CINEC CAMPUS
Beyond A Graduate

PAST PAPERS

Faculty	Department / Section/Division
Not Applicable	Learning Resource Centre

Past Papers

Faculty of Engineering and Technology
Department of Information Technology

BSc. (Hons) in Software Engineering

End Semester SEQ Examination

(Year 1 – Semester II)

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Faculty of Engineering and Technology
Department of Information Technology
BSc (Hons) in Software Engineering
IT_UGC_001/IT_IFLS_001

Year 1 Semester 2

RESIT EXAMINATION

Software Requirement Engineering – SE1201

- There are EIGHT (08) questions in this paper.
- This paper contains three (03) pages.
- Excluding the Compulsory question-answer any four (04) questions.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2022.12.08 Time: 03 Hour

Question 01: (Compulsory) (20 Marks)

1. Define the term "software process model". (02 Marks)
2. Write four (04) software process models known to you. (04 Marks)
3. Briefly explain the stages of waterfall process model. (08Marks)
4. Write three (03) disadvantages of waterfall process model. (06 Marks)

Question 02 (20 Marks)

1. What is requirements engineering? (04 Marks)
2. Who are "process actors" in requirements engineering process. (04 Marks)
3. Briefly explain "requirements engineering process" with the aid of a simple diagram. (12 Marks)

Question 03 (20 Marks)

1. Explain software prototyping? (02 Marks)
2. What are the various prototyping methods and tools? (08 Marks)
3. Briefly explain five (05) requirement elicitation techniques. (10 Marks)

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Question 4 (20 Marks)

1. What is a "use case"? (02 Marks)
2. What are the main components of a use case diagram? (04 Marks)
3. Write down four (04) different types of relationships that you can represent in a use case diagram. (04 Marks)
4. Draw a complete use case diagram for the scenario given below. (10 Marks)

   In a university, professors could select which courses that they teach online. The university registrar needs to publish them in the online catalog and need to maintain professor details, student details and course details in the system. Students can select the courses through this online catalog.

   Students can select up to four online courses for the upcoming semester and they need to register for the courses through the system. When the registration is completed by the student, the system will send the details to the billing system and students could make the payments afterwards. Professors can get their lecture schedules online which have updated by the registrar.

Question 05 (20 Marks)

1. Differentiate functional and non-functional requirements with an example for each. (04 Marks)
2. Write down two different types of readers for below mentioned requirements.
   a. User requirements
   b. System requirements
   c. Software Design Specifications (06 Marks)
3. What is feasibility study? Why it is important in the software development process? (10 Marks)

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Question 06 (20 Marks)

1. What is "requirement validation"? (02 Marks)
2. Briefly explain three (03) different requirement validation checks. (06 Marks)
3. Discuss any two (02) requirement validation techniques. (04 Marks)
4. Briefly describe the contents of SRS. (08 Marks)

Question 07 (20 Marks)

Draw the context diagram and level 1 data flow diagram for below case study.

ABC bank provides home and auto loans for its customers. Firstly, the bank customer should send a request through the bank system to get the loan amount and repayment details. Then he must send completed application. Application details will be recorded in the banking system and the system will check the customer status, requested loan details with bank database of interest rates. If it is an auto load the loan officer could approve and inform the details to the customer. If it is a home loan it needs to send for a committee for approval. The system will then send the application approval details to the customer.

Question 8 (20 Marks)

Briefly explain following terms (05 Marks * 4)

1. Validation
2. Stakeholders
3. Decision tree
4. RAD

----------END OF THE QUESTION PAPER----------

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Year 1 Semester 2

RESIT EXAMINATION

Discrete Mathematics - MA1202

- There are EIGHT (08) questions in this paper.
- This paper contains seven (07) pages.
- Excluding the Compulsory question-answer any four (04) questions.
- Calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2022.12.06 Time: 03 Hour

Question 01: (Compulsory) (20 Marks)

I. Define the following terms.

a. Reflexive Relation

b. Symmetric Relation

c. Transitive Relation

d. Identity Relation (04 Marks)

II. Prove or disprove the following using two Venn Diagrams.

a. $A - B = A \cap B'$

b. $\overline{A \cup B} = \overline{A} \cap \overline{B}$ (06 Marks)

III. Let A={k1,k2,k3,k4},Consider the relation R and S on A defined by,

α={(k1,k1),(k1,k2),(k1,k3),(k1,k4),(k2,k2),(k2,k4),(k3,k4),(k4,k4)}

β={(k1,k2),(k1,k4),(k2,k3),(k2,k4),(k3,k1),(k3,k2),(k3,k4),(K4,k1),(k4,k4)}

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Find the matrices of the above relations. Use matrices to find the following composition of the relation R and S.

a. $\alpha o \beta$
b. $\alpha o \alpha$
c. $\beta o \alpha$
d. α-1
e. β-1 (10 Marks)

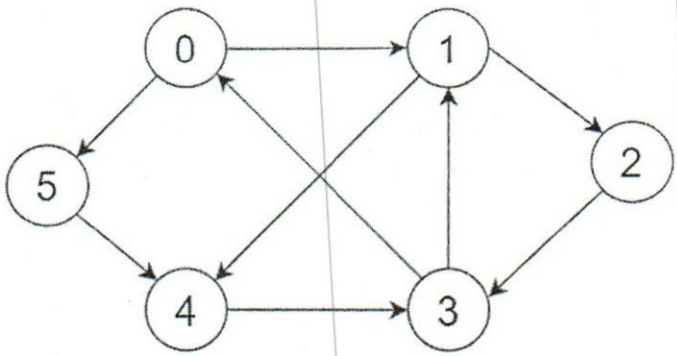
Question 02 (20 Marks)

I. Define the following terms with examples. (04 Marks)

a. Connected graph
b. Planar graph

II. Consider the following directed graph. Represent,

a. Adjacency Matrix form
b. Incidence Matrix form (06 Marks)



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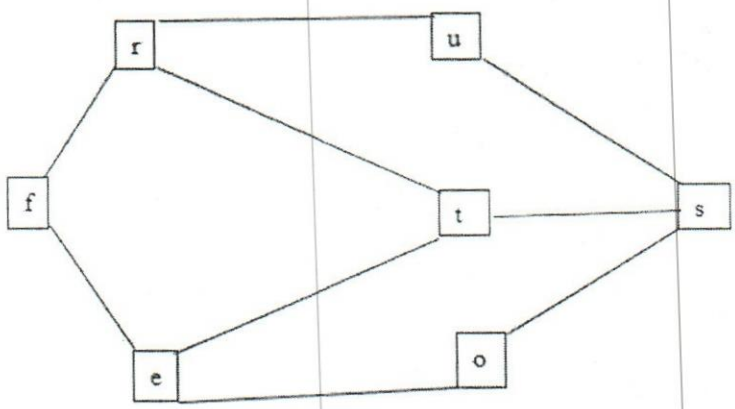
III. Consider the following graph.



Find

a. The Maximum eccentricity of vertex "r"
b. Radius of connected graph
c. Diameter of graph
d. Central point
e. Center
f. Circumference
g. Grith

(10 Marks)

Question 03 (20 Marks)

I. Define the following with respective to functions using examples.

a. Co-domain
b. Range (04 Marks)

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II. Let X = {x, y, z, k} and Y = {1, 2, 3, 4}. Determine which of the following functions. Give reasons if it is not. Find range if it is a function.

a. f = {(x, 1), (y, 2), (z, 3), (k, 4)

b. g = {(x, 1), (y, 1), (k, 4)

c. h = {(x, 1), (x, 2), (x, 3), (x, 4)

d. l = {(x, 1), (y, 1), (z, 1), (k, 1)}

e. d = {(x, 1), (y, 2), (y, 3), (z, 4), (z, 4)} (10 Marks)

III. Find the inverse of the following function $g(x) = (x - 2)/ (x^2 - 1)$ (06 Marks)

Question 04 (20 Marks)

I. Define the following with respective to functions using examples.

a. Domain

b. Co-Domain (04 Marks)

II. Let Show that f: R→ R defined as $f(a) = 3a^3 - 4$ is one to one function. (06 Marks)

III. Consider f, g and h, all functions on the integers, by $f(n) = n^2$, $g(n) = n + 1$ and $h(n) = n - 1$. Determine,

a. fog

b. foh

c. fogoh.

d. hofog

e. gofoh (10 Marks)

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Question 05 (20 Marks)

I. In a town of 10000 families it was found that 40% of families buy newspaper A, 20% family buy newspaper B, 10% family buy newspaper C, 5% family buy newspaper A and B, 3% family buy newspaper B and C and 4% family buy newspaper A and C. If 2% family buy all the newspaper. Find the number of families which buy

a. Number of families which buy all three newspapers.
b. Number of families which buy newspaper A only
c. Number of families which buy newspaper B only
d. Number of families which buy newspaper C only
e. Number of families which buy None of A, B, C
f. Number of families which buy exactly only one newspaper
g. Number of families which buy newspaper A and B only
h. Number of families which buy newspaper B and C only
i. Number of families which buy newspaper C and A only
j. Number of families which buy at least two newspapers
k. Number of families which buy at most two newspapers
l. Number of families which buy exactly two newspapers

(12 Marks)

II. Consider R is an equivalence relation. Show that R is reflexive and circular.

(08 Marks)

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Question 06 (20 Marks)

I. How many 4-digits number can be formed out of 0,1,2,3,5,7 and 8. If,

a. With no repetition (No restriction)

b. With repetition

(10 Marks)

II. A farmer purchased 3 cows, 2 pigs and 4 hens from a man who has 6 cows, 5 pigs and 8 hens. Find the number m of choices that the farmer has.

(10 Marks)

Question 07 (20 Marks)

I. Define the following terms

a. Conditional Statement

b. BiConditional Statement

(04 Marks)

II. Build truth tables for the following logical statements.

a. $(p \wedge \sim q) \rightarrow q$

b. $(p \rightarrow q) \leftrightarrow \sim (q \wedge r)$ (08 Marks)

III. Prove that $x + |x - 7| \geq 7$ for all real numbers x, using proof by cases.

(08 Marks)

Question 08 (20 Marks)

I. Define the following terms

a. Edge

b. Vertex

(04 Marks)

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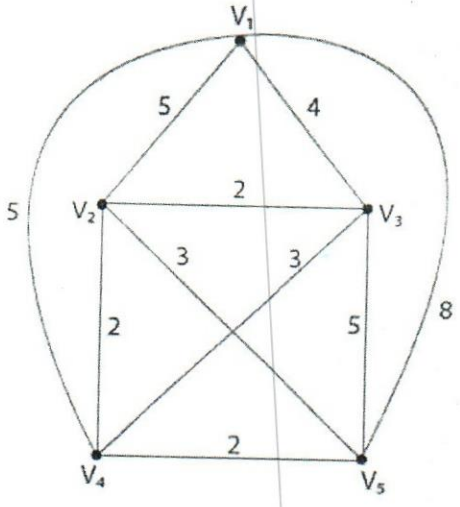
II. Solve the following travelling salesman problem using the nearest-neighbor method. The graph shown below is starting at vertex V_1.



