BINGHAM UNIVERSITY KARU, NASARAWA STATE
DEPARTMENT OF COMPUTER SCIENCE
SECOND SEMESTER TEST 2020/2021 SESSION

COURSE TITLE: Computer Network & Data Communication COURSE CODE: CMP 401

CREDIT UNIT: 3 TIMES ALLOWED: 3Hrs

Instruction: Answer any Four (4) questions.

1a. Discuss the benefits of Computer Network?
1b. What are the Desirable criteria for an efficient Computer Network?

2a. Discuss any three Network devices you know?
2b. Distinguish between Classical and Distributed Networking?

3a. Briefly explain the differences between the fiber optic and copper cable technology?

3b. Explain the similarity and difference in the OSI and TCP/IP model?

4a. Explain the key components of Data Communication?

4b. Explain the term "MODEM"?

DICKSON

CMP418 FINAL CA TEST 2020/2021 ACADEMIC SESSION

Time: 90 Mins Credit Unit(s): 3 Units Instruction: Answer all questions

Question One: Transform and Conquer

a) There are three major variations of Transfrom and Conquer techniques for problem solving, explain each of the three with examples. **(3 Marks)**

b) There are four properties that qualifies a tree as a Heap (Max or Min), least and explain each of the properties **(4 Marks)**

c) Transform the array below into a maxheap. Make sure you show each step of the transformation process **(3 Marks)**

0	1	2	3	4	5	6
	3	10	8	7	6	9

Question Two: Divide and Conquer

a) Given the general condition of divide-and-conquer recurrence relationship as $T(n) = T(n/b)+f(n)$ such that $a \geq 1$ and $b > 1$. **State the master theorem** **(3 Marks)**

b) Use the *Masters Theorem* to derive the complexity class of the following functions

i. $T(n) = 8\ T(\frac{n}{2}) + 1$ **(1 Mark)**

ii. $T(n) = 2\ T(\frac{n}{9}) + n^3$ **(1 Mark)**

c) Sort the array below using merge sort algorithm. Make sure you show each steps of divide and conqure **(5 Marks)**

0	1	2	3	4	5	6	7
9	4	3	10	8	2	6	4

Question Three: Decrease and Conquer

a) There are three major methods of implementing decrease and conquer, list and explain each **(3 Marks)**

b) How many iterations do you need to search for k=69 , k = 84, & k = 13 when you apply binary search algorithm? **(7 Marks)**

0	1	2	3	4	5	6	7	8	9	10	11	12
2	13	26	30	38	41	54	69	73	80	84	92	97

Question Four: Asymptotic Notational Problem

a) Use empirical analysis to analyze each functions given below and rearrange the functions in increasing order of growth (after computing for n=1000). Add short explanation to explain your ordering to earn full marks. Use n = 10, 50, 100, 200, 500, 1000 **(4 Marks)**

$f_1 = n^2$, $f_2 = n$, $f_3 = n \log n$, $f_5 = \log n^2$

b) With the aid of diagram differentiate three asymptotic notations **(2 Marks)**

i. Big O notation **(2 Marks)**

ii. Big Omega (Ω) notation **(2 Marks)**

iii. Theta (Θ) notation

Question Five: Brute Force - Exhaustive Search

You are payed to lead a software development project, which comprises of four (4) subsystems; a company can implement only one subsystem at a time. That is, each company can handle exactly one subsystem and each subsystem should be handled by only one company at a time. The cost that would accrue if the *ith* company is awarded to develop the *jth* subsystem is given as Total Cost C[i, j] for each pair i, j = 1, 2, 3, 4. As shown in the table below,

a. Find the assignment with the most minimum total cost. **(6 Marks)**

b. How much would you have lost after all possible assignment? **(4 Marks)**

Company	Subsystems 1	Subsystems 2	Subsystems 3	Subsystems 4
Company 1	9	2	7	8
Company 2	6	4	3	7
Company 3	5	8	1	8
Company 4	7	6	9	4

Question Six: Analysis of Algorithm

a) Write the general plan for the analysis of non-recursive algorithms **(4 Marks)**

Algorithm **Alpha**

for $i \leftarrow 0$ **to** $n - 2$ **do**

  for $j \leftarrow i + 1$ **to** $n - 1$ **do**

    if $A[i] = A[j]$ **return false**

return true

b) What is algorithm **Alpha** above computing? **(1 Mark)**

c) Is the algorithm **Alpha** Stable? **(1 Mark)**

d) Is algorithm **Alpha** in place? **(1 Mark)**

e) Use the five steps in Q6a to analyse algorithm **Alpha.** **(3 Mark)**

Bingham University Karu
Faculty of Science and Technology
Department of Computer Science
Second Semester Examination 2020/2021 Academic Session

Course Code: CMP418 **Time:** $2\frac{1}{2}$ hours **Credit Unit:** 3 Units

Course Title: Algorithm and Complexity Analysis **Instruction:** Answer any four questions

Question One: Asymptotic Notational Problem

a) Use empirical analysis to analyze each function given below and rearrange the functions in increasing order of growth (after computing for n=1000). Use n = 10, 50, 100, 200, 300, 400, 500, 1000 **(5 Marks)**

$f_1 = n^2$, $f_2 = n$, $f_3 = n^2 \log_2 n$, $f_5 = \log_2 n^2$

b) With the aid of a diagram ***define*** and ***differentiate*** between the following three asymptotic notations

i. Big O notation **(2 Marks)**

ii. Big Omega (Ω) notation **(2 Marks)**

iii. Theta (Θ) notation **(2 Marks)**

Question Two: Analysis of Algorithm

Algorithm **BHU**

```
for i ← 0 to n − 2 do
    for j ← i + 1 to n − 1 do
        if A[i] = A[j] return false
return true
```

a) Write the general plan for the analysis of non-recursive algorithms **(5 Marks)**

b) What is algorithm **BHU** above computing? **(1 Mark)**

c) Is the algorithm **BHU** Stable? **(1 Mark)**

d) Is algorithm **BHU** in place? **(1 Mark)**

e) Use the five steps in Q2a to analyze algorithm **BHU**. **(7 Marks)**

Question Three: Brute Force - Exhaustive Search

You are paid to lead a software development project, which comprises four (4) subsystems; a company can implement only one subsystem at a time. That is, each company can handle exactly one subsystem and each subsystem should be handled by only one company at a time. The cost that would accrue if the *ith* company is awarded to develop the *jth* subsystem is given as Total Cost C[i, j] for each pair i, j = 1, 2, 3, 4. As shown in the table below,

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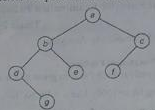
Company 4	7	6	9	4

Question Four: Decrease and Conquer **(6 Marks)**

a) what is the ***preorder***, ***inorder***, and ***postorder*** representation of the following tree?



b) There are three major methods of implementing decrease and conquer. List and explain each. **(3 Marks)**

c) How many iterations do you need to search for k=70, k = 85, & k = 31 when you apply a binary search algorithm? **(6 Marks)**

0	1	2	3	4	5	6	7	8	9	10	11	12
3	14	27	31	39	42	55	70	74	81	85	93	98

Question Five: Divide and Conquer

a) Given the general condition of divide-and-conquer recurrence relationship as $T(n) = T(n/b)+f(n)$ such that $a \geq 1$ and $b > 1$. **State the master theorem** **(5 Marks)**

b) Use the *Masters' Theorem* to derive the complexity class of the following functions

i. $T(n) = 8\,T(\frac{n}{2}) + 1$ **($2\frac{1}{2}$ Marks)**

ii. $T(n) = 2\,T(\frac{n}{2}) + n^2$ **($2\frac{1}{2}$ Marks)**

c) Sort the array below using merge sort algorithm. Make sure you show each steps of divide and conquer **(5 Marks)**

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9	4	3	10	8	2	6	4

Question Six: Transform and Conquer

a) There are three major variations of Transform and Conquer techniques for problem-solving, explain each of the three with examples. **(5 Marks)**

b) Four properties qualify a tree as a Heap (Max or Min), least and explain each of the properties **(5 Marks)**

c) Transform the array below into a maxheap. Make sure you show each step of the transformation process **(5 Marks)**

0	1	2	3	4	5	6
	2	9	7	6	5	8

take it back to the shop and demand your money back! However, it is the nature of software that it is very difficult - some say impossible - to release it 100% bug-free. Discuss the issues regarding software quality.(5marks)

(c) One of the issues with E-commerce Sites concerns WYSIWYG, many users complained about not getting what was advertised on the site or what they ordered for. Suggest ways to improve on what you order is what you get.(5 marks)

SECTION B: Legal Part

Question one

Sefiya Musa, reincarnated as a neoclassical existentialist poet, gave a poetry recital at the ring your heart Concert Hall of the Bingham University arena for intellectual display (better known as "BUAID") On this occasion, she extemporized her poetry, a fancy way of saying she made it up on the spot. Mario ("The Memory") Martinez, a student with an exceptional memory, returned home afterwards and wrote down from memory one of Sefiya Bello's extemporized poems. He published it under the name "Conversations." Does Tabitha have a claim for copyright infringement against Mario? If yes, what will be your justification for the protection of intellectual property right.
(15 Marks)

Question two

"We are sleepwalking into a surveillance society" this was a statement attributed to Richard Thomas, UK Information Commissioner (Aug 2004) how true is this statement in the light of the massive threat to national security and the need to maintain an effective balance between the right to Privacy of person and property rights and the overall security of life's. (15 Marks)

Question three

Riley was a disgruntled employee of Cox. Riley was fired, but before he left, he erased electronic control programs for an electric saw from the saw's printed circuit card. This rendered the card useless. Riley was charged with criminal damage.
Riley was convicted in the magistrates' court but appealed, on the grounds that damage to property had not actually occurred, as a computer program is "intangible" property ("tangible" property is something you can physically pick up and take away).
The appeal court upheld the conviction as it felt there had indeed been damage to property, as "the owner of the saw, which was unquestionably property for the purposes of the statute, had been required to expend time and effort of a more than minimal amount *(in other words, to re-program it)*, in order to restore it to its original condition". If this fact were presented to the courts in Nigeria, under what law is he likely to be charged? And what is likely to be the punishment for such an offence? (15 Marks)

DEPARTMENT OF COMPUTER SCIENCE
END OF SECOND SEMESTER EXAMINATION 2020/2021 SESSION
CMP 416-WEB DEVELOPMENT ISSUES

INSTRUCTION: ANSWER TWO QUESTIONS IN EACH SECTION
SECTION A: GENERAL PART
TIME ALLOWED: 2HRS 30MINS

Question one

Various Process Models have evolved over time, with the water fall model usually considered as being the one which other models are based on. The Models tend to fall into two categories based on 'Construction ' And 'Evolution'. Paradigm.

