

**International Islamic University Chittagong**  
**Center for General Education (CGED)**  
**Final Examination, Autumn - 2021**

Course Code: URIH – 4701

Course Title: A Survey of Islamic History and Culture

Full Marks: 50

Time: 2:30 Hours

Answer any five of the following questions.  
[All questions are of equal value]

1. Estimate the reforms of Abdul Malik bin Marwan in the history of Islam. How did these reforms contribute to world civilization?
2. Assess the policies of *Umar bin Abdul Aziz*. Why is he called the 'fifth pious *khalfah*' in Islam? Discuss.
3. Investigate the factors of the decline and fall of *Umayyad Khilafah*.
4. Evaluate the contributions of *Khalifah Abu Zafar al-Mansur* as the real founder of *Abbasid Khilafah*.
5. "Mamun's reign was unquestionably the most brilliant and glorious of all the history of Islam"- Estimate the statement with pragmatic reasons.
6. Appreciate the contributions of Muslims to the development of Medical Science or Geography. How is modern Medical Science or Geography indebted to this development?
7. Write short notes on any two of the following topics.
  - a) Social Stratification under *Umayyads Khilafah*
  - b) Conquest of Spain during *Khalifah Al-Walid*
  - c) Foreign Policy of *Khalifah Harun al-Rashid*
  - d) Fall of Baghdad in 1258 A.D.

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# International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

Final Exam, Autumn 2021

Course Code: CSE 3633

Course Title: **Computer Networks**

Time: 2 hours 30 minutes

Full Marks: 50

- (i) The figures in the right-hand margin indicate full marks  
(ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

Course Outcomes (COs) of the Questions	
CO1	Understand and analyze the architectures of different types of computer complex networks and protocols
CO2	Evaluate the performance of protocols and networks
CO3	Demonstrate a familiarity with major network and security algorithms and protocols
CO4	Identify and apply applications of computer networks with determining suitable alternatives of the networks for the alternative conditions.

Bloom's Levels of the Questions						
Letter Symbols	Re	Un	Ap	An	Ev	Cr
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

## Part A

[Answer the questions from the followings]

1. a) Apply LSR algorithm on the following network in fig-1 to construct a routing table of router 'C'. CO3 Ap 5

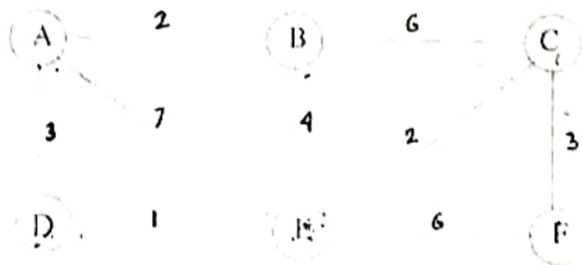


Fig-1

Or,

1. b) Apply DVR algorithm on the above network in fig-1 to construct a routing table of router 'C'. CO3 Ap 5

2. a) Discuss the advantages and disadvantages of flooding technique. How many packets will be generated if you apply the simple flooding technique on the network in the above diagram fig-1 to make sure that each of the nodes receives at least one copy of the packet? CO3 An 5
2. b) With necessary details, write how can you regulate packet flow into a network from the host? CO3 An 5

Or,

- |   |    |  |     |    |   |
|---|----|--|-----|----|---|
| 2 | a) | Write down the advantages and disadvantages of hierarchical routing with the help of appropriate network diagram.  | CO3 | An | 5 |
|   | b) | What is the token bucket algorithm? A token bucket scheme is used for traffic shaping. A new token is put into the bucket every $\mu\text{sec}$ . Each token is good for one short packet, which contains 80 bytes of data. What is the maximum sustainable data rate? | CO3 | Ap | 5 |

### Part B

[Answer the questions from the followings]

