THE COPPERBELT UNIVERSITY

KAPASA MAKASA UNIVERSITY CAMPUS

BACHELOR OF ICT WITH EDUCATION

INTERNET TECHNOLOGIES EXAM - 2023

COURSE CODE: ICT460

TIME: 3 HOURS **TOTAL MARKS: 100**

INSTRUCTIONS:

1. Do not turn over the page until you are told to do so.
2. There are **seven (7)** questions in this paper. Attempt any **five (5)** questions.
3. Credit will be given for legible writing, proper punctuation and correct use of English.
4. Cell phones are not allowed in this exam.
5. Calculators are allowed in this exam.
6. Textbooks, laptops, exercise books, phones and other devices are not allowed in the examination room. If found a candidate will be disqualified.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

QUESTION 1

Zesco Limited, a power utility company, has decided to subnet in order to create 55 hosts per subnet, in order to suit business organization needs, the quest for expansion. Given that the IP address 192.168.50.0 is to be subnetted, compute and explain the following:

a) The number of bits that were borrowed to create the subnets (show your working) (3 marks)

b) Subnet mask (2 marks)

c) Number of subnets (2 marks)

d) Number of Hosts (2 marks)

e) Subnet Addresses (At least 5) (5 marks)

f) Host addresses (Give a range of host addresses each of the 5 subnets) (6 marks)

[Total: 20 marks]

QUESTION 2

a) In the world today, IP addresses are usually distributed Internet Corporation Assigned Names and Numbers (ICANN). ICANN does this through Regional Internet Registries (RIRs). Discuss the five (5) RIRs in the world. (10 marks)

b) When an organization receives IP addresses from an Internet Service Provider (ISP), two (2) methods are used to assign these addresses to hosts. With the help of one (1) example in each case, discuss these methods. (10 marks)

[Total: 20 marks]

QUESTION 3

a) Explain the two goals (2) of universal service in the heterogeneous world. (4 marks)

b) With the use of two (2) examples in each case, discuss the use and application of TCP and UDP in the industry today. (8 marks)

c) Explain the process of encapsulation on a network. (4 marks)

d) Describe four (4) uses of Internet of Things (IoT) in modern business organizations or homes. (4 marks)

[Total: 20 marks]

KAPASA MAKASA UNIVERSITY

2024 SESSIONAL EXAMINATION

EDUCATION MANAGEMNET AND ADMINISTRATION – MG420

INSTRUCTIONS:

1. Time Allowed **THREE (3)** Hours
2. Attempt Any **FIVE (5)** Questions
3. Each Question Carries **TWENTY (20)** Marks
4. Ensure You Indicate Your SIN On Your Answer Script

Question one

In a six (600) word essay discuss the concepts of the objective and subjective interpretation of educational change.

Question two

Explain four differences between classical and human relations management theories. Your answer should clearly show the role of Elton Mayo's and F W Tylor's contribution to these management evolution.

Question three

List ten (10) roles of a school manager. With clear examples from a school set up explain the school manager's entrepreneur and conflict management roles.

Question four

(a) List five advantages of planning
(b) Provide stakeholder analysis of a school of your choice
(c) Taking the school where you did your teaching practice prepare SWOT and PESTEL tables .

Question five

State and discuss the six function of management by Peter Drucker . your discussion should bring out the relation between the planning and controlling function of management .

Question six

Prepare a health and safety audit report of the Kapasa Makasa University. Your audit report should include five health and five safety hazards

Question seven

Douglass Mcgregor postulates two contrasting view known as theory Y and theory X

(a) State three differences of those assumption
(b) Write a five hundred word essay to explain your understanding of job satisfaction according to theory Y.

Question Eight

Write a detailed four hundred (400) word critique of one of the following management books

(a) *Management* by Robert Kreitner
(b) *Educational change* by Michael Fullan
(c) *Education administration and management* by SK Kochhar

END OF EXAMINATION

SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

ICT DEPARTMENT

BACHELOR OF SCIENCE ICT WITH EDUCATION

ICT445: COMPUTER SECURITY

SESSIONAL EXAMINATION 2024

DURATION: 3 HOURS

INSTRUCTIONS:

1. Write your Student Identification Number on the Answer Booklet provided
2. Each question carries 25 marks. Answer **FOUR** questions only
3. Clearly number the questions you have answered.

INSTRUCTIONS:

- Each question carries 25 marks. Answer **FOUR** questions only
- Clearly number the questions you have answered.