(a) (i) Explain the Concept of 'Construction ' and 'Evolution' paradigm with respect to process models. Discuss two examples of models in each category ('Construction' and 'Evolution') and highlight their Advantages and Disadvantages. (10 marks)
(ii) Why are models applied in traditional software development NOT applicable in Web development? (2 marks)

(b) What is Software quality, explain the Criteria and procedures for judging quality in web application. (3 marks)

Question Two

(a) Consider the research conducted by kappel et al(2004). The researcher attempts to find out whether or not web development is same as other traditional systems development. The Researcher identifies the four web application development characteristics. With the aid of the diagram, explain the four characteristics of web development and their challenges. (10 marks)

(b) One of the best known approaches to quality control is the "Deming Cycle" The 4 steps in the Deming Cycle are: Plan-Do- Check-Act which is adapted Dahlbom and Mathiassen (1993) as Plan-Produce-Evaluate-Correct. Explain with the aid of a diagram the quality cycle. (3 marks)

(c) List 4 security issues of web application. (2marks)

Question Three

(a) If a customer or user is dissatisfied with a system (product), the developer can always claim to have fulfilled their obligations, provided they have supplied what was originally required. The user, however, may feel that the original specification was inadequate. In your opinion, whose fault is that? The users? Or the developer's or Both? why do you think so? (5 marks)

(b) Software is often not tremendously robust - in fact, it is often full of bugs. If a more tangible product, a refrigerator, say, behaved differently from what is expected, you'd

(13)

Lack of knowing the cost webapp

If you want to have a web but you must reason the cost and. Why are some several factor that may influence cost such factors as

functionality advancement, website size and webdesign advancement theme, because the cost of our website will correlate with the quality of the website

Introduction to law

contract and liability

computer misuse

data protection / privacy law

Intellectual properties

solution:
- Monitoring the activity of the user
- closely observe the essential aspect of the website to plan for effective remediation
- future proofing concentrate on making your website meeting the existing and upcoming requirement with ease

~~setting goals~~

(11) Setting goals

Goals lack of proper goals can affect or reduce the quality of my/a website. Here, Website developer need to have a web defined as specific goals based on the vision behind the website

12 Platform compatibility High ~~compatibility~~ portability and cross platform compatibility are essential for increased user engagement and productivity

solution

(1) comprehensive testing is a way to ensure that the website is truly cross platform and compatible with different systems

~~Lack of knowing the cost of~~

(13)

Lack o

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function

~~because~~

website

CMP 416

9)
Security : Managing security is among software development challenges Driven by increasing number of cyber attacks

- use of authentication : website designer should follow a good password policy it should opt for 2 factor or multifactor authentication

- validation : the designer need to validate user input and ensure it falls within the expected characters

- accessibility : At this stage the designer should follow the principle of the least privilege

10) Support and maintenance : Maintenance of a website is like behind the screen of your website because once your website is live several issue like slow(low) loading speed unresponsive webpages and performance problems occurs

CMP 416

web dev process

(i) Lack of proper well web dev process
In web development standard road map should be followed to avoid making losses eg: good methodology will be applied and outsourcing of good IT personals

(ii) Lack of talent: Bridging talent gap: selecting good talent relevant to the business is very vital in web development for example choosing a reliable approach for hiring good IT personal and go for a skill based hiring

(iii) ~~Fail~~ Lack of good technology ~~stay~~ stack: Sense of tools needed or necessary for design and development of web app is also very important. eg clear project requirement ~~determ~~ determines the tools to be used to achieve the project and emerging Technologies should be used.

(iv) The browser: Selected browser for the project ~~to~~ should be compatible with different ~~op~~ [OS] and different devices also proper testing should be done on the selected browser and browser specific app should be avoided

iv) User interface; your user interface should be interactive and should provide intuitive interface by in consideration
v) in design it should be user centred in nature
vi) Interoperability for easy exchange of information
vii) it should provide smooth navigation and easy to read content
v) scalability Room for growth
vi) speed and performance No user like a slow website therefore slow loading and any delay process should be avoided under normal circumstance should loading time should not exceed 3seconds

external and 3rd party intergration use of google maps through API to access map on your map on your phone therefore changes make in google map shall reflect on your app architecture

* Final Exam Time Table

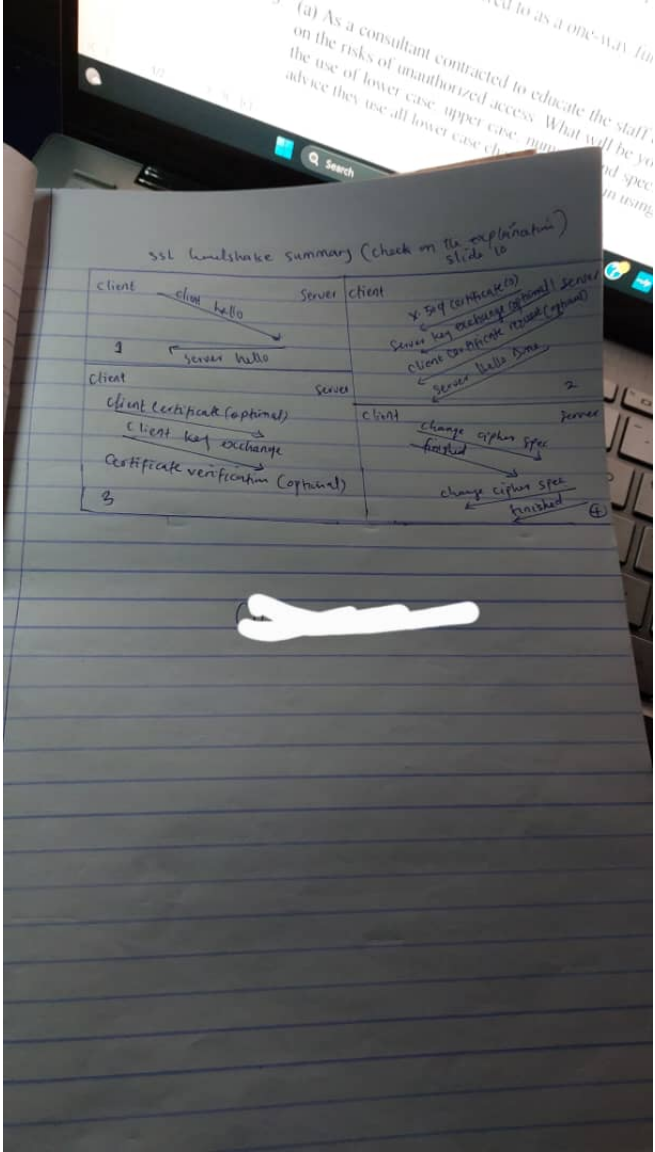
Tuesday, 18th July, 2023 — Cmp 408 — 11:00am - 2:00pm - LH

Thursday, 20th July, 2023 — Cmp 404 - 8:00am - 11:00am - CMP LH

Saturday, 22nd July, 2023 — Cmp 418 — 11:00am - 2:00pm - LH

Monday, 24th July, 2023 — Cmp 416 — 11:00am - 2:00pm - LH

Wednesday, 26th July, 2023 — Cmp 410 - 8:00am - 11:00am - CMP LH


SSL handshake summary (check on the explanation slide 10
client
client hello
server
server hello
1
client
server
client certificate (optional)
client key exchange
certificate verification (optional)
3
client
server
X.509 certificate(s)
server key exchange (optional)
client certificate request (optional)
server hello done
2
client
server
change cipher spec
finished
change cipher spec
finished
4

Question 1c Answer

"The world is cruel" using his name "Adamu Usman" as the keys, what will the cipher text be?

t → A = T
h → d = K
e → a = E
w → m = I
o → u = I
r → u = L
l → s = D
d → m = P
i → a = I
s → n = F
o → t = O
u → d = Y
a → a = A
l → m = X

∴ The cipher text is
TKEIILAPIFOYAX
"TKE IILAP IF OYAX"

1d) Describe each of the four phases of the Secure Socket Layer (SSL) and the role of each message during these phases

Phase 1: Establish the capabilities of the client and server

Phase 2: Server authentication and key exchange

Phase 3: Client key exchange and optional client authentication

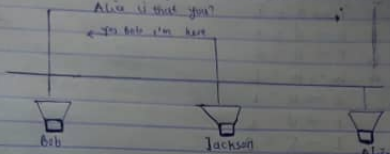
Phase 4: Changes cipher specification protocol and finish

Question 1

(1a) Bob initiates a communication between himself and alice, but in the process of communicating with alice, Jackson hijacks the transmission and poses as alice

Explain using the aid of a diagram possible event scenarios

(1a) ⇒ Answer



(1b) List 5 security services that would be typically required if you were to buy an item from Konga using their e-commerce platform? Justify your answers.