- |     |    |   |     |    |   |
|-----|----|---|-----|----|---|
| 3.  | a) | What is the necessity of transport layer? How does transport layer foil the delay and duplicate connection requests.                                | CO4 | An | 5 |
| 3.  | b) | Is there any transport protocol for crash recovery truly? Do you have any suggestion in this regard?  | CO4 | An | 5 |
| 4.) | a) | Is there any security issue with TCP/IP? If so, write them. What problem can arise in using TCP protocol and what is the reason behind it? Discuss. | CO2 | Ev | 5 |
| 4.  | b) | Briefly explain TCP and UDP. Write down the situations in which these two protocols can be used.  | CO2 | Ev | 5 |
| 5.  | a) | Explain the hierarchical structure of DNS with figure. Why such a structure is useful?  | CO3 | Un | 5 |
| 5.  | b) | Each of the protocol of application layer has its own role and importance. Find out the role and importance of SMTP, FTP and HTTP.                  | CO3 | Un | 5 |

Or,

- |     |    |  |     |    |   |
|-----|----|--|-----|----|---|
| 5.) | a) | Show the encryption and decryption techniques by using RSA method.   | CO3 | Ap | 5 |
| 5.  | b) | Do you have any use of public key cryptography? How does it function for privacy and authentication message? Give example. | CO3 | Ap | 5 |

Course Code: CSE 4741

Course Title: Computer Graphics

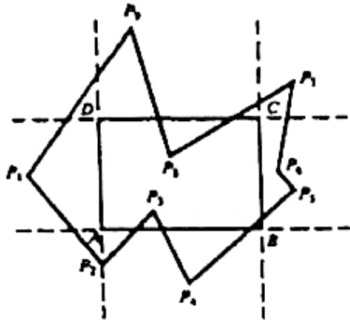
Time: 2 hours 30 minutes

Full Marks: 50

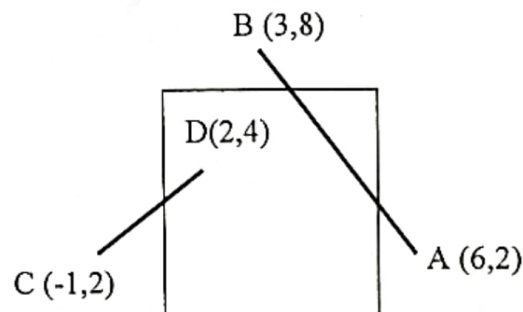
[The figures in the right-hand margin indicate full marks]

### Part A

- 1(a) What is viewing transformation? Why is it so important in computer graphics? CO1 Ap 2  
Find the workstation transformation with x extent 0 to 1 and y extent 0 to  $\frac{3}{4}$  in the normalized device space into a workstation viewport whose lower left corner is at (5,5) with same aspect ratio.
- 1(b) Find the clipping polygon using Sutherland-Hodgman and Waler-Atherton algorithm of the following image. Show the steps including vertex output list and subject polygon and clipping polygon. CO1 Ap 2



1(c)



Find the region codes for end point A(5,2); B(3,8); C(-1,2) and D(2,4). Then, Clip the line segments AB and CD using Cohen-Sutherland algorithm. (Assume  $X_{min}=1$ ,  $X_{max}=5$ ,  $Y_{min}=1$ ,  $Y_{max}=7$ )

OR

Find the normalization transformation that maps a window whose lower left corner is at (0,0) and upper right corner is at (4,3) onto a viewport that is the entire normalized device screen. So that aspect ratios are preserved.

- 2(a) Find the transformation for mirror reflection with respect to xy plane. CO2 U 2



- 2(b) Given a 3D object A(1,2,3), B(4,5,6), C(5,6,7) and D(7,8,4). Find the mirror reflection about xy-plane, yz-plane and zx-plane. CO1 Ap 4
- 2(c) Given a line AB in 3D space with coordinate points A (0, 0, 0) and B(3, 5, 3). Apply the rotation on AB, so that the line will completely align with Z axis (keeping the point A fixed). Find the new coordinates after rotation. CO1 Ap 4
- Or
- Find the align matrix which aligns a given vector V with the vector K along the positive z-axis.