(08 Marks)

III. A box contains 6 red, 8 green, 10 blue, 12 yellow and 15 white balls. What is the minimum no. of balls we have to choose randomly from the box to ensure that we get 9 balls of same color? (Hint: pigeonhole principle)

(08 Marks)

----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester II

SEMESTER END EXAMINATION

Business Communication - GS1204

- There are FIVE (05) questions in this paper.
- This paper contains FOUR(04) pages.
- Students should provide answers to all the questions.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Marks will be deducted for spelling, grammar and punctuation errors.
- Total Mark: 60

Date: **2022.06.17** Time: 03 Hour

Question 01 (15 Marks)

Read the following description and write a memorandum.

You are an assistant in the HR division in your workplace. You want to tell the staff of the marketing department about an upcoming leadership and personality development workshop. You are attaching a brochure about the workshop, but you also need to inform them of the following:

- what the workshop is for
- who the host is, including a brief statement about his/her background
- where the workshop will be held, including the date and time
- whether or not lunch and/or any refreshments will be served

Use the correct format of a memorandum.

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Question 02 (15 Marks)

Read the following description and write a formal letter.

Imagine you are the secretary of the Welfare Society of your workplace, and you wish to promote a Zumba and Yoga class for the staff. Write a letter to a well-known Yoga academy asking them for:

- Available days for conducting classes after 5p.m.
- Fees for an instructor.
- Number of students per class.
- The space and other required facilities.

Question 03 (10 Marks)

Read the following description and write an email.

You are a fresh IT graduate and wish to apply for an internship in a renowned IT company. Write an email mentioning about your educational and other qualifications. Say that you are enclosing your CV with the email.

Use the correct format of an email.

Question 04 (10 Marks)

The graph below shows the change in Sri Lankan Rupee to US Dollar Spot Exchange Rate from 2018 to 2022.

Summarize the information by selecting and reporting the main features and make comparisons where relevant. Write at least 150 words.

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Question 05 **(10 Marks)**

Read the following passages and paraphrase them.

Because of their unique perspective, Americans fear globalization less than anyone else, and as a consequence they think about it less than anyone else. When Americans do think about globalization, they think of the global economy as an enlarged version of the American economy.

(Source: Thurow, L. (1993). *Fortune Favors the Bold* (p. 6). New York: Harper Collins.)

(05 Marks)

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The prevalence and impact of non-communicable diseases continue to grow. Chronic diseases account for 60% of all deaths worldwide, and 80% of these deaths occur in low-or middle-income countries, where the toll is disproportionate during the prime productive years of youth and middle age.

(Source: Venkat Narayan, K.M., Ali, M.K., and Koplan, J. 2010, September 23)

(05 Marks)

----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester 2

SEMESTER END EXAMINATION

Fundamentals of Computer Networks - IT1205

- There are EIGHT (08) questions in this paper.
- This paper contains two (02) pages.
- Excluding the Compulsory question-answer any four (04) questions.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2022.06.15 Time: 03 Hour

Question 01: (Compulsory) (20 Marks)

(a) With the use of diagrams explain five (05) WAN Technologies used from the history

Question 02 (20 Marks)

(a) What is a sub-interface in a router? Explain with a diagram and a configuration (10 Marks)

(b) Explain the Voice, Video, and Data transmission in a WAN QoS Environment. (10 Marks)

Question 03 (20 Marks)

(a) How is an access port different from a trunk port in a Switched Environment. Explain through a diagram (10 Marks)

(b) Explain the difference between the syntax of EIGRP and OSPF (10 Marks)

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Question 04 (20 Marks)

(a) What is Redundancy and how is it useful in a WAN environment.
Explanation should have a diagram (10 Marks)

(b) Describe the difference between Point to Point and Star Topologies (10 Marks)

Question 05 (20 Marks)

(a) How is a Network address different from a Broadcast address. Using an example describe briefly. (10 Marks)

(b) How is IPV4 different from IPV6? (10 Marks)

Question 06 (20 Marks)

(a) What is Attenuation is Signaling? (10 Marks)
(b) How is a Serial Interface different from a Gigabit Ethernet interface (10 Marks)

Question 07 (20 Marks)

(a) What is Routing Summarization in EIGRP? Explain in detail. (10 Marks)
(b) Is a LAN placed in a WAN? Justify the answer (10 Marks)

Question 08 (20 Marks)

(a) How is types of Coaxial Cables different from Fibre Optics Cables. (10 Marks)
(b) Explain how TCP is different from UDP? Explanation should have a diagram (10 Marks)

----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester II

SEMESTER END EXAMINATION

Software Requirements Engineering – SE1201

- There are EIGHT (08) questions in this paper.
- This paper contains FOUR (04) pages.
- Excluding the Compulsory question-answer any four (04) questions.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: **2022.06.13** Time: 03 Hour

Question 01 (Compulsory) (20 Marks)

(a) Define the term "Software Requirement" (02 Marks)

(b) What is the difference between functional and non-functional requirements? (02 Marks)

(c) Write four (04) requirement sources. (04 Marks)

(d) Give three (03) reasons for why requirements negotiation is important in Software Engineering. (03 Marks)

(e) Explain how agile software development is differ from waterfall model. (04 Marks)

(f) Name five (05) requirements elicitation techniques. (05 Marks)

Question 02 (20 Marks)

(a) What do you mean by "User Requirements" and "System Requirements"? (04 Marks)

(b) Briefly explain "Functional Requirements" and "Non-functional Requirements" with two examples for each. (08 Marks)

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(c) What are the three (03) main types of non-functional requirements? Give two (02) examples for each. (08 Marks)

Question 03 (20 Marks)

(a) What do you mean by "Requirements Engineering" (02 Marks)

(b) What are the four (04) steps in Requirements Engineering process? (04 Marks)

(c) Briefly explain the typical stages (7 stages) in Software Development Life Cycle. (14 Marks)

Question 04 (20 Marks)

Question number 04 is based on the following case study.

ABC Bank provides vehicle and home loans to its customers. Initially, a potential loan customer communicates with a loan officer in the bank and requests a loan for a certain amount and time frame and sends a loan application. Next, the loan officer checks the customer's credit standing, the type of loan required, and available interest rates. While the loan officer can authorize vehicle loans for credit-worthy customers, a loan committee must approve all home loans.

(a) Draw the context diagram (Level 0) for the above scenario (05 Marks)

(b) Draw the level 1 DFD diagram based on the context diagram above. (15 Marks)

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Question 05 (20 Marks)

(a) Write five (05) different relationship types that could represent in a Use Case diagram. (05 Marks)

(b) Draw a UML USE CASE diagram for the detailed discussion below. (15 Marks)

Use Case for Customer Purchasing Process

1. Customer first should browse the catalog and select the items to buy
2. Customer then goes for the checkout
3. Then Customer needs to fill in the shipping details (address, home phone number)
4. System will then produce full price details to the customer
5. Customer enters the credit card details
6. System Authorize the purchase
7. System confirms the sale
8. System sends confirming email to the customer

Question 06 (20 Marks)

(a) Define the term "Requirements Validation" (02 Marks)

(b) Explain briefly four (04) requirement validation techniques. (04 Marks)

(c) Write the software Metrics for below mentioned non-functional requirements.

a. Reliability

b. Size

c. Performance (06 Marks)

(d) Describe the contents of a "Software Requirements Specifications - SRS" document. (08 Marks)

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Question 07 (20 Marks)

(a) Write five (06) different software process models. (06 Marks)

(b) List and explain briefly three (03) factors to consider when selecting a software process model. (06 Marks)

(c) Briefly explain below terms (08 Marks)

a. Decision Tree
b. Decision Table
c. User Stories
d. Scenario

Question 08 (20 Marks)

Briefly explain following terms (05 Marks * 4)

(a) Stakeholder
(b) Feasibility Study
(c) Domain Requirements
(d) Brainstorming

----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester 2

SEMESTER END EXAMINATION

Data Structure & Algorithms - IT1204

- There are EIGHT (08) questions in this paper.
- This paper contains nine (09) pages.
- Excluding the Compulsory question-answer any four (04) questions.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2022.06.10 Time: 03 Hour

Question 01: (Compulsory) (20 Marks)

"A data structure is a particular way of organizing data in a computer so that it can be used effectively".

(a) Name four (04) linear type data structures. (04 Marks)

(b) What is the difference between linear queue and circular queue? Explain your answer with proper examples. (16 Marks)

Question 02 (20 Marks)

(a) Write four (04) functions used in the Stack data Structure. (04 Marks)

(b) Draw the stack frames after performing each of the operations given below. The maximum size of the stack is six (06). (16 Marks)

1. Push(7)
2. Pop()
3. Push(2)
4. Push(5)
5. Push(25)
6. Pop()
7. Push(4)
8. Push(6)
9. Push(50)
10. Push(80)
11. Push(100)
12. Pop()
13. Peek()
14. Push(66)
15. Pop()
16. Pop()
17. Push(70)

Question 03 (20 Marks)

You have given the bubble sort algorithm. Dry-run and show how do you sort the given array using the 'Insertion Sort' algorithm? (20 Marks)

1	2	3	4	5	6	7
90	50	60	70	40	55	65

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- INSERTION SORT(A)

```
1. for j ← 2 to length[A]
2.     do key ← A[j]
3.         Insert A[j] in to the sorted sequence A[1..j-1]
4.     i ←j-1
5.     while i>0 and A[i]>key
6.         do A[i+1]←A[i]
7.         i←i-1
8.     A[i+1]←key
```

Question 04 (20 Marks)

(a) The following data is inserted into a binary tree. Draw the binary tree after inserting the data and explain the inserting methodology. (10 Marks)

80 90 45 85 20 60 50 95 55 98

(b) What is the tree representation after deleting given nodes?

(Hint: Part 1, 2, and 3 are inter-related operations. After completing part 1, take that answer to provide the answer for part 2 etc.) (10 Marks)

1. Delete(15)
2. Delete(55)
3. Delete(75)

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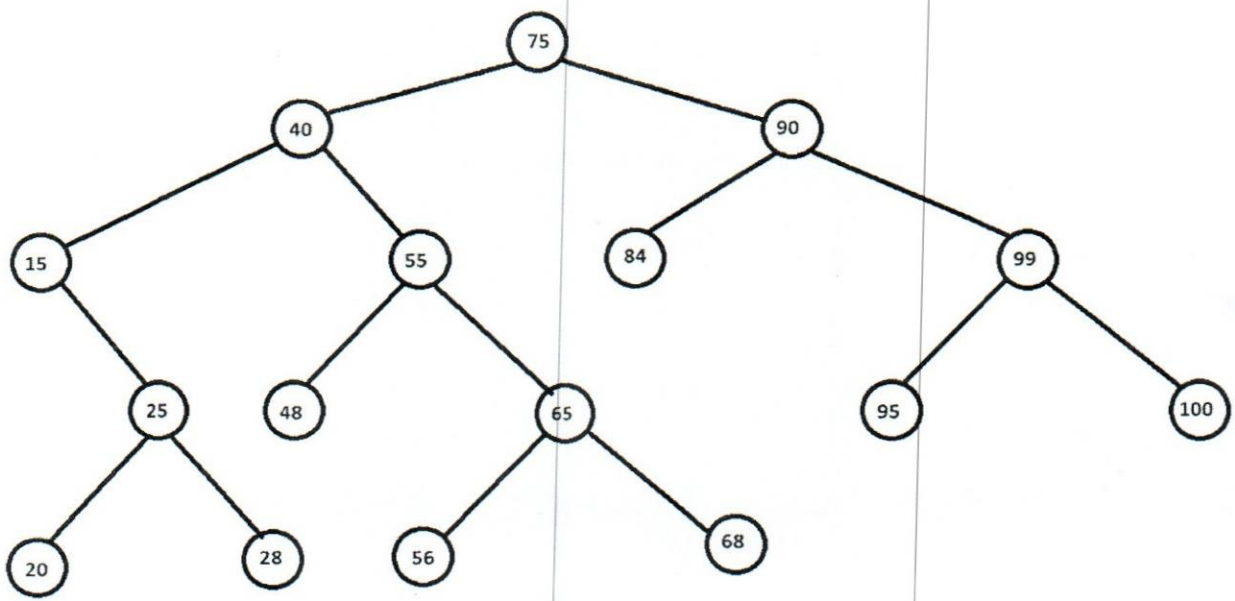

Question 05 (20 Marks)

(a) Using the **RAM Model Analysis,** find the number of steps in the given algorithms.