(1b) ⇒ Answer

1 Integrity: Guarantee that the data is what we expect

2 Confidentiality: the information must just be accessible to the authorized ~~users~~ people.

3 Availability: To make sure that data, ~~data~~ network resources or network services are continuously available to the legitimate user, whenever they require it.

4 Non repudiation: the assurance that someone cannot deny the validity of something.

5 Reliability: Computers should work without having unexpected problems.

Quest Number (2a)

- physical key exchange
- Trusted courier
- public key infrastructure (PKI) and assymmetric encryption

16 To prove equation $Y_{A1A2} \bmod p = S$ we need to show that both equation are equal.

1 $A_1 \bmod p = X_1$

$A_2 \bmod p = X_2$

$Y_{A1A2} \bmod p$

$Y_{A1A2} \bmod p = (Y_{A1} \bmod p) * (A_2 \bmod p)$

$Y_{A1A2} \bmod p = (Y X1) * X2$

$Y_{A1A2} \bmod p = X1 X2$

$S = X1$

from the equation 1, we have established that $A_1 \bmod p = X_1$ which is the same value as S

hence, we can conclude that $Y_{A1A2} \bmod p$ is indeed equal to S, as both side evaluate to X_1, ∴ $Y_{A1A2} \bmod p = S$ holds true.

(2c)

Why is hashing referred to as a one-way function?

because it is computational infeasible, ~~many~~ meaning if a information is hashed it cannot be reversed.

Bingham University Karu
Faculty of Science and Technology
Department of Computer Science
Second Semester Examination 2020/2021 Academic Session

Course Code: CMP418 **Time:** $2\frac{1}{2}$ hours **Credit Unit:** 3 Units
Course Title: Algorithm and Complexity Analysis **Instruction:** Answer any four questions

Question One: Asymptotic Notational Problem

a) Use empirical analysis to analyze each function given below and rearrange the functions in increasing order of growth (after computing for $n=1000$). Use $n = 10, 50, 100, 200, 300, 400, 500, 1000$ **(5 Marks)**

$f_1 = n^2$, $f_2 = n$, $f_3 = n^2 \log_2 n$, $f_5 = \log_2 n^2$

b) With the aid of a diagram *define* and *differentiate* between the following three asymptotic notations

i. Big O notation **(2 Marks)**
ii. Big Omega (Ω) notation **(2 Marks)**
iii. Theta (Θ) notation **(2 Marks)**

Question Two: Analysis of Algorithm

Algorithm **BHU**

```
for i ← 0 to n − 2 do
    for j ← i + 1 to n − 1 do
        if A[i] = A[j] return false
return true
```

a) Write the general plan for the analysis of non-recursive algorithms **(5 Marks)**
b) What is algorithm **BHU** above computing? **(1 Mark)**
c) Is the algorithm **BHU** Stable? **(1 Mark)**
d) Is algorithm **BHU** in place? **(1 Mark)**
e) Use the five steps in Q2a to analyze algorithm **BHU**. **(7 Marks)**

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a. Find the assignment with the most minimum total cost. **(6 Marks)**
b. Find the assignment with the most maximum total cost. **(6 Marks)**
c. How much would you have last after all possible assignments? **(3 Marks)**

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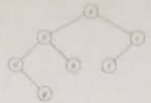
a) what is the *preorder*, *inorder*, and *postorder* representation of the following tree? **(6 Marks)**



b) There are three major methods of implementing decrease and conquer. List and explain each. **(3 Marks)**

c) How many iterations do you need to search for k=70, k = 85, & k = 31 when you apply a binary search algorithm? **(6 Marks)**

0	1	2	3	4	5	6	7	8	9	10	11	12
3	14	27	31	39	42	55	70	74	81	85	93	98

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i. $T(n) = 8\ T(\frac{n}{2}) + 1$ **($2\frac{1}{2}$ Marks)**

ii. $T(n) = 2\ T(\frac{n}{2}) + n^2$ **($2\frac{1}{2}$ Marks)**

c) Sort the array below using merge sort algorithm. Make sure you show each steps of divide and conquer **(5 Marks)**

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Question Six: Transform and Conquer

a) There are three major variations of Transform and Conquer techniques for problem-solving, explain each of the three with examples. **(5 Marks)**

b) Four properties qualify a tree as a Heap (Max or Min), list and explain each of the properties **(5 Marks)**

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	2	9	7	6	5	8

BINGHAM UNIVERSITY KARU, NASARAWA STATE
DEPARTMENT OF COMPUTER SCIENCE
SECOND SEMESTER EXAMINATION 2020/2021 SESSION

OURSE TITLE: Computer Network & Data Communication COURSE CODE: CMP 410

CREDIT UNIT: 3 TIMES ALLOWED: 3Hrs

Instruction: Answer any Four (4) questions.

1a. With the aid of a sketch diagram, explain the term "Cryptography"?

1b. Explain any four types of security threats?

2. Explain the critical issues of Network Design consideration?

3. With the aid of a diagram briefly explain the following:-
   (i). Frequency Davison Multiplexing
   (ii). Time Division Multiplexing

4. Briefly explain the following:-
   (i). Circuit Switched Network?
   (ii). Packet Switch Network

5. Assume that a voice channel occupies a bandwidth of 3KHZ; five voice channels are to be multiplexed into single communication channel with a bandwidth of 15KHZ, from 25 – 40KHZ. With the aid of a sketch diagram design the mux and demux of these five channels using the FDM techniques. Assume there are no guard bands.

6. Five channels, each with a 100KHZ bandwidth are to be multiplexed together. What is the minimum bandwidth of the communication link, if there is a need for a guard band of 20KHZ between the channels to prevent interference?

BINGHAM UNIVERSITY
FACULTY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE
END OF SECOND SEMESTER EXAMINATION 2020/2021 SESSION
CMP 416-WEB DEVELOPMENT ISSUES

INSTRUCTION: ANSWER TWO QUESTIONS IN EACH SECTION
SECTION A: GENERAL PART
TIME ALLOWED: 2HRS 30MINS
Question one

Various Process Models have evolved over time, with the water fall model usually considered as being the one which other models are based on. The Models tend to fall into two categories based on 'Construction ' And 'Evolution'. Paradigm.

(a) (i) Explain the Concept of 'Construction ' and 'Evolution' paradigm with respect to process models. Discuss two examples of models in each category ('Construction' and 'Evolution') and highlight their Advantages and Disadvantages. (10 marks)
(ii) Why are models applied in traditional software development NOT applicable in Web development? (2 marks)
(b) What is Software quality, explain the Criteria and procedures for judging quality in web application. (3 marks)

Question Two

(a) Consider the research conducted by kappel et al(2004). The researcher attempts to find out whether or not web development is same as other traditional systems development. The Researcher identifies the four web application development characteristics. With the aid of the diagram, explain the four characteristics of web development and their challenges. (10 marks)

(b) One of the best known approaches to quality control is the "Deming Cycle" The 4 steps in the Deming Cycle are: Plan-Do- Check-Act which is adapted Daidhou and Mathiassen (1993) as Plan-Produce-Evaluate-Correct. Explain with the aid of a diagram the quality cycle. (3 marks)

(c) List 4 security issues of web application. (2marks)

Question Three

(a) If a customer or user is dissatisfied with a system (product), the developer can always claim to have fulfilled their obligations, provided they have supplied what was originally required. The user, however, may feel that the original specification was inadequate. In your opinion, whose fault is that? The users? Or the developer's or Both? why do you think so? (5 marks)

(b) Software is often not tremendously robust - in fact, it is often full of bugs. If a more tangible product, a refrigerator, say, behaved differently from what is expected, you'd

4. (a) Prove that the following equations are true
   (i) $(a+b) \bmod n = (a \bmod n + b \bmod n) \bmod n$
   (ii) $(a*b) \bmod n = (a \bmod n * b \bmod n) \bmod n$
   (iii) $x^y \bmod n = x^{y \bmod \phi(n)} \bmod n$

[12 Marks]

(b) In establishing an SSL session there are 4 stages. This process is very important in maintaining a secure link during data transmission between the devices communicating. What happens if the user suspends the connection and tries to resume transmission of data later? (kindly include a diagrammatic illustration in your answer)

[8 Marks]

5. (a) Needham Schroeder uses a trusted symmetric key server to share a secret key with every user. What is the difference between this method and Kerberos?

[10 Marks]

(b) List and explain briefly any two trust models for certificate distribution

[6 Marks]

(c) Why is hashing referred to as a one way function?