### Part B

- 3(a) The unit cube is projected onto the xy plane. Draw the projected image using the standard perspective transformation with  
 (i)  $s = 4$   
 (ii)  $s = 15$   
 where s is distance from the view plane. CO1 An 3
- 3(b) Suppose you are an artist and want to draw a three dimensional picture, which projection you will use to make a realistic view. Describe the following states with necessary diagram. CO1 An 3
- i) In what situation object represents upside down?  
 ii) In what situation objects are appeared to meet a certain point?  
 iii) In what situation the object will appear small than original?
- Or
- Briefly explain the anomalies on perspective projection.
- 3(c) Find the transformation for CO3 Ap 4
- a) Cavalier with  $\theta = 45^\circ$   
 b) Cabinet projection with  $\theta = 30^\circ$   
 c) Draw the projection of the unit cube for each transformation.
- 4(a) Describe the different ways of representing a polygonal net model. CO1 U 3
- 4(b) What is the working principle of z-buffer algorithm? Demonstrate with an example. CO3 U 3
- Or
- Describe Painters algorithm for hidden surface removal. Give necessary example.
- 4(c) Given points  $P_1(1,2,0)$ ,  $P_2(3,6,20)$  and  $P_3(2,4,6)$  and a viewpoint C(0,0,-1), determine which points obscure the others when viewed from C. CO2 An 4
- 5(a) What is pinhole camera? Write the working principle of basic pinhole camera. In which fields pinhole camera are important? Describe in brief. CO1 R 3
- 5(b) What is light? What are the basic characteristics of light? Describe the visible band of electromagnetic spectrum. CO1 R 3
- 5(c) If a point  $P_1$  on line 5 has an RGB color (1, 0.5, 0) and point  $p_2$  on line 15 has an RGB color (0.2, 0.5, 0.6), what is the color for line 8? CO3 Ap 4
- Or
- Lines in two dimensional space can be represented by either the algebraic equation  $y = mx + b$  or the parametric vector equation  $L(t) = s + td$ , where  $-\infty < t < +\infty$ . For  $s = I + J$  and  $d = I - J$ , find the equivalent algebraic representation.

# International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

Final Exam, Autumn 2021

Course Code: CSE 4743

Course Title: Computer Security

Time: 2 hours 30 minutes

Full Marks: 50

- (i) The figures in the right-hand margin indicate full marks  
(ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

Bloom's Levels of the Questions						
Letter Symbols	R	U	App	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

## Part A

[Answer the questions from the followings]

1. a) Explain CIA for computer security. Why passwords are used? What is the benefit of using salt in passwords? CO2 App 5

Or,

1. a) Explain a situation where Diffie-Hellman key exchange might be used. How can a recipient verify that a message came from you? CO2 App 5

1. b) Explain Euler's Totient function. Find  $\phi(13)$  and  $\phi(14)$ . CO1 U 5

2. a) How Honey Pot-based Intrusion Detection works? How you will tune IPS signature alarms? CO1 U 5

2. b) Alice is sending a message to Bob. The message is "I had my breakfast this morning". Eve wants to modify the message to "I did not have breakfast this morning" and wants to send this modified message to Bob. How can Eve be prevented from modifying this message with the help of Hash Function? CO2 App 5

Or,

2. b) Let the length of a password (L) is 4. Assume all symbols equally likely and  $E(G) \geq (1/4)2^{H(X)} + 1$ . Let password guessers can guess 2 million passwords in a second. Calculate:

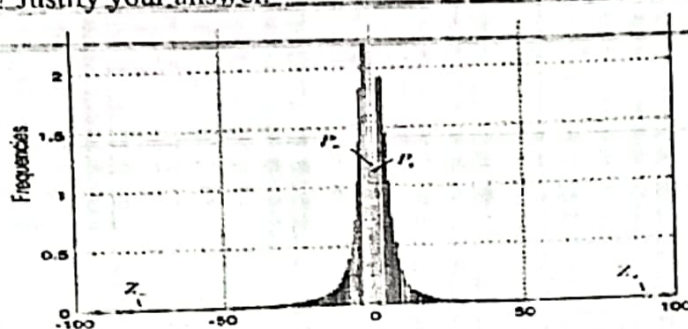
- Entropy
- Lower bound on expected guesses  $E(G)$
- Strength of the password

## Part B

[Answer the questions from the followings]

3. a) Explain Pre-processing phase of the SHA-3 Hashing algorithm with suitable figure(s). CO1 U 5

