

UNIVERSITY OF ASIA PACIFIC

Department of Computer Science and Engineering

Mid-Semester Examination, Fall-2019

Program: B.Sc. Engineering (2nd Year/ 2nd 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 Computer Science & Engineering
Mid-Semester Examination, Fall -2019

Program: B. Sc Engineering (4th Year/ 1st Semester)

Course Title: Operating System Course No: CSE 405 Credit: 3.00
Time: 1.00 Hour Full Mark: 60

There are **Four** Questions. Answer any **Three** including **Question #1**. All questions are of equal value/Figures in the right margin indicate marks.

- | | | |
|-------|--|----|
| 1.a) | What is the main goal of operating system? Brief the three classical views of modern operating system. | 8 |
| b) | What will be the problems if there were no <i>Operating System</i> (OS) interface in between computer Hardware and the user? Explain. | 8 |
| c) | What are the most challenging parts of OS to design? | 4 |
| 2. a) | Differentiate Job and Task. | 3 |
| b) | Define:
i. Job Queue
ii. Ready Queue and
iii. Device Queue.
iv. Draw the working diagram showing a process flow among these queues during execution. | 10 |
| c) | Define PCB. List out the information associated with PCB. | 7 |
| 3. | Consider the following set of processes, with the length of the CPU Burst time given in milliseconds: | 20 |

Process	Arrival Time	Burst Time
P1	2	3
P2	0	6
P3	1	4
P4	6	3

- i. Draw the Gantt charts illustrating the sequence of execution of these processes using **SJF** and **FCFS.(Non- Preemptive)**

- ii. What is the *average turnaround time* for each of the scheduling algorithm?
4. a) Define the direct and indirect access memories with suitable examples. 6
 b) Distinguish between **logical** and **physical** address. 4
 c) Consider the following Jobs and the free memory partitions, Use **Best Fit** and **First Fit** Algorithms to allocate the jobs and compare their strategies. 10

Job	Memory Free Block KB	Size of Jobs KB
J1	750	700
J2	660	400
J3	500	300
J4	400	150

University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination, Fall -2019

Program: B. Sc Engineering (4th Year 1st Semester)

Course Title: ICT Law, Policy and Ethics, Course No. CSE 407 Credit: 2.00

Time: 1.00 Hour.

Full Mark: 20

Answer any two of the following questions

1. a) Mention the names of three organs of a state? What are the nomenclatures of them in Bangladesh? (1+1)=2
b) Explain the functions of the three organs of a state. 2
c, Who are the heads of the three organs of Bangladesh? What is the position of President in Bangladesh? 2
d) What do you mean by the separation of judiciary from executive in Bangladesh? 2
e) Give five examples of civil suits and five examples of criminal cases commonly seen in Bangladesh. 2
2. a) Mention the names of criminal courts available in district area of Bangladesh. 2
b) Mention the names of criminal courts available in Metropolitan area of Bangladesh. 2
c) Differentiate between courts and tribunals. Write down names of some criminal tribunals in Bangladesh. (1+1)=2
d) What do you mean by GR and CR criminal cases in Bangladesh? 2
e) Discuss the role of police in a criminal case filed in the courts of Bangladesh. 2
3. a) What is meant by *Hajoti* and *Koyedi* in administration of criminal justice in Bangladesh? 2
b) Who forms *charge sheet* and *charge* in a criminal proceeding of Bangladesh? 2
c) Spell out the headings of a trial held by a judicial magistrate. 2
d) Explain 'Confessional statement under 164' found in a criminal case. 2
e) What are the different consequences of a criminal case that may be found at the last of the proceeding? 2

University of Asia Pacific
Department of Computer Science & Engineering
Mid-Semester Examination, Fall-2019
Program: B. Sc. Engineering (4th Year/1st Semester)

Course Title: Artificial Intelligence Course No. CSE 403 Credit: 3.00

Time: 1.00 Hour. Full Mark: 60

There are Four Questions. Answer three questions including Q-1.

1. a. What is meant by intelligent agent? Discuss the properties of an intelligent [5] agent.
- b. Describe Allan Turing's test mechanism to determine the intelligence of a [5] machine.
- c. What is an expert system? Design and describe a simple rule-based expert [10] system.

2. a. With proper examples explain how we can handle a conflict situation. [10]
- b. Represent the following knowledge using logical symbols or Prolog:
 Mr. John is a programmer. He achieved his PhD from Simon University. We,
 the students, learned lots from him. [10]

3. a. Classify agents and environments. [10]
- b. Consider a state space where the start state is number 1 and the successor
 function for state n returns two states, numbers $2n$ and $2n+1$. Now suppose the
 goal state is 29. List the order in which nodes will be visited for the iterative
 deepening search strategy. [10]

4. a. Differentiate between greedy and A* search strategies from objective function's [10]
 perspective.
- b. How can we overcome the local traps in the gradient-based technique? [10]

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Mid-Semester Examination Fall-2019
Program: B.Sc.