[4 Marks]

Bingham University, Karu

Faculty of Science and Technology

Department of Computer Science

Second Semester Exams 2020/2021 Session

Course Code: CMP 404 EXAMS. **Course Title:** Software Engineering II

Time Allowed: 2hrs. **Instructions:** (Answer any 3 questions in not more than 4 lines)

1) a. What are the fundamental software engineering activities? *(5 marks)*
   b. What is the difference between software engineering and computer science? *(5 marks)*
   c. What differences has the web made to software engineering? *(5 marks)*

2) From the essential attributes of good software discuss:
   a. Maintainability *(5 marks)*
   b. Efficiency *(5 marks)*
   c. Acceptability *(5 marks)*

3) a. With the aid of a diagram, illustrate web application architecture using the MVC pattern. *(5 marks)*
   b. In architectural designs, when do we use the repository pattern? *(5 marks)*
   c. In architectural designs, when do we use the client-server pattern? *(5 marks)*

4) a. Draw the use-case diagram for the diagram below

(5 marks)

   b. What are the stages in the requirements elicitation and analysis process? *(5 marks)*
   c. Discuss Configuration management during the development process. *(5 marks)*

) Discuss the following re-use levels:

   a. The Object level *(5 marks)*

   b. The Component level *(5 marks)*

   c. The System level *(5 marks)*

BINGHAM UNIVERSITY
FACULTY OF SCIENCE AND TECHNLOGY
DEPARTMENT OF COMPUTER SCIENCE
END OF SECOND SEMESTER EXAMINATION 2021/2022 SESSION
CMP 416-WEB DEVELOPMENT ISSUES

INSTRUCTION: ATTEMPT TWO QUESTIONS IN THIS SECTION
SECTION A: GENERAL PART
TIME ALLOWED : 3HRS

Question one

Various Process Models have evolved over time, with the water fall model usually considered as being the one which other models are based on. The Models tend to fall into two categories based on 'Construction ' And 'Evolution'. Paradigm.

(a) (i) Explain the Concept of 'Construction ' and 'Evolution' paradigm with respect to process models. Discuss two examples of models in each category ('Construction' and 'Evolution') and highlight their Advantages and Disadvantages.
(ii) Why are models applied in traditional software development NOT applicable in Web development?

(b) What is Software quality, explain the Criteria and procedures for judging quality in web application.

Question Two

(a) Consider the research conducted by kappel et al(2004). The researcher attempts to find out whether or not web development is same as other traditional systems development. The Researcher identifies the four web application development characteristics. With the aid of the diagram, explain the four characteristics of web development and their challenges.

(b) One of the best known approaches to quality control is the "Deming Cycle" The 4 steps in the Deming Cycle are: Plan-Do- Check-Act which is adapted Dahlbom and Mathiassen (1993) as Plan-Produce-Evaluate-Correct. Explain with the aid of a diagram the quality cycle.

(c) List 4 security issues of web application.

Question Three

(a) If a customer or user is dissatisfied with a system (product), the developer can always claim to have fulfilled their obligations, provided they have supplied what was originally required. The user, however, may feel that the original specification was inadequate. In your opinion, whose fault is that? The users? Or the developer's or Both? why do you think so?

(b) Software is often not tremendously robust - in fact, it is often full of bugs. If a more tangible product, a refrigerator, say, behaved differently from what is expected, you'd

take it back to the shop and demand your money back! However, it is the nature of software that it is very difficult - some say impossible - to release it 100% bug-free. Discuss the issues regarding software quality.

(c) One of the issues with E-commerce Sites concerns WYSIWYG, many users complained about not getting what was advertised on the site or what they ordered for. Suggest ways to improve on what you order is what you get.

SECTION B: LEGAL PART
INSTRUCTION: ATTEMPT THREE QUESTIONS FROM THIS SECTION

QUESTION ONE

The need to maintain an effective balance between the right to Privacy of person, property rights and the overall national security of the country has been a controversial topic of discussion, the matter is even made worse in the wake of the September 11 bombing of the world trade centre in New York. The question is how do our security agency ensure that the rights to privacy and data protection is safeguarded and national security is not jeopardized. Unlawful surveillance is a rampant feature in the twenty first century and often seen as a tool used by our law enforcement agencies which has the potential for been abused, it is the term used when government intentionally uses or installs an imaging device to 'surreptitiously' view, broadcast or record a person dressing, undressing, or engaging in sexual or other intimate conduct without such person's knowledge and when they would otherwise have a reasonable expectation of privacy. Comments freely on the how the twin interest of national security and right to privacy can be balanced for the interest of the advancement of civil society.

QUESTION TWO

"Who owns information, artistic works, ideas, creative thoughts, musical performance, works of fictions? Can it be owned? Is it property? The term property implies something that can be owned and therefore stolen. Theft is when someone dishonestly appropriates property belonging to another with an intention to permanently deprive the owner of it.

i. In clear terms, advance the justification for the protection of intellectual property (Copyright). Why should it be accorded the same treatment as if it were a tangible property

QUESTION THREE

It is common knowledge that copyright ownership gives sole and exclusive rights to work otherwards, they make and receive consideration for their work by selling and licensing copies. Write explanatory notes on 5 rights that the owner of copyright enjoys

Bingham University, Karu

Faculty of Science and Technology

Department of Computer Science

Second Semester Exams 2021/2022 Session

Course Code: CMP 404 EXAMS. **Course Title:** Software Engineering II

Time Allowed: 2hrs. **Instructions:** (Answer Question 1 and 2 other questions)

---

1) a. How do sub-system models work? *(5 marks)*

   b. Why do we use state diagrams? *(5 marks)*

   c. Why do object interfaces have to be specified? *(5 marks)*

2) a. What are the fundamental software engineering activities? *(5 marks)*

   b. What is the difference between software engineering and computer science? *(5 marks)*

   c. What differences has the web made to software engineering? *(5 marks)*

3) From the essential attributes of good software discuss:

   a. Maintainability *(5 marks)*

   b. Efficiency *(5 marks)*

   c. Acceptability *(5 marks)*

3) a. Mixing development with testing is known as what kind of development? *(5 marks)*

   b. What type of development was introduced as a part of extreme programming and plan-driven development? *(5 marks)*

   c. When the system is checked to see that changes made do not affect previously working code, we refer to this as …..? What development type is this used under? *(5 marks)*

4) a. What is the objective of release testing? *(5 marks)*

   b. Discuss stress testing explain what form of testing it comes under*(5 marks)*

   c. Illustrate the spiral model of development and evolution? *(5 marks)*

5) Discuss the following re-use levels:

   a. The Object level *(5 marks)*

   b. The Component level *(5 marks)*

   c. The System level *(5 marks)*

BINGHAM UNIVERSITY
FACULTY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE
SECOND SEMESTER EXAMINATION, 2021/2022 SESSION

COURSE TITLE: COMPUTER NETWORK & DATE COMMUNICATION
COURSE CODE: CMP ~~401~~ 410
CREDIT UNIT: 3
TIME ALLOWED: 3HRS.

INSTRUCTION: ANSWER **ANY** FOUR QUESTIONS.

1. (a) What is data Communication and explain the fundamental characteristics of effective data communication system.

   (b) Explain the key components of data communication

2. Explain the concept of channel in data communication.

   (b) Support a user wants to upload a text document at the rate of 10 pages per 20 seconds. What will be the required data rate of the channel? Assume that one page contains 1600 characters and each character is of 8 bits.

3. Briefly explain the classification of transmission wares and their properties.

4. Briefly explain the generations and features of mobile telecommunications Technologies/Network.

5. (a) Distinguish between frequency-division multiplexing and Time-division-multiplexing.

   (b) Assume that a voice channel occupies a bandwidth of 5KHz. We need to combine the five voice channels into a single communication channel with bandwidth of 33KHz from 100KHz to 133KHz. The voice channel has a guard band of 2KHz.Show the configuration using the frequency domain.

   6. (a) Distinguish between circuit switched Network and Packet Switched Networks.

   (b) Suppose a communication network has five channels, each with a 100KHz bandwidth, are to be multiplexed together. What is the minimum bandwidth of the network line if there is a need for a guard band of 10KHz between the channels to prevent interferences?

Bingham University
Faculty of Science and Technology
Department of Computer Science
Second Semester Examination 2021/2022 Academic Session

Course Code: CMP418 **Credit Unit:** 3 Units
Course Title: Data Structure and Analysis of Algorithm **Time:** 3 hours
Instruction: Answer question **ONE** and other **THREE** questions

Question One: Divide and Conquer **(22 Marks)**

a) Given the general condition of divide-and-conquer recurrence relationship as T(n) = T(n/b) + f(n) such that a ≥ 1, d ≥ 0 and b > 1. **State the master theorem**
b) Use the *Masters' Theorem* to derive the complexity class of the following functions
c) $T(n) = 2\,T(\frac{n}{6}) + n^3$
d) $T(n) = 9\,T\frac{n}{3} + n^3$
e) Sort the array below using merge sort algorithm. Make sure you show each steps of divide and conquer

0	1	2	3	4	5	6	7
9	4	3	10	8	2	6	4

Question Two: Class Complexity Analysis **(16 Marks)**

Complete the table below and use it to answer questions 1a – 1c

S/N	n	$log_2 n$	n	$n\,log_2 n$	n^2	n^3	$n!$
1	10						
2	10^2						
3	10^3						
4	10^4						
5	10^5						

a. Which of the complexity class is the fastest?
b. Which of the complexity class is the slowest?
c. What is empirical analysis, State the general plan for performing empirical analysis of algorithm efficiency?

Question Three: Asymptotic Notational Problem **(16 Marks)**

With the aid of a diagram, explain each of the following Asymptotic Notations
a) Asymptotic O(big oh)-Notation
b) Asymptotic Θ(big theta)-Notation
c) Asymptotic Ω(big omega)-Notation
d) What are the steps required for mathematical Analysis of Recursive Algorithms?

Question Four: Analysis of Non-Recursive Algorithm **(16 Marks)**

```
ALGORITHM BubbleSort(A[0..n-1])
for i <- 0 to n-2 do
    for j <- 0 to n-2-i do
        if A[j+1] < A[j]
            swap A[j] and A[j+1]
```

a) Write the general plan for the analysis of non-recursive algorithms
b) What is algorithm BubbleSort above computing?
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Bingham University
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Second Semester Examination 2021/2022 Academic Session

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Question Five: Brute Force - Exhaustive Search **(16 Marks)**

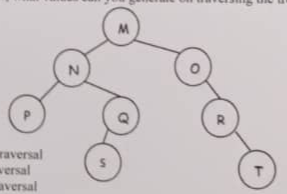
You are paid to lead a software development project, which comprises four (4) subsystems; a company can implement only one subsystem at a time. That is, each company can handle exactly one subsystem and each subsystem should be handled by only one company at a time. The cost that would accrue if the *ith* company is awarded to develop the *jth* subsystem is given as Total Cost C[i, j] for each pair i, j = 1, 2, 3, 4. As shown in the table below,

a) Find the assignment with the most minimum total cost.
b) Find the assignment with the most maximum total cost.
c) How much would you have lost after all possible assignments?