- |       |   |     |     |   |
|-------|---|-----|-----|---|
| 3. b) | What is a digital signature? Why it is used? If a person P signs message M with signature S(P,M), what are the desired properties from security perspectives? | CO1 | R   | 5 |
| 4. a) | How does TLS (Transport Layer Security) start a secured communication involving two parties? How TLS 1.3 improves over TLS 1.2?                               | CO3 | U   | 5 |
| 4. b) | Write down the IPSEC processing that would be applied to an incoming packet before sending the packet to the transport layer of a host.                       | CO3 | An  | 5 |
| 5. a) | What is Steganography? What are the drawbacks of Cryptography that can be overcome by Steganography?  | CO3 | R   | 3 |
| 5. b) | Define embedding Payload and embedding capacity. Briefly explain the steps of Basic pixel reference errors (BPPE) histogram based scheme.                     | CO5 | U   | 5 |
| 5. c) | Do you think an intruder can guess the existence of the secret message from the histogram below? Justify your answer.   | CO2 | App | 2 |



Or,

- |       |   |     |     |   |
|-------|---|-----|-----|---|
| 5. a) | Demonstrate some packet filtering policies that are configured in your firewall.  | CO4 | App | 4 |
| 5. b) | Explain Proof of work in Blockchain. Why is it an expensive process? What makes forging of a block difficult in Blockchain? | CO3 | U   | 6 |



**Bismillaher Rahmanir Rahim**  
**International Islamic University Chittagong**  
 Department of Computer Science and Engineering  
 B. Sc. in CSE  
 Final Exam, Autumn 2021

Course Code: **CSE 4745**

Course Title: Numerical Methods

**Full Marks: 50**

**Time: 2 hours 30 minutes**

Answer all questions. The figures in the right-hand margin indicate full marks

Course Outcomes and Bloom's Levels are mentioned in additional Columns

				CO										
		<b>Group A</b>												
1.	a)	Solve the following system of linear equation by <i>Gauss-Jordan</i> method: $2x_1 + 11x_2 - 3x_3 = 4$ $3x_1 + 3x_2 + 20x_3 = 7$ $x_1 + 28x_2 + 80x_3 = 20$	4.5	CO1										
1.	b)	Solve the following system of linear equation by <i>Gauss Seidel</i> method: $3x_1 + 25x_2 - x_3 = 7$ $2x_1 + 13x_2 + 20x_3 = 5$ $x_1 + 21x_2 + 80x_3 = 29$	4.5	CO1										
1.	c)	Write the difference between <i>Jacobi Iteration</i> and <i>Gauss Seidel method</i> in context of iteration.	1	CO1										
2.	a)	The observations from an experiment are as given below <table style="margin-left: 40px;"> <tr> <td>x</td><td>2</td><td>10</td><td>26</td><td>61</td></tr> <tr> <td>y</td><td>600</td><td>500</td><td>4XX</td><td>350</td></tr> </table> [XX means the last two digits of your ID number. Example: for C191017, XX will be 17] It is known that a relation of type $Y = a + bX$ exists. Find the best possible values of $a$ and $b$ .  <b>OR</b>	x	2	10	26	61	y	600	500	4XX	350	5	CO4
x	2	10	26	61										
y	600	500	4XX	350										
2.	a)	The observations from an experiment are as given below <table style="margin-left: 40px;"> <tr> <td>x</td><td>2</td><td>10</td><td>26</td><td>61</td></tr> <tr> <td>y</td><td>600</td><td>500</td><td>4XX</td><td>350</td></tr> </table> [XX means the last two digits of your ID number. Example: for C191017, XX will be 17] It is known that a relation of type $Y = ae^{bx}$ exists. Find the best possible values of $a$ and $b$ .	x	2	10	26	61	y	600	500	4XX	350	5	CO4
x	2	10	26	61										
y	600	500	4XX	350										



