanities

Program: B.Sc. in CSE

Mid-Semester Examination

Fall-2023

2nd year 2nd Semester

Course Code: ECN 201

Course Title: Economics

Credit: 2.00

Time: 1.00 Hour.

Full Mark: 20

There are two questions. Answer all of them. Part marks are shown in the margins.

1. $Q = 300 - 4Q$
 $Q = 40 + Q$
 - a. Calculate equilibrium price and quantity. [5] [CO1]
 - b. Explain the effect of change in input price on equilibrium price and quantity. [5] [CO1]
2. Explain the difference between perfect competition and monopoly market. [10] [CO2]