Company	Subsystems 1	Subsystems 2	Subsystems 3	Subsystems 4
Company 1	9	2	7	8
Company 2	6	4	3	7
Company 3	5	8	1	8
Company 4	7	6	9	4

Question Six: Decrease and Conquer **(16 Marks)**

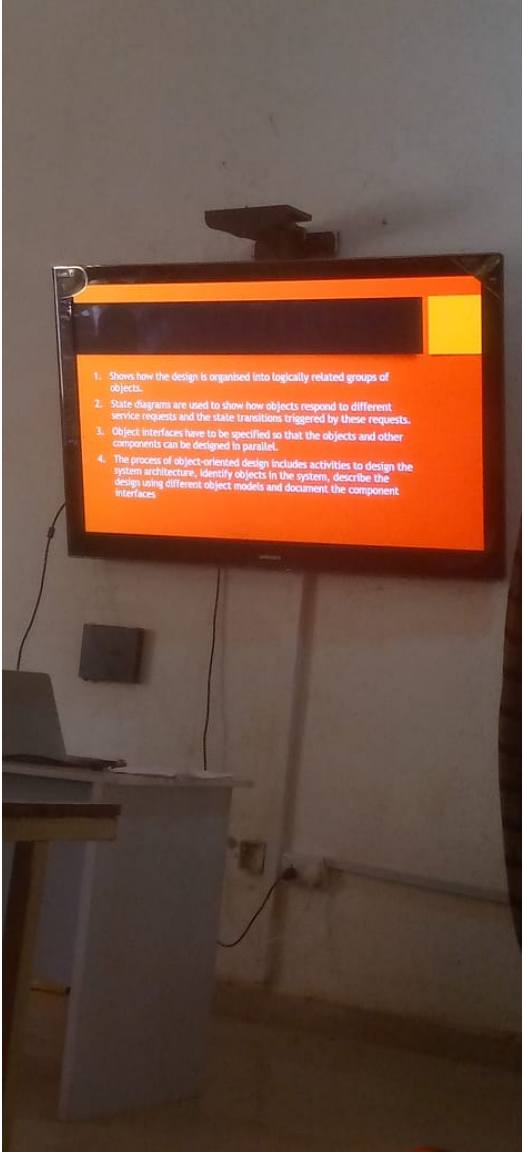
a) Given the tree below, what values can you generate on traversing the tree using



i. Post order traversal
ii. In order traversal
iii. Pre order traversal

b) How many iterations do you need to search for k=70, k = 85, & k = 31 when you apply a binary search algorithm?

0	1	2	3	4	5	6	7	8	9	10	11	12
3	14	27	31	39	42	55	70	74	81	85	93	98


1. Shows how the design is organised into logically related groups of objects.
2. State diagrams are used to show how objects respond to different service requests and the state transitions triggered by these requests.
3. Object interfaces have to be specified so that the objects and other components can be designed in parallel.
4. The process of object-oriented design includes activities to design the system architecture, identify objects in the system, describe the design using different object models and document the component interfaces

Test-driven development

- Test-driven development (TDD) is an approach to program development in which you inter-leave testing and code development.
- Tests are written before code and 'passing' the tests is the critical driver of development.
- You develop code incrementally, along with a test for that increment. You don't move on to the next increment until the code that you have developed passes its test.
- TDD was introduced as part of agile methods such as Extreme Programming. However, it can also be used in plan-driven development processes.

4. (a) Prove that the following equations are true
   (i) $(a+b) \bmod n = (a \bmod n + b \bmod n) \bmod n$
   (ii) $(a*b) \bmod n = (a \bmod n * b \bmod n) \bmod n$
   (iii) $x^y \bmod n = x^{y \bmod \phi(n)} \bmod n$

[12 Marks]

(b) In establishing an SSL session there are 4 stages. This process is very important in maintaining a secure link during data transmission between the devices communicating. What happens if the user suspends the connection and tries to resume transmission of data later? (kindly include a diagrammatic illustration in your answer)

[8 Marks]

5. (a) Needham Schroeder uses a trusted symmetric key server to share a secret key with every user. What is the difference between this method and Kerberos?

[10 Marks]

(b) List and explain briefly any two trust models for certificate distribution

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(c) Why is hashing referred to as a one way function?

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Bingham University
Faculty of Science and Technology
Department of Computer Science
Second Semester Examination 2021/2022 Academic Session

Course Code: CMP418 **Credit Unit:** 3 Units
Course Title: Data Structure and Analysis of Algorithm **Time:** 3 hours
Instruction: Answer question **ONE** and other **THREE** questions

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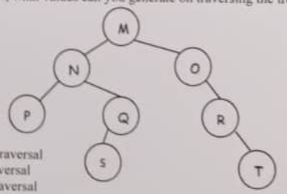
a) Given the tree below, what values can you generate on traversing the tree using



i. Post order traversal
ii. In order traversal
iii. Pre order traversal

b) How many iterations do you need to search for k=70, k = 85, & k = 31 when you apply a binary search algorithm?

0	1	2	3	4	5	6	7	8	9	10	11	12
3	14	27	31	39	42	55	70	74	81	85	93	98

Bingham University Karu
Faculty of Science and Technology
Department of Computer Science
Second Semester Examination 2020/2021 Academic Session

Course Code: CMP418 **Time:** $2\frac{1}{2}$ hours **Credit Unit:** 3 Units
Course Title: Algorithm and Complexity Analysis **Instruction:** Answer any four questions

Question One: Asymptotic Notational Problem

a) Use empirical analysis to analyze each function given below and rearrange the functions in increasing order of growth (after computing for $n=1000$). Use $n = 10, 50, 100, 200, 300, 400, 500, 1000$ **(5 Marks)**

$f_1 = n^2$, $f_2 = n$, $f_3 = n^2 \log_2 n$, $f_5 = \log_2 n^2$

b) With the aid of a diagram *define* and *differentiate* between the following three asymptotic notations

i. Big O notation **(2 Marks)**
ii. Big Omega (Ω) notation **(2 Marks)**
iii. Theta (Θ) notation **(2 Marks)**

Question Two: Analysis of Algorithm

Algorithm **BHU**

```
for i ← 0 to n − 2 do
    for j ← i + 1 to n − 1 do
        if A[i] = A[j] return false
return true
```

a) Write the general plan for the analysis of non-recursive algorithms **(5 Marks)**
b) What is algorithm **BHU** above computing? **(1 Mark)**
c) Is the algorithm **BHU** Stable? **(1 Mark)**
d) Is algorithm **BHU** in place? **(1 Mark)**
e) Use the five steps in Q2a to analyze algorithm **BHU**. **(7 Marks)**

Question Three: Brute Force - Exhaustive Search

You are paid to lead a software development project, which comprises four (4) subsystems; a company can implement only one subsystem at a time. That is, each company can handle exactly one subsystem and each subsystem should be handled by only one company at a time. The cost that would accrue if the *ith* company is awarded to develop the *jth* subsystem is given as Total Cost C[i, j] for each pair i, j = 1, 2, 3, 4. As shown in the table below.

a. Find the assignment with the most minimum total cost. **(6 Marks)**
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c. How much would you have last after all possible assignments? **(3 Marks)**

Company	Subsystems 1	Subsystems 2	Subsystems 3	Subsystems 4
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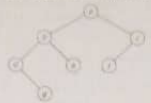
Company 3	5	8	1	8
Company 4	7	6	9	4

Question Four: Decrease and Conquer

a) what is the *preorder*, *inorder*, and *postorder* representation of the following tree? **(6 Marks)**



b) There are three major methods of implementing decrease and conquer. List and explain each. **(3 Marks)**

c) How many iterations do you need to search for k=70, k = 85, & k = 31 when you apply a binary search algorithm? **(6 Marks)**

0	1	2	3	4	5	6	7	8	9	10	11	12
3	14	27	31	39	42	55	70	74	81	85	93	98

Question Five: Divide and Conquer

a) Given the general condition of divide-and-conquer recurrence relationship as $T(n) = T(n/b)+f(n)$ such that a ≥ 1 and b > 1. **State the master theorem** **(5 Marks)**

b) Use the *Masters' Theorem* to derive the complexity class of the following functions

i. $T(n) = 8\ T(\frac{n}{2}) + 1$ **($2\frac{1}{2}$ Marks)**

ii. $T(n) = 2\ T(\frac{n}{2}) + n^2$ **($2\frac{1}{2}$ Marks)**

c) Sort the array below using merge sort algorithm. Make sure you show each steps of divide and conquer **(5 Marks)**

0	1	2	3	4	5	6	7
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Question Six: Transform and Conquer

a) There are three major variations of Transform and Conquer techniques for problem-solving, explain each of the three with examples. **(5 Marks)**

b) Four properties qualify a tree as a Heap (Max or Min), list and explain each of the properties **(5 Marks)**

c) Transform the array below into a maxheap. Make sure you show each step of the transformation process **(5 Marks)**

0	1	2	3	4	5	6
	2	9	7	6	5	8

Master theorem provide a set of rules to determine the time complexity of algorithm based on 3 main cases depending on the relationship between $f(n)$ of the form of $T(n/b)$

1a $T(n) = aT(n/b) + f(n)$

$T(n)$ - represent the time complexity of the algorithm on a problem

a - is the number of subproblems generated in the divide step

n/b - represent the size of each subproblem

$f(n)$ - resp represent the time complexity of the combination step of or any additional work

1b $T_n = 2T(n/2) + n^3$

$a=2 \quad b=2 \quad d=3$

$a < b^d \Rightarrow \Theta(n^d)$, $a = b^d \Rightarrow \Theta(n^d \log n)$

③ $a > b^d \Rightarrow \Theta(n^{\log_b a})$

$2 < 2^3$

Θn^3

$T_n = 9T(n/3) + n^3$

$a=9 \quad b=3 \quad d=3$

$9 > 3^3$

$\Theta(n^{\log_3 9})$

$\Theta(n^{3.16})$

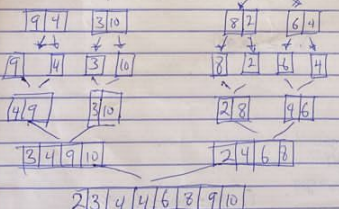
1c

0	1	2	3	4	5	6	7
9	4	3	10	8	2	6	4

$(n-1) = 3.5$

0	1	2	3
9	4	3	10

0	1	2	3
8	2	6	4



2.