2.	b)	Find the best linear fit to the data $(x, y) = (1, 0.5), (2, 2.5), (3, 2), (4, 4), (5, 3.5), (6, 6), (7, 5.5)$	5	CO4																
		OR																		
2.	b)	Compare with appropriate example for fitting a polynomial n degree equation and a parabola.	5	CO3																
Groups B																				
3.	a)	Derive the equations of 1st order <i>differentiation</i> and discuss which equation is better than other?	5	CO1																
3.	b)	Find $y'$ and $y''$ from the following table for $x=2$ : <table><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>y</td><td>12.89</td><td>14.56</td><td>17.45</td><td>19.34</td><td>20.45</td><td>22.34</td><td>26.89</td></tr></table>	x	1	2	3	4	5	6	7	y	12.89	14.56	17.45	19.34	20.45	22.34	26.89	5	CO2
x	1	2	3	4	5	6	7													
y	12.89	14.56	17.45	19.34	20.45	22.34	26.89													
		OR																		
3.	b)	From the following table find x, correct to two decimal places, for which y is maximum and find this value of y. <table><tr><td>x</td><td>1.2</td><td>1.3</td><td>1.4</td><td>1.5</td><td>1.6</td></tr><tr><td>y</td><td>0.9320</td><td>0.9636</td><td>0.9855</td><td>0.9975</td><td>0.9996</td></tr></table>	x	1.2	1.3	1.4	1.5	1.6	y	0.9320	0.9636	0.9855	0.9975	0.9996	5	CO2				
x	1.2	1.3	1.4	1.5	1.6															
y	0.9320	0.9636	0.9855	0.9975	0.9996															
4.	a)	Derive <i>Trapezoidal rule</i> for integration.	4	CO1																
4.	b)	Do you think <i>Simpson's 3/8 rule</i> is better to get the more accurate result than <i>Simpson's 1/3 rule</i> ? If yes then why or if no then why?	1	CO2																
4.	c)	Evaluate $\int_1^9 \frac{1}{3}x \, dx$ by i) <i>Simpson's 1/3</i> and <i>Simpson's 3/8</i> rule and compare the result with the exact value $\log_e 9$ of the integral.	5	CO2																
		OR																		
4.	c)	Evaluate $\int_0^{45} \cos x \, dx$ by <i>Trapezoidal rule</i> . Here both upper limit and lower limit is in degree. The interval will be divided into 3 strips.	5	CO2																
5.	a)	A rod is rotating in a plane. The following table gives the angle $\theta$ in radians through which the rod has turned for various values of the time t seconds. Calculate the i) <b>angular velocity</b> and the ii) <b>angular acceleration</b> of the rod, when $t = 0.7$ sec. <table><tr><td>t-seconds</td><td>0.0</td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td></tr><tr><td><math>\theta</math>-radians</td><td>0.0</td><td>0.22</td><td>0.48</td><td>1.10</td><td>2.0</td><td>3.2</td></tr></table>	t-seconds	0.0	0.2	0.4	0.6	0.8	1.0	$\theta$ -radians	0.0	0.22	0.48	1.10	2.0	3.2	5	CO6		
t-seconds	0.0	0.2	0.4	0.6	0.8	1.0														
$\theta$ -radians	0.0	0.22	0.48	1.10	2.0	3.2														
5.	b)	Use the <i>fourth order Runge-Kutta method</i> to solve $\frac{dy}{dx} = Ax^2 + y^2$ , $y(0) = 1$ [A means the last digit of your ID number.] for the interval $0 < x \leq 0.4$ , with $h = 0.2$ .	5	CO6																

# International Islamic University Chittagong

## Department of Computer Science and Engineering

B. Sc. in CSE Final Examination, Autumn 2021

Course Code: CSE 4747 Course Title: Mathematical Analysis for Computer Science

Total marks: 50

Time: 2 hours 30 minutes

The figures in the right hand margin indicate full marks.