Course Title: Mathematics for Computer Science Course No.: CSE 401 Credit: 3.00
 Time: 1.00 Hour. Full Mark: 60

There are **Four** Questions. **Answer three questions including Q-4.**

1. a. The average number of comparison steps made by quicksort when it is applied to **20** n items satisfies the following recurrence-

$$C_0 = 0$$

$$C_n = n + 1 + \frac{2}{n} \sum_{k=1}^{n-1} C_k \quad ; \text{for } n > 0$$

Analyze the complexity of quicksort algorithm by solving the recurrence mentioned above.

2. a. Find a closed form solution of the following multiple sum: **12**

$$S_n = \sum_{1 \leq j < k \leq n} \frac{1}{k+j}$$

- b. Apply perturbation method to find a closed form solution of the following sum: **08**

$$\sum_{k=0}^n k 3^k$$

3. a. How can you prove that there are infinitely many prime numbers? **10**
 b. Derive the recurrent relation for Stirling numbers of second kind. **7+3**
 Find the value of "4 subsets 3".

4. a. Twelve friends decided to play an indoor game, which is similar to the Josephus problem. In this game, twelve people sit around a round table and every second person is eliminated from the game until there is one last person remaining. The twelve friends are numbered as follows- 9

Imrul	1
Muminul	2
Khaled	3
Rubel	4
Fizz	5
Tamim	6
Sharafat	7
Tanzim	8
Mashrafee	9
Shakib	10
Mahmudullah	11
Mushfiq	12

Who will be the last person alive in this game? Provide proper mathematical explanation for your answer.

- b. Shakib is a very intelligent person and he realized how close he was winning the game mentioned in 4(a). So, he proposed to play the game again, but this time every 3rd person will be eliminated.
Do you think Shakib will win this round? Apply the algorithm for finding $J_q(n)$ to support your answer.
- c. What are prime numbers? 2

OR

4. a. The Concrete Math Club has a casino in which there's a roulette wheel with one thousand slots, numbered 1 to 1000. If the number n that comes up on a spin is divisible by the floor of its cube root, that is, if 18

$$\lfloor \sqrt[3]{n} \rfloor \mid n$$

Then it's a winner and the house pay us \$4; otherwise it's a loser and we must pay \$1.

Can we expect to make money if we play this game? Provide proper mathematical reasoning to support your answer.

- b. What do you understand by Stirling number of second kind? 2

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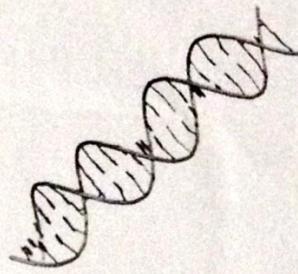
Course Title: Bioinformatics
Time: 1.00 Hour

Course No.: CSE 423

Credit: 3.00
Full Mark: 60

Answer Question 1, Question 3 and one of the two given choices for Question 2.

- Q1.** a. We know that every DNA has a double helix structure (as shown in the figure) comprising of nucleic acid bases where each base of one sequence forms a base pair bond with another base of the second sequence.
- i. Write the names of all four nucleic acids that DNA sequences are built with.
- ii. Mention which nucleic acid base forms bond with which base.
- iii. Write the complement of the following DNA sequence: AACATCGCA
- b. The GC-content of a DNA string is defined as the percentage of symbols in the string that are either 'C' or 'G'. Find out the GC-content of the following DNA string: TCCCACTAATAATTCTGAGG
- c. Briefly describe the process of Transcribing DNA into RNA. [10]
- Q2.** a. Define the terms Substring and Subsequence of a string. [4]
- b. Find out the total number of **unique substrings** and **unique subsequences** of the following DNA string: ACATG [4]
- c. Find out the Longest Common Subsequence among all of the following DNA strings mentioning in brief your working process for this task. [12]
- String 1: AACATCGCA
String 2: ACTAAGAAT
String 3: TCTGAGG



- Or**
- Q2.** a. Define the terms 'Collision' and 'Double Hashing' for hashing techniques. [4]
- b. Propose a hash function which can generate unique hash values for all possible RNA strings of length = 4. [8]
- c. Using your proposed hash function for Question 2 (b), find out the number of occurrences of the following pattern **P** in the text **T**.
- T:** ACUGAAAGAAU
P: GAAU

3. a. Consider the following set of RNA sequences [07]
P: {UCAAAU, GAAU, UACA, UAGA, UCAGA}
Build a Keyword Tree (Trie Tree) with these sequences.

- b. Extend the Keyword Tree of Question 3 (a) into a search automaton according to the Aho-Corasick Pattern Matching algorithm. The pseudocode for constructing search automatons is given here.

Algorithm : Construction of Search Automaton

```
1: Q := emptyQueue()
2: for a ∈ Σ do
3:   if (g(0,a)) = q ≠ 0 then
4:     f(q) := 0, enqueue(q,Q)
5:   end if
6: end for
7: while !isEmpty(Q) do
8:   v := dequeue(Q)
9:   for a ∈ Σ do
10:    if g(v,a) = u ≠ ∅ then
11:      enqueue(u,Q), v := f(v)
12:      while g(v,a)=∅ do
13:        v := f(v)
14:      end while
15:      f(u) := g(v,a)
16:      out(u) := out(u) ∪ out(f(u))
17:    end if
18:  end for
19: end while
```
