

# University of Asia Pacific (UAP)

## Department of Computer Science & Engineering

Mid Term Examination

Year: 2<sup>nd</sup> year 2<sup>nd</sup> semester

Semester: Fall, 2019

Course no. CSE 209

Course title: Digital Logic &amp; System Design

Credit: 4.0

Full Marks: 60

Time: 1 hr

There are **Four** Questions. Answer **Three** Questions including **Question # 1**

- |      |  |    |                 |
|------|--|----|-----------------|
| 1.   | a) Describe the universality of NOR gate.  | 05 |                 |
|      | b) Draw the following Boolean function with only NOR gates.  |    |                 |
|      | $y = \overline{A} B + A \overline{B} \overline{C}$   | 05 | 2 <sup>nd</sup> |
|      | c) Implement the following function using K-map.   |    |                 |
|      | $F(A, B, C, D) = \sum(0, 1, 2, 3, 7, 8, 10, 12, 13, 14, 15)$   | 10 | 7 <sup>th</sup> |
| 2.   | a) Draw the internal circuit of clocked J-K flip flop and briefly describe its operation.                | 10 |                 |
|      | b) Draw the internal circuit of clocked D flip flop and write down the truth table of the flip flop.     | 06 |                 |
|      | c) Design D flip flop from J-K flip flop.  | 04 |                 |
| ✓ 3. | a) Draw the internal circuit of IC # 74293(Counter) and describe its operation.                          | 06 |                 |
|      | b) Design MOD 60 counter using IC # 74293.   | 08 |                 |
|      | c) Design MOD 6 Johnson counter and describe its operation.  | 06 |                 |
| 4.   | a) Draw the circuit diagram of MOD-8 up counter using JK flip-flop. ✓                                    | 10 |                 |
|      | b) Construct the state transition diagram of the counter. ✓  | 03 |                 |
|      | c) If the counter is initially in the 101 state, what state will it be in after 230 clock pulses? ✓      | 03 |                 |
|      | d) Determine the frequency in KHz at the output of the last flip flop when the input frequency is 5 MHz. | 04 |                 |