Question 1

a. Network Address Translation (NAT) is often used in a network. Explain why NAT would be used and how it works. Use a diagram to illustrate your answer. (15 marks)

b. Routers provide the capability to filter traffic with the use of Access Control Lists (ACLs). Explain what ACLs are, where they are used and how they are deployed.
(N.B. You are **not** required to show the syntax of an ACL to answer this question)
(10 marks)

Question 2

Confidentiality, Integrity, and Availability form the core principles of information security, often referred to as the CIA Triad. These principles are essential for securing computer networks and ensuring that data and resources are protected against various threats.

Discuss the CIA core principles of information security and provide examples of how each can be applied in practice. (25 marks)

Question 3

a. Explain the concept of Multi-Factor Authentication and its significance in enhancing authentication security. (10 marks)

b. Internet Protocol Security (IPSec) is a suite of protocols designed to secure Internet protocol communications. Briefly explain how IPSec protocol ensures secure communication over the Internet? (5 marks)

c. Explain the difference between Federated Identity Management and Single Sign-On.

(10 marks)

Question 4

a. Discuss key principles behind the execution of the following computer security attacks:

i. Phishing attack

ii. A Man-in-the-middle attack.

iii. Distributed denial of service attack.

iv. An SQL injection attack.

v. Describe the techniques used in a ransomware attack.

(15 marks)

b. Discuss the importance of incident response planning in mitigating the impact of security breaches.

(10 marks)

Question 5

a. With the use of a suitable example explain the difference between Authentication and Authorization?

(6 marks)

b. What is the role of access control mechanisms in preventing unauthorized access to systems and data?

(4 marks)

c. Provide a short description of the access control mechanisms listed below and provide examples of how they are applied:

i. Mandatory Access Control

ii. Role based Access Control

iii. Attribute Based Access Control

(15 marks)

SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING

DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY

BACHELOR OF CYBER SECURITY

Introduction to Artificial Intelligence

ICT 471

SESSIONAL EXAMINATION

DATE: 28-Oct-24 TIME: 09.00 - 12.00 HRS, 3 HOURS

Instructions to candidates

1. Write your **Name** and **Student ID** on the **Answer Sheet** provided
2. There are **Seven (7) questions** in this paper. Question one (1) is compulsory. And attempt any other four (4) from questions two to seven (7). Indicate on the Answer sheet your choice question from the optional questions.
3. Write your Answers on the answer Sheet provided.
4. No Foreign material will be allowed in this examination.
5. The number of marks is shown in brackets ( ) at the end of each question or part question.
6. Clear handwriting and neat work is encouraged.
7. Incorrect spellings and wrong grammar will result in loss of marks.
8. The total number of marks for this paper is **100**

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

Question 1: Choise and write the best choice only. **(20 marks)**

1. Who is considered the father of artificial intelligence?
    A. Alan Turing
    B. John McCarthy
    C. Marvin Minsky
    D. Claude Shannon
2. What is the difference between precision and recall?
    A. Precision measures true positives, recall measures true negatives
    B. Precision measures true negatives, recall measures true positives
    C. Precision measures the accuracy of positive predictions, recall measures the ability to find all relevant instances
    D. Precision measures overall accuracy, recall measures the specificity
3. What is a generative model used for in machine learning?
    A. To classify data
    B. To generate new data samples
    C. To reduce the dimensionality of data
    D. None of the above
4. Which of the following is an application of natural language processing (NLP)?
    A. Speech recognition
    B. Image classification
    C. Reinforcement learning
    D. Clustering
5. What does the term 'big data' refer to?
    A. Large amounts of structured and unstructured data
    B. Data stored in a large database
    C. High-quality data
    D. Data that is easy to process
6. Which AI technique is used for translating languages?
    A. Natural Language Processing
    B. Image Recognition
    C. Reinforcement Learning
    D. Clustering
7. Which of the following is an example of a reinforcement learning application?
    A. Self-driving cars
    B. Sentiment analysis
    C. Image segmentation
    D. Anomaly detection
8. An AI agent acts upon the environment after perceiving it using
    A. Actuators

