

Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science and Engineering
4th Year 1st Semester B.Sc.Engg. Midterm Examination-2022

Course Code : CSE405
Course Title : Digital System Design

Marks: 20
Time: 1 hour

N.B. Answer all 3(Five) questions, taking

Q1. Design a 4-bit combinational logic shifter with the following operations:

6

H_1	H_0	$H_2=0$	$H_2=1$
0	0	$F=A$	$F=A$
0	1	$F = \text{shr } A \text{ with input } I_R$	$F = \text{shr } A \text{ with LSB}$
1	0	$F = \text{shl } A \text{ with input } I_L$	$F = \text{shl } A \text{ with MSB}$
1	1	$F = \text{all } 0\text{'s}$	$F = \text{all } 1\text{'s}$

Q2. Design an arithmetic unit using two selection variables, S_1 and S_0 , that generates the following arithmetic operations (use an adder and basic gates)

6

S_1	S_0	$C_{in} = 0$	$C_{in} = 1$
0	0	$F = A$	$F = A + 1$
0	1	$F = A - B - 1$	$F = A - B$
1	0	$F = B$	$F = B + 1$
1	1	$F = B - A - 1$	$F = B - A$

Q3. Using JK flip-flops design one typical stage of a register that performs the following logical micro-operations: (draw necessary figures)

8

$$p_1: A \leftarrow \overline{A \vee B}$$

$$p_2: A \leftarrow \overline{A \wedge B}$$

$$p_3: A \leftarrow A \odot B$$

$$p_4: A \leftarrow A - B$$

$$\bar{A}B + A\bar{B}$$

Bangabandhu Sheikh Mujibur Rahman Science and Technology University

Department of Computer Science & Engineering Department

4th Year 1st Semester B.Sc. Engineering Examination-2022

Course No: CSE 411

Course Title: Communication Engineering

Full Marks: 20

Time: 1 hours

- Q.1 Describe the characteristics of a data communication system. 4
- Q.2 Define Shannon capacity. A telephone line normally has a bandwidth of 4000 Hz assigned for data communications. The signal-to-noise ratio is usually 3162. What is the channel capacity? 5
- Q.3 What is baseband transmission? What is the required bandwidth of a low-pass channel if we need to send 1 Mbps by using baseband transmission? 3
- Q.4 What is attenuation? We have a channel with a 1-MHz bandwidth. The SNR for this channel is 100. What are the appropriate bit rate and signal level? 4
- Q.5 What are the propagation time and the transmission time for a 5-Mbyte message (an image) if the bandwidth of the network is 1 Mbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s. 4

$$1 \text{ kbps} = 10^3$$

$$V = f$$

$$1 \text{ Mb} = 10^6$$

$$\downarrow \text{don't } 20 \log_{10} \text{ SNR}$$

Note: Answer 2(TWO) questions taking any 3(THREE) questions.

- Q1 (a) The vast majority of the signals that can be found in nature are analog. Why the analysis of a signal typically involves the use of digital signal processing. 4
- (b) Define the digital signal. How does an analog signal transform into a digital signal? 3
- (c) Determine whether the unit ramp signal is a power or energy signal. 3
- Q2 (a) A discrete-time signal $x(n]$ is defined as 5
- $$x(n) = \begin{cases} 1 + \frac{n}{3}, & -3 \leq n \leq -1 \\ 1, & 0 \leq n \leq 3 \\ 0, & \text{elsewhere} \end{cases}$$
- vii) Determine its values and sketch the signal $x(n]$
- viii) Sketch the signal resulted if you first fold $x(n]$ and then delay the resulting signal by four samples.
- ix) Sketch the signal resulted if you first delay $x(n]$ by four samples and then folding the resulting signal
- (b) Write short note on the following discrete time signals 2.5
- (i) Unit sample (ii) unit step (iii) unit ramp
- (c) Explain energy signal and power signal. 2.5
- Q3 (a) Briefly explain ~~the~~ and Draw the block diagram of following system- 3
- $$y(n) = \frac{1}{4}y(n-1) + \frac{1}{2}[x(n+1) + x(n-1)]$$
- (b) Write short note on (i) Even and odd signal (ii) Periodic and a periodic signal. 3
- (c) Let discrete-time system can be 4
5. Static or dynamic
6. Time invariant or time variant
- Examine the following system with respect to the properties above where $x(n]$ is input to the system.
- vii. $y(n) = \cos [x(n)]$
- viii. $y(n) = x(n)\cos \omega n$
- ix. $y(n) = x(-n + 2)$

Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science and Engineering
4th Year 1st Semester B.Sc.Engg. Midterm Examination-2022

Course Code: CSE421

Course Title: Computer Simulation & Modeling

Marks: 20

Time: 1 hour

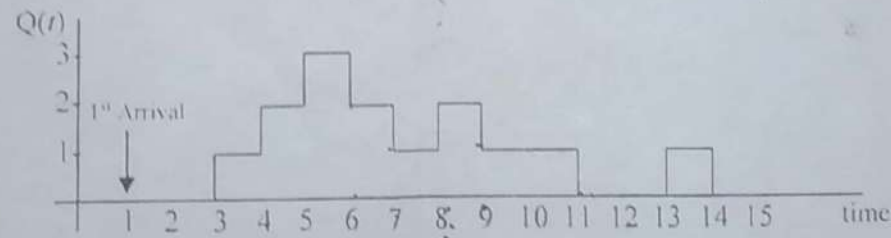
N.B. Answer all 02(Two) question

- Q1.** The occurrences of demand in an inventory system which follows a policy $(S, s) = (5, 3)$ are listed below: **10**

Month	0.6	0.9	1.2	1.9	2.1	2.4	2.5	2.6	2.9
Demand size	4	3	2	3	1	2	3	3	4

Initial inventory level is 4. If order is placed in the end of a month, it arrives after 0.45 month.

- Find the average holding cost after 3 months where holding cost for each item per month is \$12.
 - Find the average backlog cost after 3 months where backlog cost for each item per month is \$30.
- Q2.** For the following graph which indicates the number of customers in queue against time, determine the average number of customers in queue, average waiting time and average utilization time when there are 6 customers. **10**



Bangabandhu Sheikh Mujibur Rahman Science and Technology University
Department of Computer Science and Engineering
4th Year 1st Semester B.Sc.Engg. Midterm Examination-2022

Course Code : CSE401

Course Title : Artificial Intelligence

Marks: 20

Time: 1 hour

N.B. Answer all 4(Four) questions

- Q1. How do you define Artificial Intelligence (AI)? What can AI do today? Explain the significance of the statement - "System that acts rationally". 5
- Q2. Is either Depth-First Search(DFS) or Breadth-First Search(BFS) complete or optimal? Justify your answer. When will DFS outperform BFS? 5
- Q3. Write short notes on the following terms: 5
- (i) Goal-based agent,
 - (ii) Fully observable vs Partially observable environment