1. total = 0
   count = 0
   while count <=5
   total = total + 1
   count ++
   print total (10 Marks)

2. Sum = 0
   for i = 1 to 3
   Sum = Sum + 1
   Print Sum
   Avg = Sum/(i-1) (10 Marks)

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Question 06 (20 Marks)

(a) What is a recursive function? Briefly describe. (05 Marks)

(b) Write all the steps to find the value of factorial six (06) using the given formula.

n! = n*(n-1)! (05 Marks)

(c) Find the complexity (Big(O)) of the given algorithms. (10 Marks)

1.

```
1. for j ← 2 to length[A]
2.         do key ← A[j]
3.         i ←j-1
4.         while i>0 and A[i]>key
5.                 do A[i+1]←A[i]
6.                 i←i-1
7.         A[i+1]←key
```

2.

```
1. For i from 0 to List.Length
2.         SmallestElement = List[i]
3.         For j from i to List.Length
4.                 If SmallestElement > List[j]
5.                 SmallestElement = List[j]
6.         Swap(List[i], SmallestElement)
```

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3.

```
1. function solve_sudoku ( current_box_id )
2.         if all the boxes are filled
3.               return true
4.         end
5.         if the current box is filled
6.               return the result of: solve_sudoku( next box )
7.         end
8.         for each possible number from 1 to 9
9.               if that number is 'valid' (okay to put in box)
10.                 if you can "solve_sudoku" for the rest of the puzzle
11.                       return true
12.                 end
13.              end
14.        end
15.        return false
16. end
```

4.

```
1. num :INPUT "Enter a number"
2. IF num MOD 2 ===0
3.     print "Even Number"
4. ELSE
5.     print "Odd Number"x
```

5.

```
1. Function find_max( list )
2.      possible_max_1 = first value in list
3.      possible_max_2 = find_max ( rest of the list )
4.      if ( possible_max_1 > possible_max_2 )
5.              answer is possible_max_1
6.      else
7.              answer is possible_max_2
8.      end if
9. end
```

Question 07 (20 Marks)

(a) Write

1. InOrder
2. PreOrder
3. PostOrder

for the given tree below. (20 Marks)

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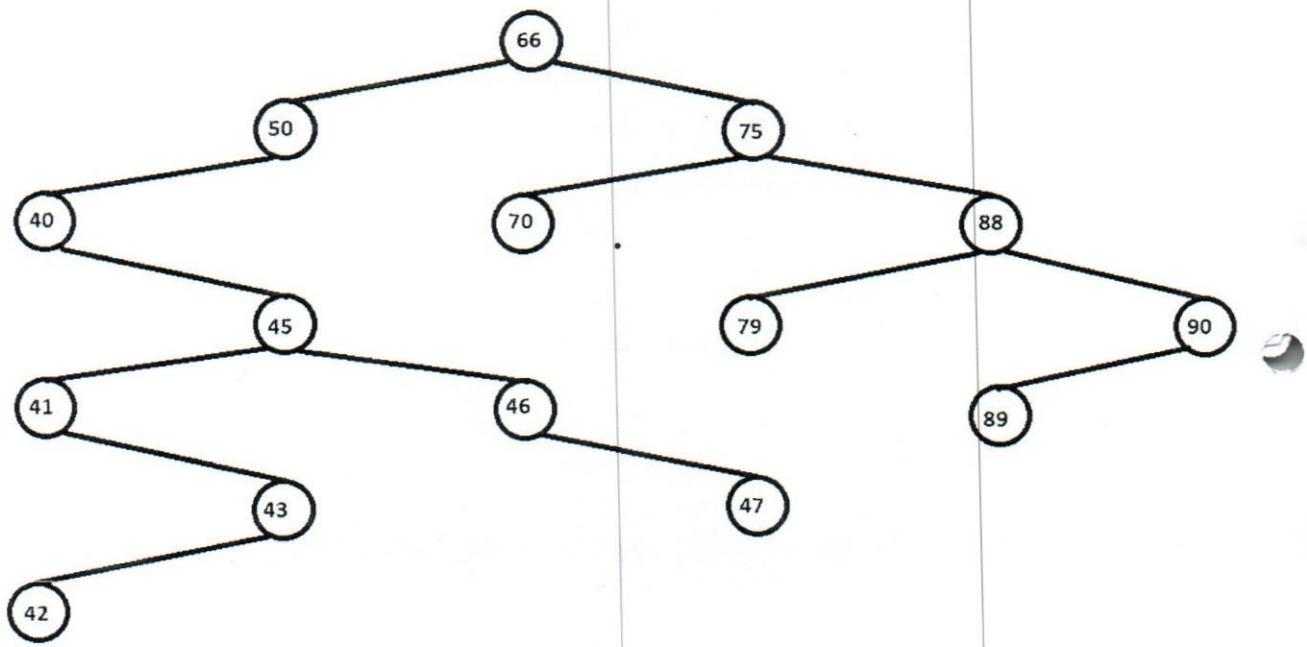
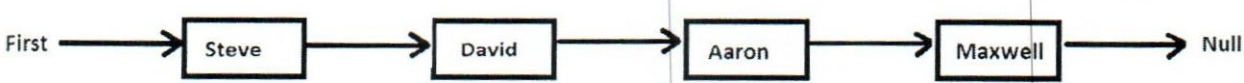
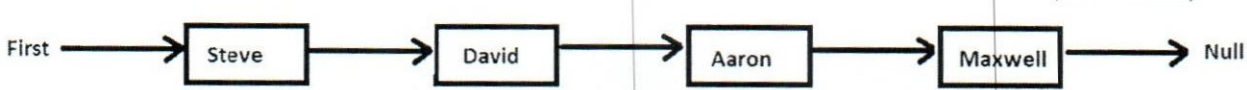


Question 08 (20 Marks)

(a) Write all the steps to delete the link "Maxwell" from the following link list.
(05 Marks)



(b) Write all the steps to delete the link "David" from the following link list.
(05 Marks)



(c) Write all the steps to insert the new link "75" as the last link of the link list.

(05 Marks)

(d) Write all the steps to insert the new link "Cummins" after the link "Steve" in the link list.

(Hint: You should insert the new link in between "Steve" and "David".

(05 Marks)

----------END OF THE QUESTION PAPER----------

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Year 1 Semester 2

SEMESTER END EXAMINATION

Discrete Mathematics - MA1202

- There are EIGHT (08) questions in this paper.
- This paper contains seven (07) pages.
- Excluding the Compulsory question-answer any four (04) questions.
- Calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: **2022.06.08** Time: 03 Hour

Question 01: (Compulsory) (20 Marks)

I. Define the following terms (1* 4 Marks)

a) Binary Relation
b) Antisymmetric Relation
c) Irreflexive Relation
d) Symmetric Relation

II. Let D={σ,£,Ω,μ}, F={a,b,μ,d} and R={(σ,a),(£,c),(μ,μ),(Ω,μ),(Ω,d),(μ,d)}.
Represent a relations "R" (06 Marks)

a) As a Matrix
b) As an Arrow diagram
c) As a Directed graph.

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III. Let A={k_1,k_2,k_3,k_4},Consider the relation R and S on A defined by

α={(k_1,k_1),(k_1,k_2),(k_1,k_3),(k_1,k_4),(k_2,k_2),(k_2,k_4),(k_3,k_4),(k_4,k_4)}

β={(k_1,k_2),(k_1,k_4),(k_2,k_3),(k_2,k_4),(k_3,k_1),(k_3,k_2),(k_3,k_4),(K_4,k_1),(k_4,k_4)}

Find the matrices of the above relations. Use matrices to find the following composition of the relation R and S. (10 Marks)

(i) $\alpha o \beta$ (ii)$\alpha o \alpha$ (iii)$\beta o \alpha$ (iv)α^{-1} (v) β^{-1}

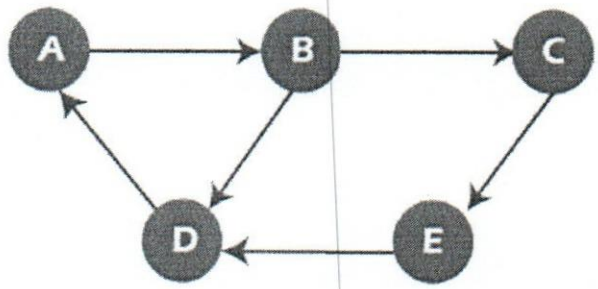
Question 02 (20 Marks)

I. Define the following terms with examples (04 Marks)

a) Directed graph
b) Complete graph
c) Connected graph
d) Trivial graph

II. Consider the following directed graph Represent,

a) Adjacency Matrix form
b) Incidence Matrix form



(06 Marks)

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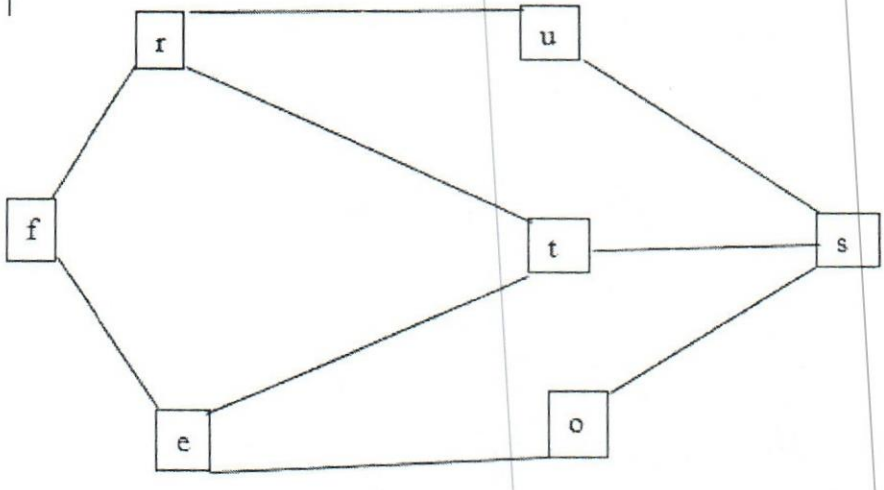
III. Consider the following graph



Find

a) The Maximum eccentricity of vertex "r"
b) Radius of connected graph
c) Diameter of graph
d) Central point
e) Center
f) Circumference
g) Grith

(10 Marks)

Question 03 (20 Marks)

I. Define the following terms of a function (03 Marks)

a) Domain
b) Co-domain
c) Range

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II.

a) Evaluate the ceiling function of 4.5 and - 4.5. Also, explain the answer.

b) Evaluate the floor value of 3.7.

c) Find k(MOD x) ? ,where k,x≥0 and k>x

(10 Marks)

III. Find the inverse of the following function $g(x) = (x - 2)/ (x^2 - 1)$

(07 Marks)

Question 04 (20 Marks)

I. Define the following with examples

a) Injective functions

b) Into functions

c) Bijective functions

d) Surjective functions.