Course Outcomes and Bloom's Taxonomy Levels are mentioned in additional Column

### Group A

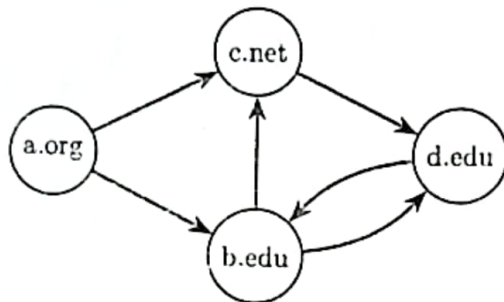
- 1a) In a best-of-three tournament, the probability of the IUUC football team to win the first match is 50%. In subsequent games, their probability of winning is determined by the outcome of the previous game. If the IUUC team lost the previous game, then they work hard on tactics and win the current game with a probability of 60%. If they win the previous game, then they keep less focus on the game and win the current game with a probability of only 30%. CO3 E 6
- i) What is the probability that the first two matches decide the tournament champion?
- ii) What is the probability that the IUUC team wins the tournament, given that they win the first game?
- 1b) Suppose that we flip three fair, mutually-independent coins and consider the following three events: CO2 An 4
- A1 is the event that coin 1 matches coin 2.
  - A2 is the event that coin 2 matches coin 3.
  - A3 is the event that coin 3 matches coin 1.
- Now, illustrate that how pairwise independence does not necessarily imply the mutual independence.
- Or,
- 1b) Find the probability that in a family of 4 children there will be CO2 An 4
- (a) at least 1 boy and
- (b) at least 1 boy and 1 girl. Assume that the probability of a male birth is 0.5
- 2a) A computer program crashes at the end of each hour of use with probability  $p$ , if it has not crashed already. Now, formulate a procedure to estimate the expected time until the program crashes? CO2 An 4
- 2b) At an unknown railway station, a person arrived at a four-way intersection point. Now, he wants to find out the exit gate, but there is no proper signboard available in this station. Therefore, initially, he has to choose one of four directions. If he goes North, then he will find the exit gate after one minute of travelling. If he goes East, he will wander around the station for three minutes and will then return to his initial position. If he goes South, he will wander around the station for ten minutes and will then return to his initial position. If he goes West, then he will find the exit gate after five minutes of travelling. Assuming that the person is at all times equally likely to choose any of the four directions. Now, estimate the expected number of minutes that the person will be trapped in the station. CO3 E 6
- Or,
- 2b) Suppose that whether or not it rains today depends on previous weather conditions through the last two days. Specifically, suppose that if it has rained for the past two days, then it will rain tomorrow with probability 0.8; if it rained today but not yesterday, then it will rain tomorrow with probability 0.6; if it rained yesterday but not today, then it will rain tomorrow with probability 0.3; if it has not rained in the past two days, then it will rain tomorrow with probability 0.1. CO3 E 6



- (a) Represent the scenario with a four-state Markov chain transition probability matrix.
- (b) Given that it rained on Monday and Tuesday, what is the probability that it will rain on Thursday?

### Group B

- 3a) What is Markov property. CO1 R 2
- 3b) A wireless channel is either bad (due to noise and interference) or good. A particular channel changes its states from slot to slot as follows: a good channel continues to be good in the next slot with probability 0.7, and turns bad with probability 0.3; a bad channel becomes good in the following slot with probability 0.6 and remains bad with probability 0.4. CO3 E 8
- What is the probability that a channel will be found good in the eleventh slot if it is observed to be bad in the seventh slot?
- What are the probabilities that, in an arbitrary slot in the long run, the channel will be found in good or bad states?
- 4a) State the gambler's ruin problem. Formulate a mathematical model to estimate the probability of avoiding ruins. CO1 R 3
- 4b) Formulate a procedure for robust calculation of the ranks of the pages in a Web-graph based on a random walk on that graph. CO3 U 3
- Illustrate how it is meant to work with the following Webgraph where (hyper)links are represented by directed edges. 4



Make reasonable assumptions as necessary.

- 5a) Explain the Simpson's paradox. CO1 R 3
- 5b) Following slotted Aloha protocol,  $n$  contending nodes attempt to transmit via a shared channel to an access point. The probability that a given node transmits in a particular slot is  $p$ . The nodes act independently of each other, and the events across slots are also independent. Any slot that sees more than one (concurrent) transmission is wasted due to collision, and slots that don't have any transmission from any of the  $n$  nodes are also wasted idly. A single transmission from one and only one of the nodes results in a successful transmission. With this setup, find the followings: CO3 Ap 7
- i) If there is a collision in a slot, what is the expected number of nodes involved in the collision?
- ii) What is the probability that a given slot sees at least one transmission?
- Or,
- 5a) What is queueing model? Describe some of the characteristics of it. CO1 R 3
- 5b) A tool crib has exponential interarrival and service times, and it serves a very large group of mechanics. The mean time between arrivals is 4 times. It takes 3 minutes on the average for a tool-crib attendant to service a mechanic. The attendant is paid \$10 per hour and the mechanic is paid \$15 per hour. Would it be advisable to have a second tool-crib attendant? CO3 Ap 7