B. Perceiver
C. Sensors
D. Camera

9. There are about five (5) types of knowledge for AI, which include
   A. Procedural, Declarative, Meta, Heuristic and Acquired knowledge
   B. Procedural, Declarative, Meta, Heuristic and Structural knowledge
   C. Procedural, Declarative, Deterministic, Heuristic and Structural knowledge
   D. Unsupervised, Supervised, Alpha-beta, Heuristic and Structural knowledge
10. Which search algorithm is categorized as uninformed?
   a. A* Search
   b. Depth-First Search (DFS)
   c. Greedy Search
   d. Hill Climbing
11. In the A search algorithm, what does the function represent?
   a. The exact cost to reach node
   b. The estimated cost to reach the goal from node
   c. The sum of the cost to reach and the estimated cost to the goal
   d. The cost of the most promising neighbor of node
12. Why is the A search algorithm considered both complete and optimal under certain conditions?*
   a. It uses breadth-first search with a heuristic
   b. Its heuristic never overestimates the cost (admissibility)
   c. It performs exhaustive search of the entire problem space
   d. It applies a randomized approach to explore all solutions
13. Why are heuristics important in informed search algorithms like A?
   a. They ensure completeness of the search
   b. They estimate the cost from a node to the goal to guide exploration
   c. They allow the search to ignore irrelevant parts of the problem space
   d. They make the search algorithm faster by avoiding cycles
14. How does alpha-beta pruning enhance the performance of the minimax algorithm?
   a. It eliminates the need for heuristics
   b. It skips branches that cannot affect the final decision
   c. It randomizes the selection of game moves
   d. It explores all possible moves at once
15. Which of the following is an example of a strong method for problem solving?
   a. Hill Climbing
   b. Rule-based Expert Systems
   c. Breadth-First Search
   d. Greedy Search
16. What type of reasoning system best handles uncertain or incomplete information?
   a. Deductive reasoning

b. Probabilistic reasoning
c. Logical reasoning
d. Symbolic reasoning

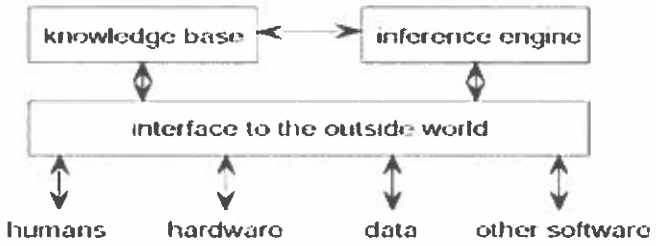
17. What is the role of the prior probability in Bayesian reasoning?
    a. It represents the likelihood of an event based on historical data
    b. It measures the impact of new evidence on the final outcome
    c. It models the overall uncertainty in the environment
    d. It calculates the cost of taking an action
18. What is the role of the utility function in game playing algorithms?
    a. To randomly select a move
    b. To measure the desirability of a game state for a player
    c. To represent the path cost in search algorithms
    d. To reduce the branching factor of the game tree
19. What is the significance of pruning in a game tree search?
    a. To increase the accuracy of the search
    b. To reduce the number of nodes explored, improving efficiency
    c. To guarantee that the best move is selected
    d. To remove redundant search algorithms
20. Which of the following algorithms uses probabilistic reasoning for decision-making under uncertainty?
    a. Depth-First Search
    b. Greedy Search
    c. Bayesian Networks
    d. Iterative Deepening Search

Instructions

1. *Choose any other four questions from the six (6) questions below. Note that all questions have the same mark allocation (20).*
2. *Indicate the choice of your answer on the Answer Booklet provided.*

Question 2.

1. What is the primary goal of artificial intelligence? (5)
2. Define a search problem in artificial intelligence. (5)
3. Using the First-order Predicate Logic (FOL), and a consistent vocabulary, represent the following sentences 'Some students took MA101 in 2023' (5)
4. Knowledge-based systems is a computer program that reasons and uses a knowledge base to solve complex problems, using the diagram below:



   b. Explain the role of the human in the knowledge-based system. (2)
   c. The function of the (3)
      i. Inference engine
      ii. Knowledge base
      iii. Hardware