(04 Marks)

II. Show that f: R→ R defined as $f(a) = 3a^3 - 4$ is one to one function

(06 Marks)

III. Consider f, g and h, all functions on the integers, by $f(n) = n^3 - 1$, $g(n) = n^2 - 1$ and $h(n) = n - 1$.

Determine (i) fog (ii) foh (iii) fogoh (iv)hofog (v) gofoh

(10 Marks)

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Question 05 (20 Marks)

I. A total of 1232 students have taken a course in Spanish, 879 have taken a course in French, and 114 have taken a course in Russian. Further, 103 have taken courses in both Spanish and French, 23 have taken courses in both Spanish and Russian, and 14 have taken courses in both French and Russian. If 2092 students have taken a course in at least one of Spanish French and Russian, how many students have taken a course in all 3 languages. Number of families which buy exactly two newspapers

(12 Marks)

II. Negate each of the following propositions

a) $\forall x\, p(x) \wedge \exists\, y\, q(y)$

b) $(\exists x \in U)\ (x+5=75)$

(08 Marks)

Question 06 (20 Marks)

I. The Egotists' Club has 6 members: A, B, C, D, E, and F. They are going to line up, from left to right, for a group photo. After lining up in alphabetical order (ABCDEF), Mr. F complains that he is always last whenever they do things alphabetically, so they agree to line up in reverse order (FEDCBA) and take another picture. Then Ms. D complains that she's always stuck next to Mr. C, and that she never gets to be first in line. Finally, in order to avoid bruised egos, they all agree to take pictures for every possible left-to-right line-up of the six people. How many different photos must be taken?.

(10 Marks)

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II. In playing the lottery the object is to choose 5 numbers between 1 to 49. If these 5 numbers match the 5 numbers drawn from the machine (it does not matter about order), then you win the jackpot. What is the probability of winning this prize if you have bought 500 lottery tickets and have chosen different numbers on each ticket?

(10 Marks)

Question 07 (20 Marks)

I. Define the following terms

a. Conditional Statement

b. BiConditional Statement

(04 Marks)

II. Show that

a. $k \rightarrow l$ and its contrapositive $\sim l \rightarrow \sim k$ are logically equivalent.

b. Proposition $l \rightarrow k$, and $\sim k \rightarrow \sim l$ is not equivalent to $k \rightarrow l$.

c. Prove that $k \leftrightarrow l$ is equivalent to $(k \rightarrow l) \wedge (l \rightarrow k)$.

(12 Marks)

III. Consider the following propositions

$\sim k \vee \sim l$ and $\sim(k \wedge l)$ .Are they equivalent?

(04 Marks)

Question 08 (20 Marks)

I. Define the following terms

a. Tree

b. Spanning Tree

(04 Marks)

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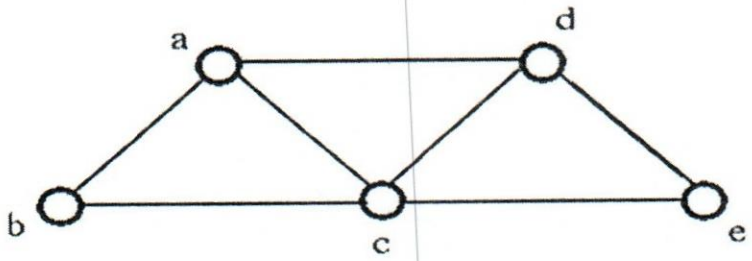
II. Consider a graph G,

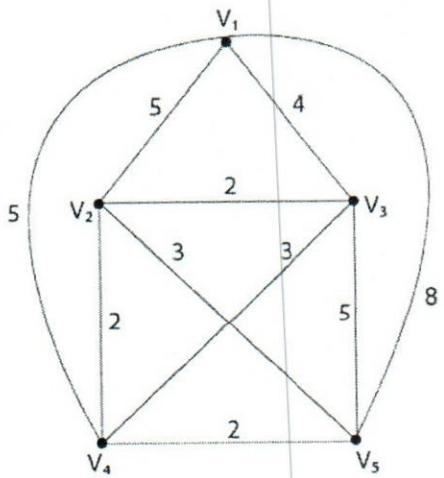


Find the spanning tree systematically by using,

a. Cutting- down Method
b. Building- up Method

(08 Marks)

III. Use the nearest-neighbor method to solve the following travelling salesman problem, for the graph shown in fig starting at vertex v1.



(08 Marks)

----------END OF THE QUESTION PAPER----------

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Year 1 Semester 2

SEMESTER END EXAMINATION

Database Management Systems - IT1203

- There are EIGHT (08) questions in this paper.
- This paper contains six (06) pages.
- Excluding the Compulsory question-answer any four (04) questions.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2022.06.06 Time: 03 Hour

Question 01: (Compulsory) (20 Marks)

(a) Describe the difference between an entity and an attribute. (02 Marks)

(b) Explain the difference between logical and physical data independence. (02 Marks)

(c) Name any three (03) specific benefits of the database approach. (03 Marks)

(d) Explain entity integrity and, referential integrity constraints in the relational model. (04 Marks)

(e) What is the difference between a superkey and a key? (04 Marks)

(f) What is the cardinality of relationships (05 Marks)

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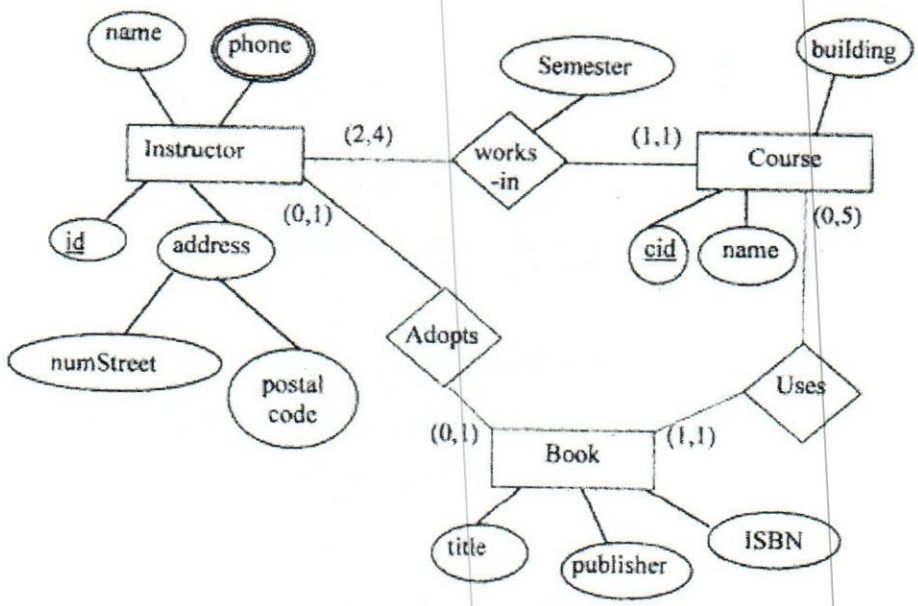
Question 02 (20 Marks)

(a) List two (02) purposes of schema normalization. (04 Marks)

(b) Normal forms are used to eliminate or reduce redundancy in database tables. Explain three (03) normal forms with an example. (16 Marks)

Question 03 (20 Marks)

Convert the following ER diagram to the relational model. You do not need to specify the domains of attributes. State any assumption/s you made.



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Question 4 (20 Marks)

Draw the ER diagram for the airport database. Be sure to indicate the various attributes of each entity and relationship set; also specify the key and participation constraints for each relationship set.

The officials of the airport decided that all information related to the airport should be organized using a DBMS, and you have been hired to design the database. Your first task is to organize the information about all the airplanes stationed and maintained at the airport. The relevant information is as follows:

- Every airplane has a unique registration number.
- Each airplane belongs to a specific model.
- The airport accommodates a number of airplane models, and each model is identified by a model number (e.g-DC-10) and has a capacity and a weight.
- A number of technicians work at the airport. You need to store the name, NIN (National Identity Number), address, phone number, and salary of each technician.
- Each technician is an expert on one or more plan model(s), and his or her expertise may overlap with that of other technicians. This information about technicians must also be recorded.
- Traffic controllers must have an annual medical examination. For each traffic controller, you must store the date of the most recent exam.
- All airport employees (both technician and traffic controllers) belong to a union. You must store the union membership number of each employee. You can assume that each employee is uniquely identified by a national identity number.
- The airport has a number of tests that are used periodically to ensure that airplanes are still airworthy. Each test has Federal Aviation Administration (FAA) test number, a name, and a maximum possible score.
- The FAA requires the airport to keep track of each time a given airplane is tested by a given technician using a given test. For each testing event, the information needed is the date, the number of hours the technician spent doing the test, and the score the airplane received on the test.

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Question 05 (20 Marks)

Consider the relation for published books:
Book (Book_Title, Authirname, Book_Type, Listprice, Author_affil, Publisher)

Suppose the following dependencies exist;

Book_Title -> Publisher, Book_Type
Book_Type -> Listprice
Authorname -> Author_affil

The key for this relation is Book_Title, Authorname

Decompose the relation into 3NF. For each step of the decomposition procedure, state what functional dependency it is based on, and give the relational schemas after the step has been carried out. State the relation instance in your 3NF schema corresponding to the above instance of R.

Question 06 (20 Marks)

The questions given below are based on the following relational schema:

Cosider the following database which records information in a video rental store.

Film (Film#, title, year, dailyrate)
Tape (Tape#, Film#)
Rental(Tape#, Customer#, date, numdays)
Customer(Customer#, name, address, phone)

Information about rentals is kept indefinitely. The cost of a rental is simply the dailyrate for that film multiplied by the number of days the tape is out.