# University of Asia Pacific

## Department of Computer Science & Engineering

### Mid-Semester Examination Fall -2019

#### Program: B. Sc. Engineering (2<sup>nd</sup> Year/2<sup>nd</sup> Semester)

Course Title: Database Systems

Course No. CSE 211

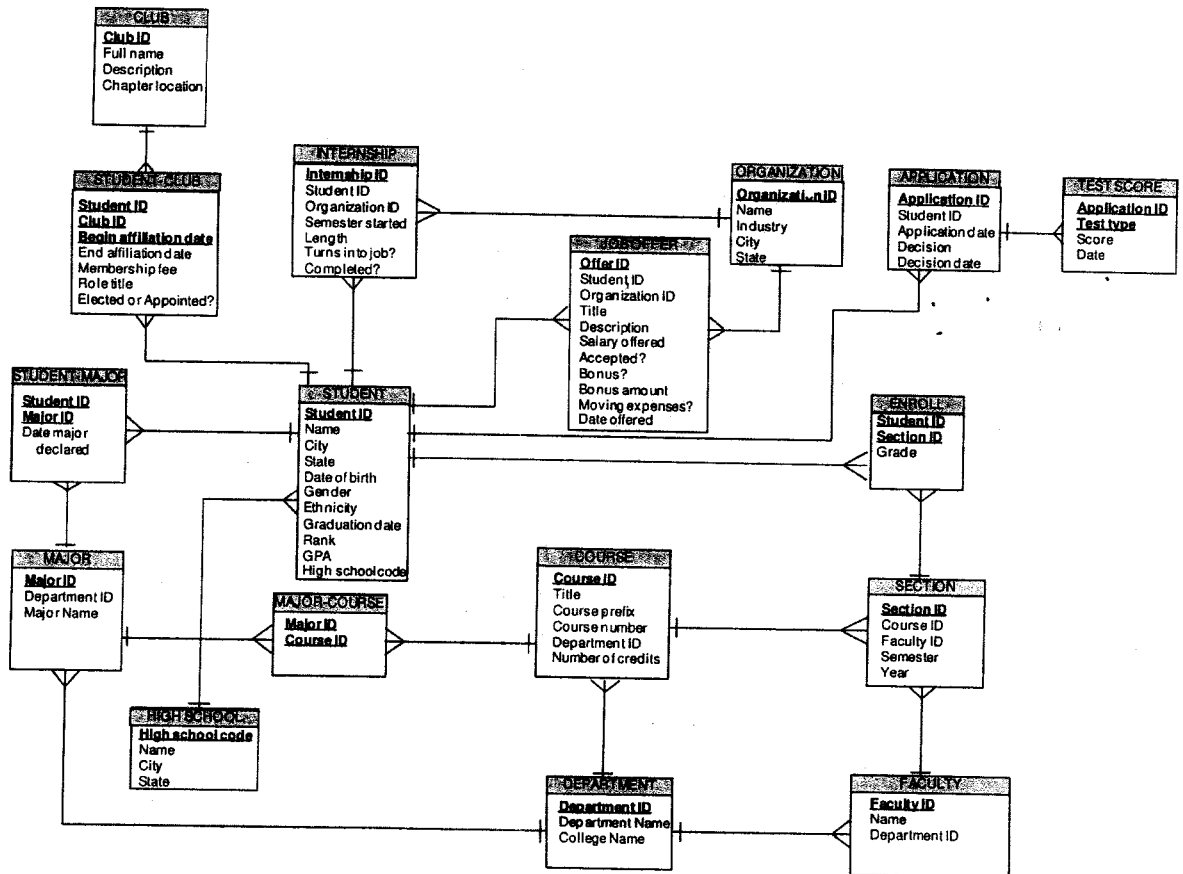
Credit: 3.00

Time: 1.00 Hours.

Full Mark: 60

There are Four Questions. Answer questions 1, 4 and (2 or 3). Figures in the right margin indicate marks.

- 1.a) Define Integrity Constraint. Explain Super key, Candidate key, Primary and Foreign key with an example. 10
- b) Analyze a scenario where you have already created the tables in below. Now you want to drop all the tables. Write DDL in a correct sequence. 10



✓ 2. Consider the following schema:

employee (person id, street, city)

works (person id, person name, company name, salary)

company (company name, city)

a) Construct the DDL for creating the above mentioned tables in question with proper integrity constraints. ✓ 10

b) i) Construct the DDL for adding a new column "country" in employee and company table. ✓ 10

ii) Construct a SQL to insert information of 2 persons into works table. ✓

iii) Construct a SQL to drop the salary attribute from works table. ✓

iv) Construct a SQL to select all tuples from company table where city attribute starts with 'Sa'. ✓

v) Construct a SQL to Show all 'person\_id' of Dhaka city. ✓

3.a) Same schema is repeated from question 2. Construct DML listed in below. 20

i) Find the names and cities of residence of all employees who work for "First Bank Corporation".

ii) Find the names, street addresses, and cities of residence of all employees who work for "First Bank Corporation" and earn more than 10000.

iii) Find all employees in the database who do not work for "First Bank Corporation".

iv) Find all employees in the database who earn more than some employee of "Small Bank Corporation".

v) Find the company that has the most employees.

vi) Find the minimum salary of employees in each company.

vii) Find the names and average salaries of all companies whose average salary is greater than 42000.

✓ 4.a) Analyze a scenario where UAP wants to automate their whole system. Map the scenario and give a brief description of what is logical design (business decision, computer science decision) and physical design in this perspective. 12

b) Evaluate the working role between database developer and database administrator. Which role is better and why? 8

# University of Asia Pacific

## Department of Computer Science & Engineering

### Mid-Semester Examination Fall -2019

#### Program: B. Sc Engineering (2<sup>nd</sup> Year/ 2<sup>nd</sup> Semester)

Course Title: Algorithm

Course No. CSE207

Credit: 3.00

Time: 1.00 Hours.

Full Mark: 60

There are **Four** Questions. Answer any **Three** including Q-1.