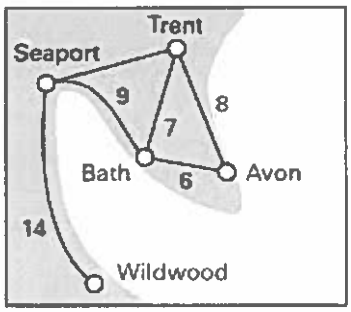
Question 3

1. Provide a brief overview of the Turing Test and its significance in AI. (5)
2. With examples, explain how AI can be applied to solve complex problems in various domains such as healthcare, finance, and transportation. Provide specific examples.(5)
3. Describe how the Breadth-First Search (BFS) algorithm works. What type of problems is it best suited for? (5)
4. Prove by refutation the theorem below, i.e. show that c is derivable from the formula $(a \wedge b \supset c) \wedge (d \supset a) \wedge (d \supset b) \wedge d$:
   $(a \wedge b \supset c) \wedge (d \supset a) \wedge (d \supset b) \wedge d \mid\!- c$ (5)

Question 4

1. Explain the Prisoners' Dilemma, and give a real-life example (5)
2. What is the minimax algorithm used for in game-playing AI, and how does it decide the best move? (5)
3. Draw to four levels the search tree produced by the best-fit algorithm of figure below in finding the route from Trent to Wildwood. Each node in the search tree will be a city on the map. Begin with a node for Trent. When expanding a node, add only the cities that are

directly connected to the city being expanded. Record in each node the straight-line distance to Wildwood and use this as the heuristic value. Does the best-fit algorithm have a defect in its processing? (5)



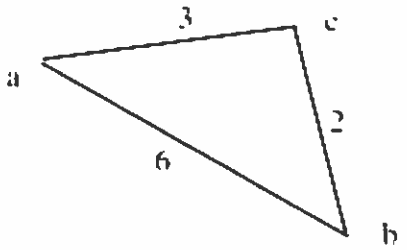
Straight line distance to Wildwood from

Avon	10
Bath	8
Trent	15
Seaport	13

4. How does the Propositional Logic (PL) differ from the First-Order Logic (FOL), in knowledge representation? (5)

Question 5

1. What are some common concerns and ethical issues associated with artificial intelligence? (5)
2. What are the different methods for knowledge representation in AI, and how do they influence the effectiveness of AI systems? (5)
3. Explain, which actions will be taken by A* algorithm to find the shortest path from the node a to the node b in the following graph, where the distances between its nodes are shown on its edges: (5)

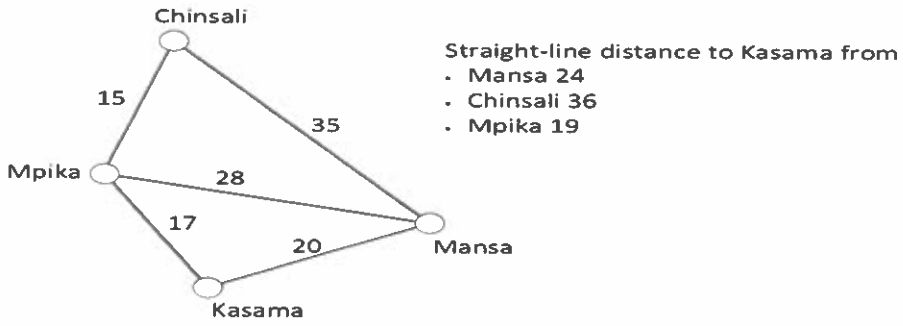


4. There are five common logical connectives used in AI and are; Conjunction, Negotiation, Implication, Disjunction, & Biconditional. Complete the truth table below, to show your understanding of the logical connective's symbols (5)

p	Q	R	¬R	P^Q	(P∨Q)¬R
True	True	True			
True	False	True			
True	False	False			
False	False	False			

Question 6

1. How does the history of AI development influence current AI research and applications? Provide examples of significant AI milestones and their impact. (5)
2. Using the information provided on the graph below:



   a) Draw the search tree produced by the best-fit algorithm in finding the route from Chinsali to Kasama. Each node in the search tree will be a city on the map. Begin with a node for Chinsali. When expanding a node, add only the cities that are directly connected to the city being expanded. (5)

   b) The A* algorithm modifies the best-fist algorithm in two significant ways. First, it records the actual cost to reach a state. In the case of a route on a map, the actual cost is the distance travelled. Secondly, when selecting a node to expand, it chooses the node whose sum of the actual cost, plus the heuristic value is the smallest. Draw the search tree that would result from these two modifications and record in each node the distance travelled to the city, the heuristic value to reach the goal and their sum. (5)