(a) Write an SQL statement to list Film#, title, year , dailyrate of all the films sorted by ascending order of year. (04 Marks)

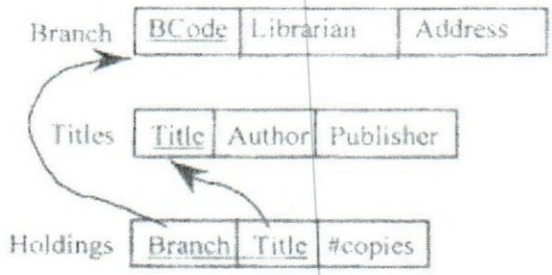
(b) For customers who borrowed more than one tape, write an SQL statement to list their Customer# and the number of tapes each of them borrowed, and give the alias of "total_tapes" for the number of tapes.. (05 Marks)

(c) Give a SQL query to list the names and phone numbers of customers who have not rented a video since 31/05/2022 (05 Marks)

(d) One day, the librarian finds a mistake in the view that a copy of the book "MamaMia" was borrowed by customer with Customer# "R1096" But actually it was borrowed by another customer with Customer# "M2656". Write a SQL query to correct this mistake. (06 Marks)

Question 07 (20 Marks)

Consider the following relational database schema. It is intended to represent the holdings of a multi-branch library. Specify the following queries in Relational Algebra.



(a) Print a list of the names of the branch librarians. (03 Marks)

(b) Print the list of branches which have holdings of books authored by "Harry Potter". (03 Marks)

(c) Print the list of branches which have NO holdings of books by :John Brown". (04 Marks)

(d) Print the list of titles having a more that 5 copies in every branch. (05 Marks)

(e) Print the list of titles having a total of 15 copies in all the branches. (05 Marks)

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Question 8 (20 Marks)

Define each of the following database terms accurately and concisely. Give an example for each.

(a) Data Model
(b) Schema
(c) Partial key
(d) Attribute
(e) Recursive entity

----------END OF THE QUESTION PAPER----------

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Year 1 Semester 2

SEMESTER END EXAMINATION

Discrete Mathematics - MA1201

- There are EIGHT (08) questions in this paper.
- This paper contains eight (08) pages.
- Excluding the Compulsory question-answer any four (04) questions.
- Calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: **2022.01.10** Time: 03 Hour

Question 01: (Compulsory) (20 Marks)

I. Define the following terms (1* 4 Marks)

a) Binary Relation
b) Reflexive Relation
c) Irreflexive Relation
d) Symmetric Relation

II. Let H={1,2,3,4}, K={a,b,c,d} and R={(1,a),(1,b),(1,c),(2,b),(2,c),(2,d)}. Represent a relations "R" (06 Marks)

a) As a Matrix
b) As an Arrow diagram
c) As a table

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III. Let A={2,3,4,5},Consider the relation R and S on A defined by

R={(2,2),(2,3),(2,4),(2,5),(3,4),(3,5),(4,5),(5,3)}

S={(2,3),(2,5),(3,4),(3,5),(4,2),(4,3),(4,5),(5,2),(5,5)}

Find the matrices of the above relations.Use matrices to find the following composition of the relation R and S. (10 Marks)

(i) RoS (ii)RoR (iii)SoR (iv)R^{-1} (v) S^{-1}

Question 02

(20 Marks)

I. Define the following terms with examples (04 Marks)

a) Directed graph
b) Simple graph
c) Complete graph
d) Null graph

II. Consider the following directed graph Represent,

a) Adjacency Matrix form
b) Incidence Matrix form
c) Adjancecy list form (06 Marks)

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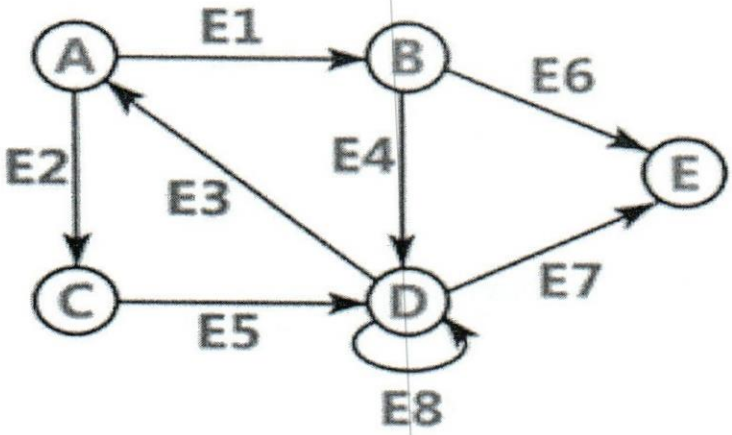
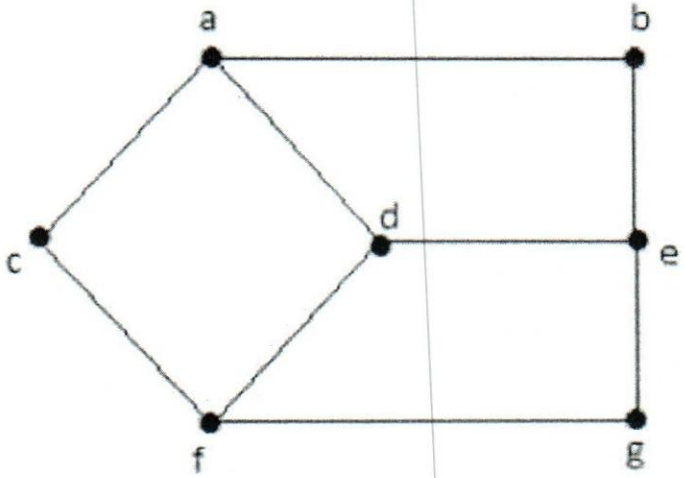


III. Consider the following graph



Find

a) The Maximum eccentricity of vertex "a"
b) Radius of connected graph
c) Diameter of graph
d) Central point
e) Center

f) Circumference

g) Grith

(10 Marks)

Question 03

(20 Marks)

I. Define the following terms of a function

a) Domain

b) Co-domain

c) Range

(03 Marks)

II. Let X = {x, y, z, k} and Y = {1, 2, 3, 4}. Determine which of the following functions. Give reasons if it is not. Find range if it is a function.

a) f = {(x, 1), (y, 2), (z, 3), (k, 4)

b) g = {(x, 1), (y, 1), (k, 4)

c) h = {(x, 1), (x, 2), (x, 3), (x, 4)

d) l = {(x, 1), (y, 1), (z, 1), (k, 1)}

e) d = {(x, 1), (y, 2), (y, 3), (z, 4), (z, 4)}

(10 Marks)

III. Find the inverse of the following function $g(x) = (x + 4)/ (2x -5)$

(07 Marks)

Question 04

(20 Marks)

I. Define the following with examples

a) Injective functions

b) Surjective functions

c) Bijective functions

d) Into functions (04 Marks)

II. Show that f: R→ R defined as f(a) = 3a3 – 4 is one to one function

(06 Marks)

III. Consider f, g and h, all functions on the integers, by f (n) =n^3,

g (n) = n - 1 and h (n) = n - 2.

Determine (i) fog (ii) foh (iii) fogoh. (iv)hofog (v) gofoh

(10 Marks)

Question 05 (20 Marks)

I. In a town of 10000 families it was found that 40% of families buy newspaper A, 20% family buy newspaper B, 10% family buy newspaper C, 5% family buy newspaper A and B, 3% family buy newspaper B and C and 4% family buy newspaper A and C. If 2% family buy all the newspaper. Find the number of families which buy

a) Number of families which buy all three newspapers.
b) Number of families which buy newspaper A only
c) Number of families which buy newspaper B only
d) Number of families which buy newspaper C only
e) Number of families which buy None of A, B, C
f) Number of families which buy exactly only one newspaper
g) Number of families which buy newspaper A and B only
h) Number of families which buy newspaper B and C only
i) Number of families which buy newspaper C and A only

j) Number of families which buy at least two newspapers

k) Number of families which buy at most two newspapers

l) Number of families which buy exactly two newspapers

(12 Marks)

II. Negate each of the following propositions

a) $\forall x\ p(x) \wedge \exists\ y\ q(y)$
b) $(\exists x \in U)\ (x+6=25)$

(08 Marks)

Question 06

(20 Marks)

I. The security code of an alarm consists of three single-digit numbers including zero followed by three letters, without any repetition. Evaluate how many different codes can by formed.

(10 Marks)

II. In playing the lottery the object is to choose 6 numbers between 1 to 49. If these 6 numbers match the 6 numbers drawn from the machine (it does not matter about order), then you win the jackpot. What is the probability of winning this prize if you have bought 100 lottery tickets and have chosen different numbers on each ticket?

(10 Marks)

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Question 07 (20 Marks)

I. Define the following terms

a. Conditional Statement

b. BiConditional Statement

(04 Marks)

II. Show that

a. $p \rightarrow q$ and its contrapositive $\sim q \rightarrow \sim p$ are logically equivalent.

b. proposition $q \rightarrow p$, and $\sim p \rightarrow \sim q$ is not equivalent to $p \rightarrow q$.

c. Prove that $p \leftrightarrow q$ is equivalent to $(p \rightarrow q) \wedge (q \rightarrow p)$.

(12 Marks)

III. Consider the following propositions

$\sim p \vee \sim q$ and $\sim(p \wedge q)$ .Are they equivalent?

(04 Marks)

Question 08 (20 Marks)

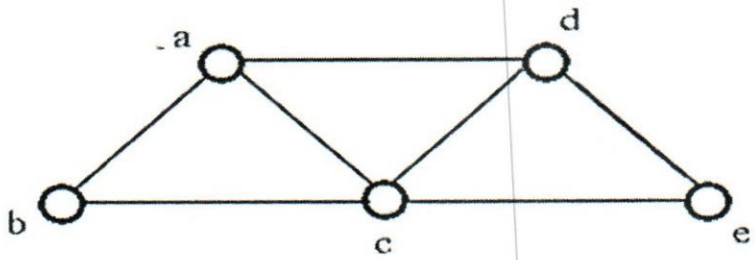
I. Define the following terms

a. Tree

b. Spanning Tree

(04 Marks)

II. Consider a graph G,



Find the spanning tree systematically by using,

a. Cutting- down Method

b. Building- up Method

(08 Marks)

III. Show that from any three integers, one can always choose two so that $a^3b - ab^3$ is divisible by 10.(Hint: pigeonhole principle)

(08 Marks)

----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester 2

SEMESTER END EXAMINATION

Data Structure & Algorithms - IT1204

- There are EIGHT (08) questions in this paper.
- This paper contains eight (08) pages.
- Excluding the Compulsory question-answer any four (04) questions.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2022.01.12 Time: 03 Hour

Question 01: (Compulsory) (20 Marks)

"In computer science, an algorithm is a finite sequence of well-defined, computer-implementable instructions, typically to solve a class of specific problems or to perform a computation."

(a) Write two (02) types of searching algorithms. (02 Marks)

(b) What do you mean by "Recursive Function"? Briefly describe the answer. (05 Marks)

(c) List down five (05) sorting algorithms (05 Marks)

(d) Factorial formula can be written as

n! = n*(n-1)!

How do you get above formular? Write all the steps to get above formula by using **Factorial(05)** (5!). (08 Marks)

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Question 02

(20 Marks)

You have given the bubble sort algorithm. Dry-run and show how do you sort the given array using bubble sort algorithm?

Array A

1	2	3	4
50	20	80	40

- BUBBLESORT(A)

```
1. For i= 1 to A.length – 1
2.     for j = A.length downto i + 1
3.         if A[j] < A[j – 1]
4.             exchange A[j] with A[j – 1]
```

Question 03

(20 Marks)

(a) Using the **RAM Model Analysis,** find the number of steps in the given algorithms.

```
1. i = 0
   While i <=3
       print i
       i = i + 1
```

2. Sum = 0
   for i = 0 to 3
       Sum = Sum + 1

Question 04 (20 Marks)

(a) How do you explain a 'Tree Data Structure'? Briefly write your answer.