S/N	n	$\log_2 n$	n	$n\log_2 n$	n^2	n^3	n!
1	10	3.3	10	3.3×10	10^2	10^3	3.6×10^6
2	10^2	6.6	10^2	6.6×10^2	10^4	10^6	9.3×10^{157}
3	10^3	10	10^3	10×10^3	10^6	10^9	
4	10^4	13	10^4	13×10^4	10^8	10^{12}	
5	10^5	17	10^5	17×10^5	10^{10}	10^{15}	

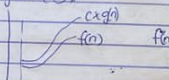
a) $\log_2 n$

b. n!

c ?

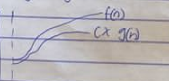
3.

a Big oh [O]



$f(n) \leq C \times g(n)$

a big omega [Ω]



$f(n) \geq (x g(n)$

a big theta [Θ]

$C_2 g(n) \leq f(n) \leq (x g(n)$

d) ① Identify the array

② Identify the major code in the algorithm the algorithm that does all the work

③ ~~Best case~~ Indentify the best case

④ Identify worse case

Question five - Exhaustive Search

Company	Subsystems 1	Subsystems 2	Subsystems 3	Subsystems 4
Company 1	9	2	7	8
Company 2	6	4	3	7
Company 3	5	8	1	8
Company 4	7	6	9	4

permutations = <1, 2, 3, 4>

$\langle 1, 2, 3, 4 \rangle$ cost $= 9 + 4 + 1 + 4 = 18$

$\langle 1, 2, 4, 3 \rangle$ cost $= 9 + 4 + 8 + 9 = 30$

$\langle 1, 3, 2, 4 \rangle$ cost $= 9 + 3 + 8 + 4 = 24$

$\langle 1, 4, 2, 3 \rangle$ cost $= 9 + 7 + 8 + 9 = 33$

$\langle 1, 4, 3, 2 \rangle$ cost $= 9 + 7 + 1 + 6 = 23$

$\langle 1, 3, 4, 2 \rangle$ cost $= 9 + 8 + 8 + 6 = 26$

$\langle 2, 1, 3, 4 \rangle$ cost $= 2 + 6 + 1 + 4 = 13$

$\langle 2, 4, 3, 1 \rangle$ cost $= 2 + 7 + 1 + 7 = 17$

$\langle 2, 3, 4, 1 \rangle$ cost $= 2 + 3 + 8 + 7 = 20$

$\langle 2, 1, 4, 3 \rangle$ cost $= 2 + 6 + 8 + 9 = 25$

$\langle 2, 4, 1, 3 \rangle$ Cost $= 2 + 7 + 5 + 9 = 23$

$\langle 2, 3, 1, 4 \rangle$ Cost $= 2 + 3 + 5 + 4 = 14$

$\langle 3, 1, 2, 4 \rangle$ cost $= 7 + 6 + 8 + 4 = 25$

$\langle 3, 1, 4, 2 \rangle$ cost $= 7 + 6 + 8 + 6 = 27$

$\langle 3, 2, 1, 4 \rangle$ cost $= 7 + 4 + 5 + 4 = 20$

$\langle 3, 2, 4, 1 \rangle$ Cost $= 7 + 4 + 8 + 7 = 26$

$\langle 3, 4, 2, 1 \rangle$ Cost $= 7 + 7 + 8 + 7 = 29$

$\langle 3, 4, 1, 2 \rangle$ Cost $= 7 + 7 + 5 + 6 = 25$

Complexity is $O(n!)$

$\langle 4, 1, 2, 3 \rangle$ cost = 8 + 6 + 8 + 9 = 31
$\langle 4, 1, 3, 2 \rangle$ cost = 8 + 6 + 1 + 6 = 21
$\langle 4, 2, 1, 3 \rangle$ cost = 8 + 4 + 5 + 9 = 26
$\langle 4, 2, 3, 1 \rangle$ cost = 8 + 4 + 1 + 7 = 20
$\langle 4, 3, 2, 1 \rangle$ cost = 8 + 3 + 8 + 7 = 26
$\langle 4, 3, 1, 2 \rangle$ cost = 8 + 3 + 5 + 6 = 22

a. Assignment with the minimum ~~total cost~~
- Assignment 7

b. Assignment with the maximum ~~total cost~~
- Assignment 4

c.

Bingham University
Faculty of Science and Technology
Department of Computer Science
Second Semester Examination 2021/2022 Academic Session

Course Code: CMP418 **Credit Unit:** 3 Units
Course Title: Data Structure and Analysis of Algorithm **Time:** 3 hours
Instruction: Answer question **ONE** and other **THREE** questions

Question One: Divide and Conquer **(22 Marks)**

a) Given the general condition of divide-and-conquer recurrence relationship as $T(n) = T(n/b) + f(n)$ such that $a \geq 1$, $d \geq 0$ and $b > 1$. **State the master theorem**
b) Use the *Masters' Theorem* to derive the complexity class of the following functions
c) $T(n) = 2\,T(\frac{n}{4}) + n^3$
d) $T(n) = 9\,T\frac{n}{2} + n^3$
e) Sort the array below using merge sort algorithm. Make sure you show each steps of divide and conquer

0	1	2	3	4	5	6	7
9	4	3	10	8	2	6	4

Question Two: Class Complexity Analysis **(16 Marks)**

Complete the table below and use it to answer questions 1a – 1c

S/N	n	$log_2 n$	n	$n\,log_2 n$	n^2	n^3	$n!$
1	10						
2	10^2						
3	10^3						
4	10^4						
5	10^5						

a. Which of the complexity class is the fastest?
b. Which of the complexity class is the slowest?
c. What is empirical analysis, State the general plan for performing empirical analysis of algorithm efficiency?

Question Three: Asymptotic Notational Problem **(16 Marks)**

With the aid of a diagram, explain each of the following Asymptotic Notations
a) Asymptotic O(big oh)-Notation
b) Asymptotic Θ(big theta)-Notation
c) Asymptotic Ω(big omega)-Notation
d) What are the steps required for mathematical Analysis of Recursive Algorithms?

Question Four: Analysis of Non-Recursive Algorithm **(16 Marks)**

```
ALGORITHM BubbleSort(A[0..n-1])
for i <- 0 to n-2 do
    for j <- 0 to n-2-i do
        if A[j+1] < A[j]
            swap A[j] and A[j+1]
```

a) Write the general plan for the analysis of non-recursive algorithms
b) What is algorithm BubbleSort above computing?
c) Is the algorithm BubbleSort Stable?
d) Is algorithm BubbleSort in place?
e) Derive the complexity class of the bubble sort algorithm

Question Five: Brute Force - Exhaustive Search **(16 Marks)**

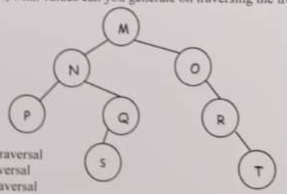
You are paid to lead a software development project, which comprises four (4) subsystems; a company can implement only one subsystem at a time. That is, each company can handle exactly one subsystem and each subsystem should be handled by only one company at a time. The cost that would accrue if the *ith* company is awarded to develop the *jth* subsystem is given as Total Cost C[i, j] for each pair i, j = 1, 2, 3, 4. As shown in the table below,

a) Find the assignment with the most minimum total cost.
b) Find the assignment with the most maximum total cost.
c) How much would you have lost after all possible assignments?

Company	Subsystems 1	Subsystems 2	Subsystems 3	Subsystems 4
Company 1	9	2	7	8
Company 2	6	4	3	7
Company 3	5	8	1	8
Company 4	7	6	9	4

Question Six: Decrease and Conquer **(16 Marks)**

a) Given the tree below, what values can you generate on traversing the tree using



i. Post order traversal
ii. In order traversal
iii. Pre order traversal

b) How many iterations do you need to search for k=70, k = 85, & k = 31 when you apply a binary search algorithm?