- ✓ 1. a) Explain what the time complexity of an algorithm is. Why do we need to measure the time complexity of an algorithm? 5
- b) Derive the time complexity of the following algorithm. 10
- ```
algorithm(A, B, val){
    n = A.length;
    m = B.length;
    for(i=1; i<=n; i++)
        System.out.println(A[i]);

    for(i=1; i<=n; i=2*i)
        for(j=1; j<=m; j=2*j)
            if (A[i]+B[j] == val) return (i,j);
    return (-1,-1);
}
```
- c) For algorithm of Q#1b, give example of A and B array where  $n=m=4$  for both Best and Worst case. 5
- ✓ 2. Simulate binary search algorithm in the array 2,3,5+mod(roll,3), 8, 10, 12, 15, 17, 19, 22 for searching 1, 10, 22, 23 by drawing a table for low, high, mid, found. 20
3. Merge sort divides an array into two halves, recursively call itself, sort each of them by calling the merge process. Assume the algorithm is modified divide the array into three sub-arrays of size  $\lfloor n/3 \rfloor$ ,  $\lfloor (n+1)/3 \rfloor$  &  $\lfloor (n+2)/3 \rfloor$ , sort each of these three subarrays recursively, and then merge the three sorted subarrays. Assume the merging process takes  $O(n)$  time.
- a) Design a recurrence relation for the running-time  $T(n)$  of this algorithm. 6
- b) Create the recursion tree for the recursion equation developed in previous question and calculate the time complexity. 14
- ✓ 4. a) Write down a recursive algorithm for finding maximum and minimum of an array A. 10
- b) Deduce average number of assignments and comparisons for the above algorithm. 10

# UNIVERSITY OF ASIA PACIFIC

Department of Computer Science and Engineering

Mid-Semester Examination, Fall-2019

Program: B.Sc. Engineering (2<sup>nd</sup> Year/ 2<sup>nd</sup> Semester)

Course Title: Principles of Economics

Course No. ECN 201

Credit: 2.00

Time: 1.00 Hour

Full Mark: 20

Answer any Two out of Four Questions. All Questions are of equal mark.

Q-1 Discuss the Production Possibilities Model covering such areas as The Production Possibilities Curve, The Role of Scarcity, Increasing Opportunity Costs and Economic Growth. Illustrate with appropriate Schedules and Curves.

Q-2 Discuss the Changes in Demand including the Demand Factors. Illustrate with appropriate Market Demand Schedule and Demand Curve. Also, distinguish between the Changes in the Quantity demanded and the Change in Demand. Illustrate with appropriate Market Demand Curves.

Q-3 Discuss How Competitive Market Operates covering such areas as Market Equilibrium, Effects of a Surplus and Effects of a Shortage. Illustrate with appropriate Market Demand and Supply Schedules and Curves.

Q-4 Discuss the Effects of Changes in Both Demand and Supply on Market Equilibrium including two different cases (a) Effects of Increase in both Demand and Supply on Market Equilibrium and (b) Effects of Increase in Demand but Decrease in Supply on Market Equilibrium. Illustrate with appropriate Market Demand and Supply Schedules and Curves.

**University of Asia Pacific**  
**Department of Basic Sciences and Humanities**  
**Mid-Semester Examination Fall-2019**  
**Program: B.Sc. Engineering (Computer Science)**

Course Title: Math IV: Differential  
Equations and Laplace and  
Fourier Transformations  
Time: 1.00 Hour.

Course No: MTH-205

Credit: 3.00

Full Marks: 60

There are Four Questions. Answer **three questions including 3 and 4**. All questions are of equal value. Figures in the right margin indicate marks.

1. a. Solve the following differential equation [10]

$$\frac{dy}{dx} = \frac{y}{x} + x \sin \frac{y}{x}.$$

- b. What is linear differential equation? Solve the following differential equation [2+8]

$$(x+1) \frac{dy}{dx} - y = e^x (x+1)^2.$$

OR

2. a. Show that the equation  $\left[1 + \log(xy)\right] dx + \left[1 + \frac{x}{y}\right] dy = 0$  is exact. Also find its solution. [10]

- b. Solve the differential equation  $\sin x \frac{dy}{dx} + 2y = \tan^3\left(\frac{x}{2}\right)$ . [10]

- ✓ 3. a. Form the following differential equation by eliminating arbitrary constants and write down the order and degree of the differential equations obtained. Hence also explain why the respective differential equation is either linear or non-linear.  $y^2 = Ax^2 + Bx + C$ . [4+3+3]

- ✓ b. Using the method of separation of variables solve the following differential equation  $x^4 \frac{dy}{dx} + x^3 y = -\sec(xy)$ . [10]

✓4. a. Find the solution of the differential equation  $(D^2 - 4D + 4)y = x^3 e^{2x}$ . [8]

b. Solve  $\frac{d^3 y}{dx^3} - 3\frac{d^2 y}{dx^2} + 4\frac{dy}{dx} - 2y = e^x + \cos x$ . [12]