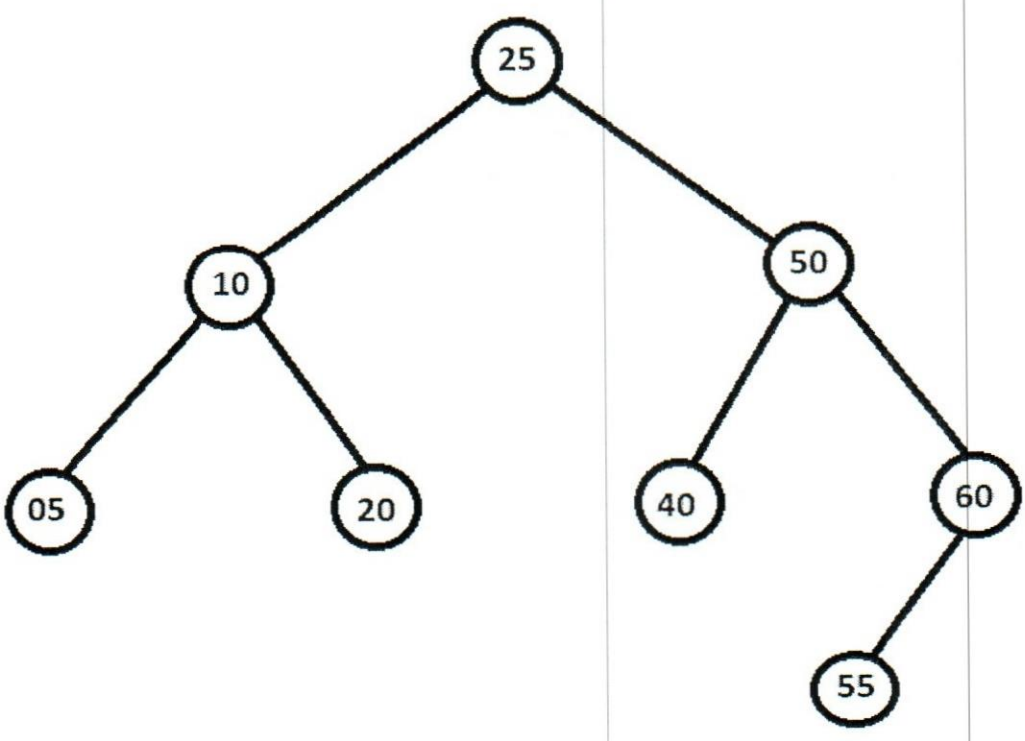
(02 Marks)

(b) What is the tree representation after deleting given nodes?

(Hint: Part 1 and 2 are inter related operations. After completing part 1, take that answer to provide the answer for part 2.)

1. Delete(20)
2. Delete(50)

(08 Marks)



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(c) Following data is inserted into a binary tree. Draw the binary tree after inserting the data and explain the inserting methodology. (10 Marks)

50 70 60 10 85 80 45 03 48 95

Question 05 (20 Marks)

(a) What is a data structure? Briefly explain your answer. (04 Marks)

(b) Write four (04) functions used in the Stack data Structure. (04 Marks)

(c) Draw the stack frames after performing each operations given below. The maximum size of the stack is five (05). (12 Marks)

1. Push(10)
2. Push(25)
3. Pop()
4. Push(40)
5. Push(60)
6. Push(70)
7. Push(80)
8. Push(100)
9. Push(85)
10. Pop()
11. Pop()
12. Push(90)

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Question 06 (20 Marks)

(a) Write two (02) asymptotic notations that can be used to measure the complexity of a code. (02 Marks)

(b) Find the Big O value for the following functions. (08 Marks)

1. $T(n)= 3 +5n + n^2 + 45$
2. $T(n)= 3n^2 + nlogn + logn$
3. $T(n)= logn + 2^n + n$
4. $T(n)= nlogn + n + 3$

(c) Find the Big(O) value for given codes. (10 Marks)

1.

```
#include <stdio.h>

int factorial(int i) {

        if(i <= 1) {
                return 1;
        }
        else{
                return i * factorial(i - 1);
        }
```

2.

```
import java.util.Scanner;

public class Fib1 {

   public static void main(String args[]){

      int i,v,u,n,t;

      u=0;

      v=1;


      System.out.println("Enter a value to find fibonachi sequence");

      Scanner sc = new Scanner(System.in);

      n=sc.nextInt();

      if(n==0){

         System.out.println(u);

      }

      else{

         for(i=1;i<n;i++){

            t=u+v;

            u=v;

            v=t;

         }

         System.out.println(v);

      }

   }

}
```

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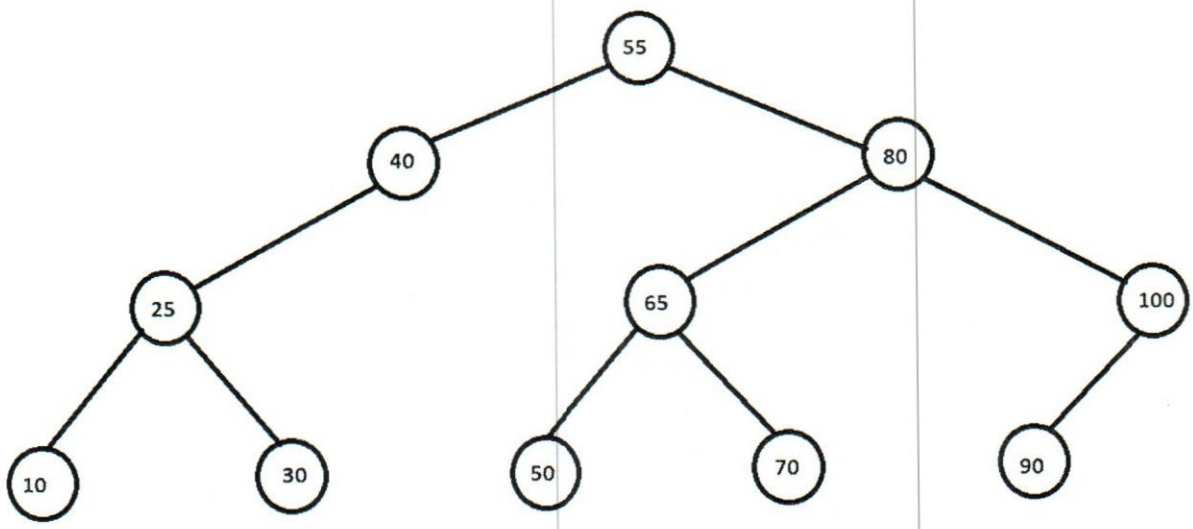
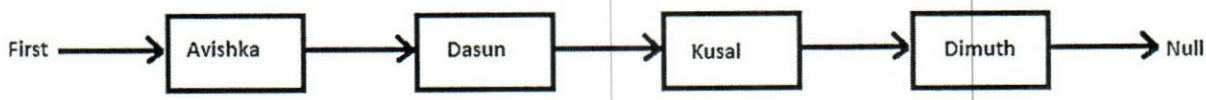
Question 07 (20 Marks)

(a) Write InOrder, PreOrder and PostOrder for the given tree below.

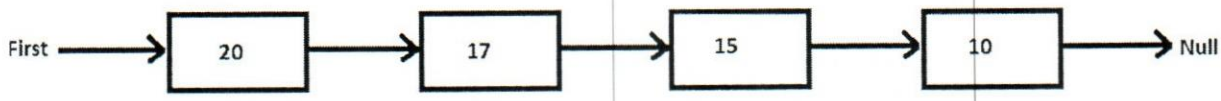


Question 08 (20 Marks)

(a) Write all the steps to delete the link "Kusal" from the following link list.



(b) Write all the steps to delete link "20" from the following link list.



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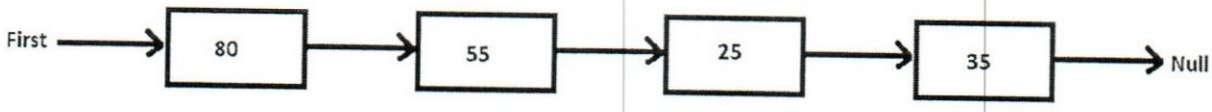
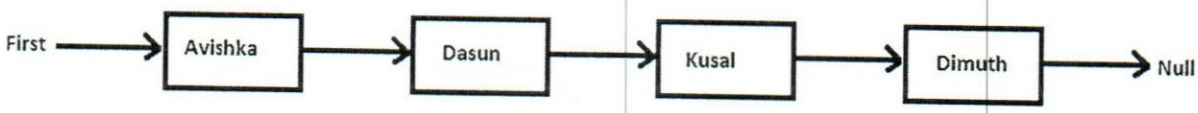
(c) Write all the steps to insert the new link "75" as the first link of the link list.



(d) Write all the steps to insert the new link "Bhanuka" after the link "Kusal" in the link list.
(Hint: You should insert the newlink in between "Kusal" and "Dimuth".



----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester II

SEMESTER END EXAMINATION

Software Requirements Engineering – SE1201

- There are EIGHT (08) questions in this paper.
- This paper contains SIX (06) pages.
- Excluding the Compulsory question-answer any four (04) questions.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: **2022.01.18** Time: 03 Hour

Question 01 (Compulsory) **(20 Marks)**

(a) Define the term "Software Process". What are the main four (04) Fundamental Process activities? (06 Marks)

(b) Write four (04) Software Process Models. (04 Marks)

(c) What are the six (06) stages in risk management Process? (06 Marks)

(d) Briefly explain "product requirement" and "process requirement". (04 Marks)

Question 02 **(20 Marks)**

(a) What is SDLC and what is it used for? (05 Marks)

(b) What are the phases of SDLC? Briefly explain the different phases of SDLC. (10 Marks)

(c) What are the differences between Agile and V-shaped model? (05 Marks)

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Question 03 (20 Marks)

(a) Several documents should be prepared during the requirement engineering process of a software development project. Name 3 such documents and describe the contents of them. Who are the authors and readers of these documents? (12 Marks)

(b) Describe the contents of a "Software Requirements Specifications" document. (08 Marks)

Question 04 (20 Marks)

Question number 04 is based on following case study.

Video-Rental is a small video rental store. The store lends videos to customers for a fee and purchases its videos from a local supplier. A customer wishing to borrow a video provides the title of the video they desire, their membership card, and payment - payment is always with the credit card used to open the customer account.

The customer then returns the video to the store after watching it. If a loaned video is overdue by a day the customer's credit card is charged, and a reminder letter is sent to them. Each day after that a further card is made, and each week a reminder letter is sent. This continues until either the customer returns the video, or the charges are equal to the cost of replacing the video. New customers fill out a form with their personal details and credit card details, and the counter staff gives the new customer a membership card. Each new customer's form is added to the customer file.

The local video supplier sends a list of available titles to Video-Rental LTD, who decide whether to send them an order and payment. If an order is sent, then the

supplier sends the requested videos to the store. For each new video a new stock form is completed and placed in the stock file.