0	1	2	3	4	5	6	7	8	9	10	11	12
3	14	27	31	39	42	55	70	74	81	85	93	98

	0	1	2	3	4	5
for K = 31 ;	3	14	27 (m)	31	39	42

$\frac{0+5}{2} = 2$

	3	4	5
K > m ;	31	39 (m)	42

$\frac{3+5}{2} = 4$

	3
K < m ;	31

∴ It took 3 iterations to find K = 31

Using Binary search

(45)

0	1	2	3	4	5	6	7	8	9	10	11
3	14	27	31	39	42	55	70	74	85	93	98

m

$\frac{0+12}{2} = 6$

if $k > m$ = RHS

$k < m$ = LHS

for $k = 70$ ∴

7	8	9	10	11	12
70	74	81	85	93	98

m

$\frac{7+12}{2} = 9$

7	8
70	74

m

∴ $\frac{7+8}{2} = 7$ (new m)

70 ⟶ when $m = k$ (we stop)

∴ It took 3 iterations to find $k = 70$.

For $k = 85$ ∴

7	8	9	10	11	12
70	74	81	85	93	98

m

$\frac{7+12}{2} = 9$

$k > m$ ∴

10	11	12
85	93	98

m

$\frac{10+12}{2} = 11$

$k < m$ ∴

10
85

∴ It took 3 iterations to find $k = 85$

Assignment

5.
① 1, 2, 3, 4 = 9+4+3+1+4=18
② 1, 2, 4, 3 = 9+4+8+9=30
③ 1, 3, 2, 4 = 9+3+8+4=24
④ 1, 3, 4, 2 = 9+3+8+6=26
⑤ 1, 4, 2, 3 = 9+7+8+9=33
⑥ 1, 4, 3, 2 = 9+7+1+6=23
⑦ 2, 1, 3, 4 = 2+6+1+4=13
⑧ 2, 1, 4, 3 = 2+6+8+9=25
⑨ 2, 3, 1, 4 = 2+3+5+4=14
⑩ 2, 3, 4, 1 = 2+3+8+7=20
⑪ 2, 4, 1, 3 = 2+7+5+9=23
⑫ 2, 4, 3, 1 = 2+7+1+7=17
⑬ 3, 1, 2, 4 = 7+6+8+4=25
⑭ 3, 1, 4, 2 = 7+6+8+6=27
⑮ 3, 2, 1, 4 = 7+4+5+4=24
⑯ 3, 2, 4, 1 = 7+4+8+7=26
⑰ 3, 4, 1 2 = 7+7+5+6=25
⑱ 3, 4, 2, 1 = 7+7+8+7=29
⑲ 4, 1, 2, 3 = 8+6+8+9=31
⑳ 4, 1, 3, 2 = 8+6+1+6=21
㉑ 4, 2, 1, 3 = 8+4+5+9=26
㉒ 4, 2, 3, 1 = 8+4+1+7=20
㉓ 4, 3, 1, 2 = 8+3+5+6=22
㉔ 4, 3, 2, 1 = 8+3+8+7=26

ⓐ Assignment 7
ⓑ Assignment 5
ⓒ

Question 2 check slide 2 page 10.

Question (3.) check lecture 2 from page 18.

Question (4.)

a.) Check lecture 2 page 31

4b.) what is the algorithm Bubblesort above computing

Swap A[j] and A[j+1]

4c.) Yes the algorithm is stable.

4d.) Yes the algorithm is in place.

4e.) The complexity class =

$$C(n) = \sum_{i=0}^{n-2} \sum_{j=0}^{n-2-i} 1$$

$$= \sum_{i=0}^{n-2} [(n-2-i)-(0)+1]$$

$$C(n) \in \Theta(n^2)$$

d) $9T\frac{n}{2} + n^3$

$a = 9,\ b = 2,\ d = 3$

$b^d = 2^3 = 8$

$a > b^d$ ∴ case 3

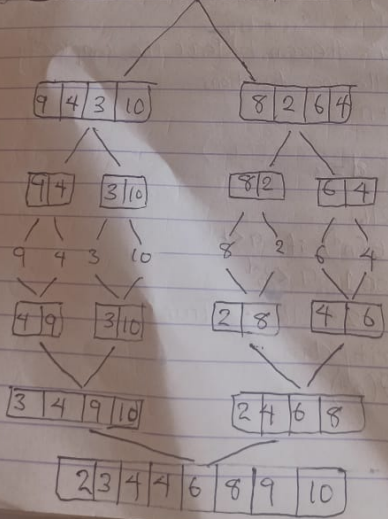
$9 > 8 \equiv$ True

Complexity class $= \Theta(n \log_b a)$

e.)

0	1	2	3	4	5	6	7
9	4	3	10	8	2	6	4

using merge sort algorithm.



4.) State the master's theorem.

$T(n) = aT\left(\frac{n}{b}\right) + f(n)$, $a \geq 1$, $b > 1$

If $f(n) \in \Theta(n^d)$ where $d \geq 0$ then

$$T(n) \in \begin{cases} \Theta(n^d) & \text{if } a < b^d \\ \Theta(n^d \log n) & \text{if } a = b^d \\ \Theta(n^{\log_b a}) & \text{if } a > b^d \end{cases}$$

for adding n numbers

we say $A(n) = 2A(n/2) + 1$

4b.) Use the Master's theorem to derive the complexity class of the following functions

c) $T(n) = 2T\left(\frac{n}{6}\right) + n^3$

$a = 2, \; b = 6, \; d = 3$

$b^d = 6^3 = 216$

case 1 $= T(n) = \Theta(n^d)$ if $a < b^d$

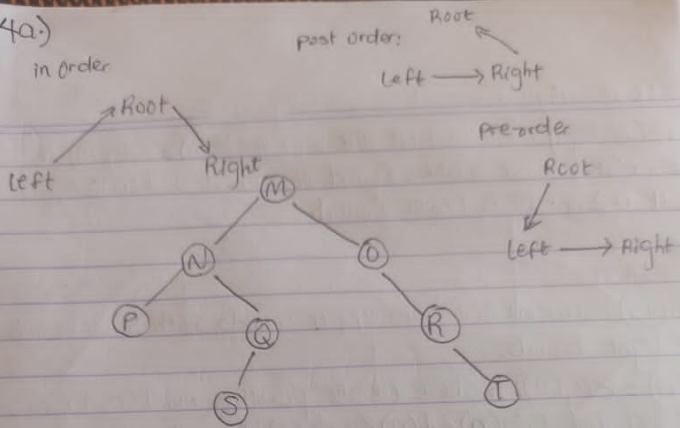
from case 1 $a < b^d$

$2 < 216$ - - - True

The complexity class

$= \Theta(n^d)$

4a.)



i.) Post order traversal: P, S, Q, N, T, R, M

ii) Pre-order traversal: M, N, P, Q, S, O, R, T

iii) In-order traversal: P, N, S, Q, M, O, R, T

In order

Root

Left → Right

Post order:

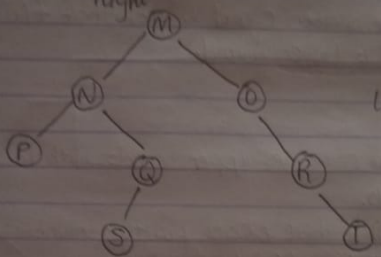
Root

Left → Right

Pre-order

Root

Left → Right



i) Post order traversal: P, S, Q, N, T, R, M

ii) Pre-order traversal: M, N, P, Q, S, O, R, T

iii) In-order traversal: P, N, S, Q, M, O, R, T

* Final Exam Time Table

Tuesday, 18th July, 2023 — Cmp 408 – 11:00am – 2:00pm – LH

Thursday, 20th July, 2023 — Cmp 404 – 8:00am – 11:00am – CMP LH

Saturday, 22nd July, 2023 — Cmp 418 — 11:00am – 2:00pm – LH

Monday, 24th July, 2023 — Cmp 416 — 11:00am – 2:00pm – LH

Wednesday, 26th July, 2023 — Cmp 410 – 8:00am – 11:00am – CMP LH

take it back to the shop and demand your money back! However, it is the nature of software that it is very difficult - some say impossible - to release it 100% bug-free. Discuss the issues regarding software quality.(5marks)

(c) One of the issues with E-commerce Sites concerns WYSIWYG, many users complained about not getting what was advertised on the site or what they ordered for. Suggest ways to improve on what you order is what you get.(5 marks)

SECTION B: Legal Part

Question one

Sefiya Musa, reincarnated as a neoclassical existentialist poet, gave a poetry recital at the ring your heart Concert Hall of the Bingham University arena for intellectual display (better known as "BUAID") On this occasion, she extemporized her poetry, a fancy way of saying she made it up on the spot. Mario ("The Memory") Martinez, a student with an exceptional memory, returned home afterwards and wrote down from memory one of Sefiya Bello's extemporized poems. He published it under the name "Conversations." Does Tabitha have a claim for copyright infringement against Mario? If yes, what will be your justification for the protection of intellectual property right.
(15 Marks)

Question two

"We are sleepwalking into a surveillance society" this was a statement attributed to Richard Thomas, UK Information Commissioner (Aug 2004) how true is this statement in the light of the massive threat to national security and the need to maintain an effective balance between the right to Privacy of person and property rights and the overall security of life's. (15 Marks)

Question three

Riley was a disgruntled employee of Cox. Riley was fired, but before he left, he erased electronic control programs for an electric saw from the saw's printed circuit card. This rendered the card useless. Riley was charged with criminal damage.
Riley was convicted in the magistrates' court but appealed, on the grounds that damage to property had not actually occurred, as a computer program is "intangible" property ("tangible" property is something you can physically pick up and take away).
The appeal court upheld the conviction as it felt there had indeed been damage to property, as "the owner of the saw, which was unquestionably property for the purposes of the statute, had been required to expend time and effort of a more than minimal amount *(in other words, to re-program it)*, in order to restore it to its original condition". If this fact were presented to the courts in Nigeria, under what law is he likely to be charged? And what is likely to be the punishment for such an offence? (15 Marks)

DEPARTMENT OF COMPUTER SCIENCE
END OF SECOND SEMESTER EXAMINATION 2020/2021 SESSION
CMP 416-WEB DEVELOPMENT ISSUES

INSTRUCTION: ANSWER TWO QUESTIONS IN EACH SECTION
SECTION A: GENERAL PART
TIME ALLOWED: 2HRS 30MINS

Question one

Various Process Models have evolved over time, with the water fall model usually considered as being the one which other models are based on. The Models tend to fall into two categories based on 'Construction ' And 'Evolution'. Paradigm.