3. What are the advantages of combining model-based and case-based systems? (5)

Question 7

1. Design a search algorithm that can handle decision-making in an uncertain environment, combining the strengths of both informed and uninformed search techniques. Explain your approach. (5)
2. Given a tic-tac-toe game state, use the minimax algorithm to determine the best possible move for the player. Provide your reasoning at each step. (5)
3. Draw and label an architecture of a typical expert system for any problem domain of your choosing (5)
4. Name any five (5) agent types, which have percepts, actions and goals within the environment (5)

SCHOOL OF APPLIED SCIENCE AND OPEN LEARNING
DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY
BACHELOR OF CYBER SECURITY

Mobile Networks
ICT 480

SESSIONAL EXAMINATION
DATE: 16-Oct-24 TIME: 09.00 - 12.00 HRS, 3 HOURS

Instructions to candidates

1. Write your Name and Student ID on the Answer Sheet provided

2. There are SIX (6) questions in this paper. Attempt only five (4). Question One is compulsory and choose any four (3) from the remaining FIVE (5). Indicate on the Answer sheet your choice from the optional questions.

3. Write your Answers on the answer Sheet provided.

4. No Foreign material will be allowed in this examination.

5. The number of marks is shown in brackets [ ] at the end of each question or part question.

6. Clear handwriting and neat work is encouraged.

7. The total number of marks for this paper is 100

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

QUESTION 1

A commuter on a bus from Chinsali to Lusaka is on a voice call. The commuter notices that as the bus moves from Chinsali towards Lusaka, the cell's coverage area to another along the way, the GSM network detects a decrease in signal strength from the current base station and initiates a handover to a stronger signal from a nearby base station. However, the user remains connected throughout the call with no noticeable interruption.

Based on the above scenario answer the following questions: -

a) Using the above scenario define mobile computing **(4 marks)**
b) Mention the four (4) characteristics a device on the bus mentioned above exhibits during communication **(4 marks)**
c) Explain the two different kinds of mobility available? **(4 marks)**
d) State any FIVE Limitations of Mobile Computing **(5 marks)**
e) Explain MOBILITY MANAGEMENT in GSM **(4 marks)**
f) List and explain GSM services. **(6 Marks)**
g) State the different interfaces present in GSM**? (6 marks)**
h) Name the different subsystems of GSM? **(4 marks)**
i) Give the two types of roaming available **(4 marks)**
j) What are the security services provided in GSM? **(4 Marks)**

Total: 40 Marks

QUESTION 2

a) Differentiate between nomadic computing and ubiquitous computing **(4 marks)**
b) Discuss two ways of coping with uncertainties in mobile computing **(4 marks)**
c) Describe two types of Mobile value-added services **(4 marks)**
d) Mention any four (4) New Forms of Computing available **(4 marks)**
e) Why should Mobile Computing be undertaken? **(4 marks)**

Total: 20 Marks

QUESTION 3

a) What do you understand by the following terms
   I. Cellular network **(2 Marks)**
   II. Cell **(2 Marks)**
   III. MAHO **(2 Marks)**
   IV. BSS **(2 Marks)**
b) State 4 requirements of a Secure Routing Protocol for Ad Hoc Wireless Networks **(4 marks)**
c) Differentiate between mobile ip and cellular-ip **(4 marks)**
d) Discuss the components of WLAN **(4 marks)**

Total: 20 Marks

QUESTION 4

a) Describe three components of mobile IP **(6 Marks)**
b) What are the disadvantages of mobile IP? **(4 Marks)**
c) Explain the key mechanism of mobile IP with the help of a suitable schematic diagram and by using suitable examples. **(6 Marks)**
d) Illustrate packet delivery mechanism in Mobile IP network with neat diagram? **(4 Marks)**

Total: 20 Marks

QUESTION 5

a) Define link state protocols (LSP) **(2 Marks)**
b) What are the Popular MANET Routing Protocols **(4 Marks)**
c) Difference Between Proactive & Reactive protocols **(4 Marks)**
d) What are the essentials needs of traditional routing Protocols **(4 Marks)**
e) What are the MANET Design Issues? **(4 Marks)**
f) What are the Applications of MANETs **(2 Marks)**

Total: 20 Marks

QUESTION 6

a) Explain multicasting **(3 Marks)**
b) Discuss five application areas of mobile computing with relevant examples **(5 Marks)**
c) What are the layers of TCP/IP protocol stack? **(4 Marks)**
d) State the layers each of the following protocols belong to along with their functionality
   i. RARP **(4 Marks)**
   ii. DNS **(4 Marks)**

Total: 20 Marks

END OF EXAMINATION