(a) Read the above case study of the "Video Rental" and draw the Data Flow Diagram to represent entire system. (20 Marks)

Question 05 (20 Marks)

Question 5 is based on below case study.

Hotel Reservation System

A Hotel consisting of 100 rooms needs to computerize their manual Hotel Reservation System. The systems analyst who was assigned to this project has visited the Hotel and he has gathered the following information about the system. The following text describes his findings.

The 100 rooms available are categorized into different room types and each room type has different rates. The number of rooms in different types and the corresponding rates are as follows:

Room Type	*Room No. from/to*	*Rate/Night*
Single	*1 to 60*	*Rs. 1000*
Double	*61 to 89*	*Rs. 1800*
Suite	*90 to 100*	*Rs. 5000*

A Customer can reserve a room by calling the hotel receptionist. The receptionist will answer customer's queries regarding the room types, room rates, modes of payments available and any discounts the customer is entitled to etc. The receptionist will then

take the following particulars from the customer, if customer wishes to proceed with the reservation.

Customer's name, Contact address, Country, Sex,
Type of accommodation, the period of stay, expected check in date.

Subsequently the receptionist will check the room availability. If a room is available, the customer is informed about the room availability. If customer accepts the reservation, a room number is allocated at the same time. The customer is also informed if a room is not available.

A customer can cancel the reservation at any time. It can be done by calling or by sending a fax. The receptionist is also responsible for handling the cancellations.

When the customer checks-in at the hotel on the reserved date, the receptionist will obtain the customers desired mode of payment. The customer may be entitled to a discount based on the payment mode selected.

The different payment modes and their discounts are as follows:

Payment Modes	*Discount*
Cash	*- No discount*
Travelers Cheques	*- 2% eg. AMEX Cooks etc.*
Credit Card	*- 3% eg. Diners, Master etc.*
Company	*- Depend upon the company, Eg. NEC 12%, IBM 10% etc.*

The Customer can checks-out from the hotel at any time by informing the receptionist. The receptionist will immediately inform the billing Clerk to handle the billing. The details about the Payments such as discounts given, company name, kind of traveler's cheques used, and credit card details etc. are preserved for any future reference.

If the customer needs to extend the stay he/she may do so by informing the receptionist. Receptionist will check the room availability and extension is accepted if rooms are available.

Read the above case study and

(a) Draw the Use Case Diagram using correct notations (12 Marks)

(b) Write the Use Case Descriptions for any two use cases of your choice. (08 Marks)

Question 06 (20 Marks)

(a) Imagine that you have been assigned the task of developing a web portal that provides information for the paddy farmers. Briefly explain how you would capture the requirements and develop a web portal. Your answer should include the requirements capture methods that you would consider for the above task. (12 Marks)

(b) Define functional and non-functional requirements with an example for each. (08 Marks)

Question 07 (20 Marks)

(a) What is "Requirements Engineering". Briefly explain Requirements Engineering activities. (10 Marks)

(b) Briefly explain requirements validation. (05 Marks)

(c) What are the techniques used in requirements validation process? (05 Marks)

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Question 08

(20 Marks)

Briefly explain following terms

(a) User Stories (05 Marks)

(b) Decision Table (05 Marks)

(c) Spiral Model (05 Marks)

(d) Prototyping (05 Marks)

----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester II

SEMESTER END EXAMINATION

Business Communication - GS1204

- There are FIVE (05) questions in this paper.
- This paper contains SIX (06) pages.
- Students should provide answers to all the questions.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Marks will be deducted for spelling, grammar and punctuation errors.

Date: **2022.01.20** Time: 03 Hour

Question 01 (10 Marks)

- Read the article below about life coaching - regular meetings.
- Choose the correct word or phrase to fill each gap from A, B, C or D
- For each question, mark one letter (A, B, C or D) on the given space.

Anyone who has ever glanced through a self-improvement book has probably learned that such books do not hold the (1) ..... of personal happiness. Having read too many of them without success, I was (2) ..... to staying dissatisfied for the rest of my life. But when I (3) ..... a newspaper article about a new kind of consultant, called a life coach, I became curious, and decided to learn more. I was looking for a more personal way to (4) ..... my life: I'd achieved my material goals before (5) ..... the support of a coach, but professional challenges, long hours and not having someone neutral to talk to were putting my work and relationships at (6) ..... . I realised I needed to learn how to deal with problems before they occurred. My life coach is very good at asking me (7) ..... questions which help me to discover what I'm dissatisfied with in my life, and to understand who I am. It's good to have someone you can trust and respect to (8) ..... things over with. I sometimes pick topics in (9) ..... of our discussions, such as situations at work, or conflicts between me and colleagues, though I don't always (10) ..... an agenda. And I know that everything I say to my coach is in the strictest confidence. I'm far better at tackling difficult situations now, and best of all, I feel much more at ease with my life

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1) A solution	B answer	C key	D secret
2) A patient	B resigned	C tolerant	D contented
3) A found out	B came across	C ran into	D met with
4) A evaluate	B account	C estimate	D reckon
5) A appointing	B signing	C registering	D enlisting
6) A danger	B hazard	C risk	D peril
7) A examining	B probing	C exploring	D investigating
8) A talk	B discuss	C say	D tell
9) A preparation	B readiness	C precaution	D anticipation
10) A set	B put	C place	D hold

Question 02

(20 Marks)

Read the following paragraph and answer the questions

Over recent years, the psychology behind problem solving and decision making in a business context has been analysed and taught at university levels. Marie Scrive, senior lecturer at Carling University, argues that poor management skills can be ***identified*** *in many arenas, but few are perhaps as illustrative as the ability to make* ***accurate*** *judgements to overcome an obstacle. She argues that there is a tendency for decisions to be made quickly, leading to only short-term solutions and a recurrence of the problem at a later date. Pressure from other managers, senior staff or even* ***employees*** *can cause those in middle management to make decisions based quickly, reacting at speed to a problem that would have been better solved by a calmer, more inclusive style of management.*

However, Martin Hewings, author of Strategic Thinking, believes most ***repetitive*** *problems are actually not permanently resolved because of a lack of focus on the problem. He introduces a system whereby the problem must be clearly defined before the appropriate course of action can be decided upon, and this is achieved by applying questions to the problem itself: why is this happening? When is this happening? With whom is this happening? Garen Filke,*

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Managing Director of a large paper supply company, has put Hewings' steps to the test, and he referred to the results as 'potentially encouraging'.

1. What did the university education programmes related to business management start to teach students? (03 Marks)

.....
.....
.....
.....
.....

2. According to Marie Scrive, what are the skills lacking in many individuals to overcome obstacles? (02 Marks)

.....
.....

3. What is highlighted by Marie Scrive as the main reason for the recurrence of problems at a later period? (03 Marks)

.....
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.....

4. According to the passage, what is the reason for the middle management to take decisions quickly? (03 Marks)

.....
.....

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5. Complete the following sentence. (02 Marks)

The Lack of focus on the problem is not a reason to resolve.....

6. Was Garen Filke satisfied with the results of Hewings' method? Explain the reason for your answer. (03 Marks)

.....
.....
.....
.....
.....
.....

7. Give the meanings of the words in bold print. (04 Marks)

- Identified .....
- Accurate .....
- Employees .....
- Repetitive .....

Question 03 (10 Marks)

You decide to apply leave for a week due to a family concern. Write an email to the HR manager of your company, informing the leave dates and the reason for your absence. Use the following format. (200-250 Words)

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From: .....

To: .....

Subject: .....

.....
.....
.....
.....

Question 04 (15 Marks)

Read the following job advertisement.

Imagine that you are a suitable candidate for the below given position. Write a cover letter to the company including your personal details, educational qualifications, work experiences, and your motivation to apply for the position. (250- 300 words)

VACANCIES

ABC Graphics (Pvt) Ltd.

Lecturers for Advertising and Marketing

ABC Graphics will entertain applications till 31st February 2022 from suitably qualified persons for the above post to our Colombo and Kandy Branches.

Qualifications

- Degree or Diploma in Advertising and Marketing from a University recognized by the University Grant Commission of Sri Lanka.
- 2-3 Years working experience in a similar capacity.

Please forward your application to

abcgraphics@gmail.com

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Question 05

(15 Marks)

Imagine that you received a job as a System Engineer in a Singapore based company. Write a letter of resignation to your current employer, NBN Private Limited including the following details.

- The reason for resignation
- Date of resigning
- Thank the current employer

(Word count: 250-300 words)

.....
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----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester 2

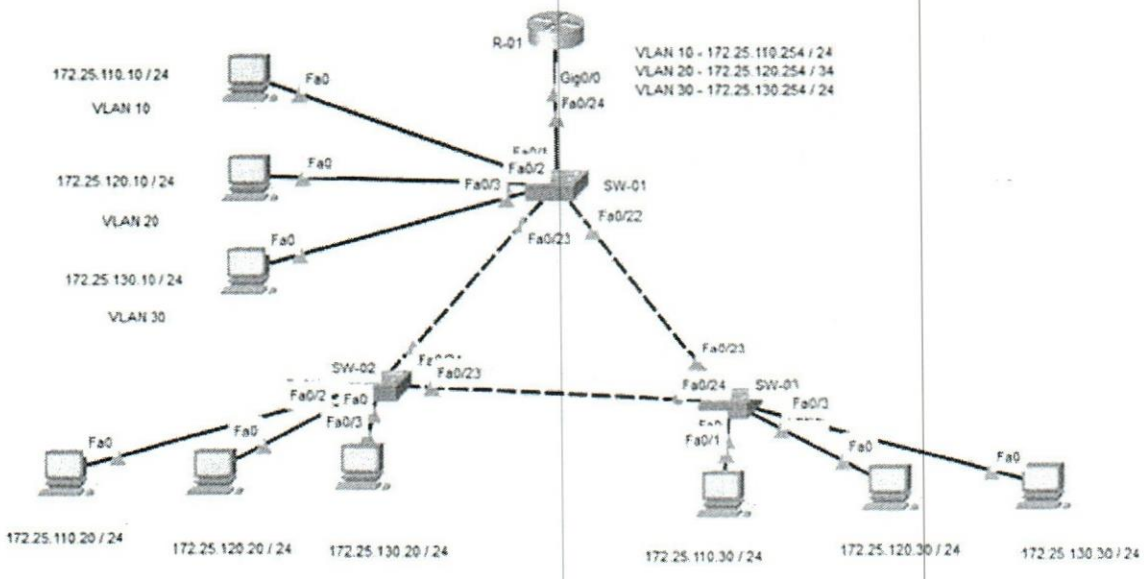
SEMESTER END EXAMINATION

Fundamentals of Computer Networks - IT1205

- There are EIGHT (08) questions in this paper.
- This paper contains three (03) pages.
- Excluding the Compulsory question-answer any four (04) questions.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2022.01.20 Time: 03 Hour

Question 01: (Compulsory) (20 Marks)



MAC Addresses
SW - 01 - 00E0.B067.D918
SW - 02 - 0002.16C1.2417
SW - 03 - 0002.4A29.BE57

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Using the diagram indicated above explain Spanning Tree in detail.