(a) (i) Explain the Concept of 'Construction ' and 'Evolution' paradigm with respect to process models. Discuss two examples of models in each category ('Construction' and 'Evolution') and highlight their Advantages and Disadvantages. (10 marks)
(ii) Why are models applied in traditional software development NOT applicable in Web development? (2 marks)

(b) What is Software quality, explain the Criteria and procedures for judging quality in web application. (3 marks)

Question Two

(a) Consider the research conducted by kappel et al(2004). The researcher attempts to find out whether or not web development is same as other traditional systems development. The Researcher identifies the four web application development characteristics. With the aid of the diagram, explain the four characteristics of web development and their challenges. (10 marks)

(b) One of the best known approaches to quality control is the "Deming Cycle" The 4 steps in the Deming Cycle are: Plan-Do- Check-Act which is adapted Dahlbom and Mathiassen (1993) as Plan-Produce-Evaluate-Correct. Explain with the aid of a diagram the quality cycle. (3 marks)

(c) List 4 security issues of web application. (2marks)

Question Three

(a) If a customer or user is dissatisfied with a system (product), the developer can always claim to have fulfilled their obligations, provided they have supplied what was originally required. The user, however, may feel that the original specification was inadequate. In your opinion, whose fault is that? The users? Or the developer's or Both? why do you think so? (5 marks)

(b) Software is often not tremendously robust - in fact, it is often full of bugs. If a more tangible product, a refrigerator, say, behaved differently from what is expected, you'd

(13)

Lack of knowing the cost webapp

If you want to have a web but you must reason the cost and. Why are some several factor that may influence cost such factors as

functionality advancement, website size and webdesign advancement theme, because the cost of our website will correlate with the quality of the website

Introduction to law

contract and liability

computer misuse

data protection / privacy law

Intellectual properties

solution:
- Monitoring the activity of the user
- closely observe the essential aspect of the website to plan for effective remediation
- future proofing concentrate on making your website meeting the existing and upcoming requirement with ease

~~setting goals~~

(11) Setting goals

Goals lack of proper goals can affect or reduce the quality of my/a website. Here, Website developer need to have a web defined as specific goals based on the vision behind the website

12 Platform compatibility High ~~compatibility~~ portability and cross platform compatibility are essential for increased user engagement and productivity

solution

(1) comprehensive testing is a way to ensure that the website is truly cross platform and compatible with different systems

~~Lack of knowing the cost of~~

(13)

Lack o

If fo

~~thy~~ ar

as

function

~~because~~

website

CMP 416

9)
Security : Managing security is among software development challenges Driven by increasing number of cyber attacks

- use of authentication : website designer should follow a good password policy it should opt for 2 factor or multifactor authentication

- validation : the designer need to validate user input and ensure it falls within the expected characters

- accessibility : At this stage the designer should follow the principle of the least privilege

10) Support and maintenance : Maintenance of a website is like behind the screen of your website because once your website is live several issue like slow(low) loading speed unresponsive webpages and performance problems occurs

CMP 416

web dev process

(i) Lack of proper well web dev process
In web development standard road map should be followed to avoid making losses eg: good methodology will be applied and outsourcing of good IT personals

(ii) Lack of talent: Bridging talent gap: selecting good talent relevant to the business is very vital in web development for example choosing a reliable approach for hiring good IT personal and go for a skill based hiring

(iii) ~~Fail~~ Lack of good technology ~~stay~~ stack: Sense of tools needed or necessary for design and development of web app is also very important. eg clear project requirement ~~determ~~ determines the tools to be used to achieve the project and emerging Technologies should be used.

(iv) The browser: Selected browser for the project ~~to~~ should be compatible with different ~~op~~ [OS] and different devices also proper testing should be done on the selected browser and browser specific app should be avoided

iv) User interface; your user interface should be interactive and should provide intuitive interface by in consideration
v) in design it should be user centred in nature
vi) Interoperability for easy exchange of information
vii) it should provide smooth navigation and easy to read content
v) scalability Room for growth
vi) speed and performance No user like a slow website therefore slow loading and any delay process should be avoided under normal circumstance should loading time should not exceed 3seconds

external and 3rd party intergration use of google maps through API to access map on your map on your phone therefore changes make in google map shall reflect on your app architecture

BINGHAM UNIVERSITY
FACULTY OF SCIENCE AND TECHNLOGY
DEPARTMENT OF COMPUTER SCIENCE
END OF SECOND SEMESTER EXAMINATION 2021/2022 SESSION
CMP 416-WEB DEVELOPMENT ISSUES

INSTRUCTION: ATTEMPT TWO QUESTIONS IN THIS SECTION
SECTION A: GENERAL PART
TIME ALLOWED : 3HRS

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(c) List 4 security issues of web application.

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(b) Software is often not tremendously robust - in fact, it is often full of bugs. If a more tangible product, a refrigerator, say, behaved differently from what is expected, you'd

take it back to the shop and demand your money back! However, it is the nature of software that it is very difficult - some say impossible - to release it 100% bug-free. Discuss the issues regarding software quality.

(c) One of the issues with E-commerce Sites concerns WYSIWYG, many users complained about not getting what was advertised on the site or what they ordered for. Suggest ways to improve on what you order is what you get.

SECTION B: LEGAL PART
INSTRUCTION: ATTEMPT THREE QUESTIONS FROM THIS SECTION

QUESTION ONE

The need to maintain an effective balance between the right to Privacy of person, property rights and the overall national security of the country has been a controversial topic of discussion, the matter is even made worse in the wake of the September 11 bombing of the world trade centre in New York. The question is how do our security agency ensure that the rights to privacy and data protection is safeguarded and national security is not jeopardized. Unlawful surveillance is a rampant feature in the twenty first century and often seen as a tool used by our law enforcement agencies which has the potential for been abused, it is the term used when government intentionally uses or installs an imaging device to 'surreptitiously' view, broadcast or record a person dressing, undressing, or engaging in sexual or other intimate conduct without such person's knowledge and when they would otherwise have a reasonable expectation of privacy. Comments freely on the how the twin interest of national security and right to privacy can be balanced for the interest of the advancement of civil society.

QUESTION TWO

"Who owns information, artistic works, ideas, creative thoughts, musical performance, works of fictions? Can it be owned? Is it property? The term property implies something that can be owned and therefore stolen. Theft is when someone dishonestly appropriates property belonging to another with an intention to permanently deprive the owner of it.

i. In clear terms, advance the justification for the protection of intellectual property (Copyright). Why should it be accorded the same treatment as if it were a tangible property

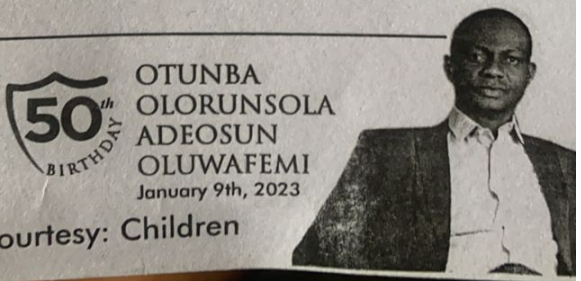
QUESTION THREE

It is common knowledge that copyright ownership gives sole and exclusive rights to work otherwards, they make and receive consideration for their work by selling and licensing copies. Write explanatory notes on 5 rights that the owner of copyright enjoys

1. National Security vs right to privacy
2. Intellectual property

→ Criminal offence
and modifications of documents

5 Question
Answer → 3
→ privacy & National Security
→ Computer misuse
→ Intellectual property
→ Contract and liability.



- Computer Networking
- Network design constructor
- Network protocols
- Data communication circuits
- Data flow & transfer rates
- multiplexing & Network switching
- Computations

BINGHAM UNIVERSITY
FACULTY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE
SECOND SEMESTER EXAMINATION, 2021/2022 SESSION

COURSE TITLE: COMPUTER NETWORK & DATE COMMUNICATION
COURSE CODE: CMP ~~401~~ 410
CREDIT UNIT: 3
TIME ALLOWED: 3HRS.

INSTRUCTION: ANSWER **ANY** FOUR QUESTIONS.

1. (a) What is data Communication and explain the fundamental characteristics of effective data communication system.

   (b) Explain the key components of data communication

2. Explain the concept of channel in data communication.

   (b) Support a user wants to upload a text document at the rate of 10 pages per 20 seconds. What will be the required data rate of the channel? Assume that one page contains 1600 characters and each character is of 8 bits.

3. Briefly explain the classification of transmission wares and their properties.

4. Briefly explain the generations and features of mobile telecommunications Technologies/Network.

5. (a) Distinguish between frequency-division multiplexing and Time-division-multiplexing.

   (b) Assume that a voice channel occupies a bandwidth of 5KHz. We need to combine the five voice channels into a single communication channel with bandwidth of 33KHz from 100KHz to 133KHz. The voice channel has a guard band of 2KHz.Show the configuration using the frequency domain.

   6. (a) Distinguish between circuit switched Network and Packet Switched Networks.

   (b) Suppose a communication network has five channels, each with a 100KHz bandwidth, are to be multiplexed together. What is the minimum bandwidth of the network line if there is a need for a guard band of 10KHz between the channels to prevent interferences?