Question 02 (20 Marks)

(a) How does a Source different from a Destination. Explain with an example. (08 Marks)

(b) What is VTP? Explain using diagrams. (12 Marks)

Question 03 (20 Marks)

(a) What is a clock rate in a router? (08 Marks)

(b) With diagrams, explain the difference between OSI and TCP/IP Stacks. (12 Marks)

Question 04 (20 Marks)

(a) Explain MAC Address. (08 Marks)

(b) Describe Private IP Addressing scheme. (12 Marks)

Question 05 (20 Marks)

(a) How is a Router different from a Switch. (08 Marks)

(b) Through diagrams explain Centralization, Decentralization, and Distributed Networks. (12 Marks)

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Question 06

(20 Marks)

(a) How does an Internal Firewall different from a Perimeter Firewall.
(08 Marks)

(b) Explain the difference between Bottle Neck Situation and Redundancy
(12 Marks)

Question 07

(20 Marks)

(a) What are LAN and WAN standing for? How is it different from each other? Explain with diagrams.
(08 Marks)

(b) How does IPV4 different from IPV6? Explain using examples.
(12 Marks)

Question 08

(20 Marks)

(a) How does Layer 02 switch different from Layer 03 Switch? (08 Marks)

(b) Explain the difference between EIGRP and OSPF Protocols. (12 Marks)

----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester 2

SEMESTER MID EXAMINATION

Database Management Systems - IT1203

- This is a MCQ paper.
- This paper contains twenty five (25) questions and seven (07) pages.
- Students should provide answers to all the questions.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 21/03/2022 Time: 01 Hour

Underline the correct answer/s. Four (04) marks for each MCQ question.

1. EMPLOYEE (EmpNo, eName, Age, DoB, Address, deptNo) in above EmpNo, eName, Age, DoB, Address, deptNo are .....and EMPLOYEE is a .....

   a) Fields, Record
   b) Fields, Relation
   c) Records, Relationships
   d) Tuples, Table

2. The ---------- specifies the number of instances of one entity that can [or must] be associated with an instance of another entity.

   a) Cardinality constraint
   b) Entity instance
   c) Multivalued attribute
   d) Associative entity

3. The -------- states that a foreign key must either match a primary key value in another relation or it must be null.

   a) Entity integrity rule
   b) Referential integrity constraint

c) Action assertion
d) Composite attribute

4. Different categories of data models are

a) Conceptual, logical, physical
b) Conceptual, hierarchical, physical
c) Contextual, organizational, implementation
d) Conceptual, physical, external

5. Why would you use an identifying relationship?
To model a:

a) Recursive relationship
b) M:N Relationship
c) Exclusive relationship
d) Inclusive relationship

6. A degree of a relation is

a) The number of participating entity types
b) The number of attributes
c) The number of primary keys used
d) None of the above

7. Which of the following is NOT true about ER to relational mapping?

a) Strong entities are mapped as separate relations
b) Multi-valued attributes are mapped to separate relations
c) Composite attributes are mapped to separate relations
d) Primary key of an entity is mapped as a primary key in a relational schema

8. An ER (Entity Relationship) diagram is a type of:

a) Conceptual model
b) Logical model
c) Physical model
d) Computer implementation

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9. Which SQL command returns only the number of different salaries (SAL) in the employee (EMP) table?

   a) SELECT e.sal FROM emp e
   b) SELECT DISTINCT COUNT (e.sal) FROM emp e
   c) SELECT COUNT (e.sal) FROM emp e
   d) SELECT COUNT (DISTINCT e.sal) FROM emp e

10. Given the following relational heading:
    COURSE (course_code , course_title, location, number_of_credits)

    Which of the following queries would list the code and course total of all courses with more than 250 students :

a	SELECT course_code, COUNT(*) AS count_of_students FROM COURSE WHERE count_of_students > 250;
b	SELECT course_code, COUNT(*) AS count_of_students FROM COURSE GROUP BY course_code WHERE count_of_students > 250;
c	SELECT course_code, COUNT(*) AS count_of_students FROM COURSE GROUP BY course_code HAVING count_of_students > 250;
d	SELECT course_code, COUNT(*) AS count_of_students FROM COURSE GROUP BY course_code WHERE COUNT(*) > 250;

   a) Query a
   b) Query b
   c) Query c
   d) Query d

11. Which of the following is a DBA's function?

   a) Database design
   b) Backing up the database

c) Defining who can access what in the database
d) All of the above

12. You need to display Name, ContactNo and Amount of the customers whose Name are ends with the letter "M" and could have several other characters.

Which SQL statement displays the required results?

a) SELECT Name, ContactNo, Amount FROM CUSTOMER WHERE Name LIKE _'M';
b) SELECT * FROM CUSTOMER WHERE Name ENDS 'M';
c) SELECT Name, ContactNo, Amount FROM CUSTOMER WHERE Name = '%M';
d) SELECT Name, ContactNo, Amount FROM CUSTOMER WHERE Name LIKE '%M';

13. Which of the following is a function of a database management system (DBMS)

a) Controls access to the data
b) Provides data independence
c) Provides concurrency control
d) All of the above

14. The E-R model is most often used as a tool during the ____ phase of database development

a) Analysis
b) Programming
c) Design
d) Implementation

15. Which is NOT an example of a strong entity type?

a) STUDENT
b) COURSE
c) DEPARTMENT
d) STUDENT_ID

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16. In a data model, a weak entity is connected to its relationship by

    a) A dashed line
    b) Two lines
    c) A dotted line
    d) A single line

17. _____ is not a data model.

    a) Object relational
    b) Relational
    c) Hierarchical
    d) Netmode

18. Program data independence means

    a) Insulation between programs and data
    b) Encapsulation between programs and data
    c) Integrity between programs and data
    d) None of the above

19. In a relational model the main construct is a relation. A relation has

    a) Field, attributes
    b) Rows, records
    c) Attributes, Tuples
    d) Tuples, records

20. "Lecturers must teach courses" In this relationship the participation of lectures entity with courses entity is _____

    a) Partial
    b) Total
    c) Impartial
    d) None of the above

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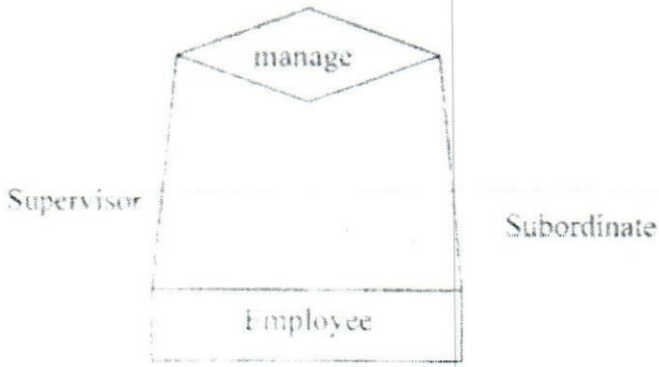
Please refer to the ER diagram given below to answer question 21.



21. The above ER diagram shown an example of a

    a) Total relationship
    b) Recursive relationship
    c) Identifying relationship
    d) Descriptive relationship

22. Which of the following constraints states that the primary key cannot have NULL values?

    a) Domain constraint
    b) Participation constraint
    c) Partial key constraint
    d) Entity integrity constraint

23. Delete operation performed on a particular relation might violate following constraint.

    a) Key constraint
    b) Entity integrity constraint
    c) Domain constraint
    d) Referential integrity constraint

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24. One to many relationship is mapped as

a) Primary key of the one side appears as foreign key on the many side.
b) Primary key of the many side appears as foreign key on the one side
c) A non-prime key of the one side appears as foreign key on the many side
d) A non-key of the many side appears as foreign key on the one side.

25. An example of metadata for a student database could be:

a) Manel, Asanka
b) Malabe
c) Integer
d) Introduction to Computers

----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester 2

SEMESTER MID EXAMINATION

Data Structures & Algorithms - IT1204

- This is a closed book MCQ paper.
- There are twenty (20) questions and the paper contains sixteen (16) pages.
- Students should provide answers to all the questions.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

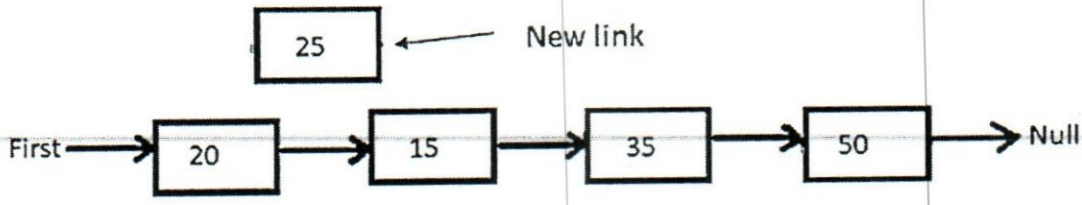
Date: 21/03/2022 Time: 01 Hour

Underline the correct answer/s. Five (05) marks for each MCQ question.

1. Select the incorrect answer about data structures.

   a. 'Stack' is a liner type data structure
   b. 'Tree' is a linear type data structure.
   c. In 'Arrays', item occupies a particular position and can be directly accessed using an index number
   d. Both Array lists and Linked-lists are linear type data structures

2. Consider the following link list and find the correct steps to insert new link between link 20 and 15.



a. 1.Newlink
   2.First.next=Newlink
   3.Newlink.next = T2

b. First.next = T2
   T2.next = T3

c. 1.Newlink
   2.T1 = First.next
   3.Newlink.next = T1
   4.First.next = Newlink

d. 1.T1=T2
   2.First=Newlink

3. Assume that functions are already implement in a Circular Queue program call CircularQueue. Select the correct representation of Circular Queue according to the given function calls. Maximum size of this queue is five (05).

```
insert(50);
insert(20);
insert(65);
delete();
insert(40);
insert(75);
insert(80);
delete();
insert(90);
delete();
delete();
```

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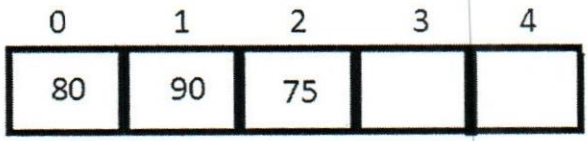
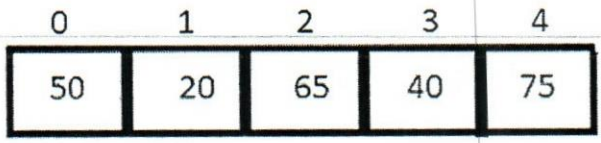
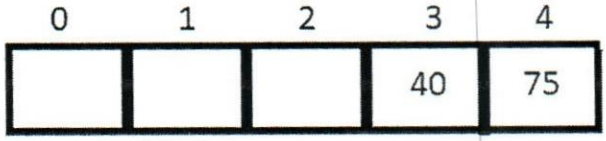
a.



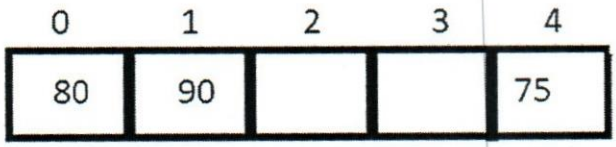
b.



c.

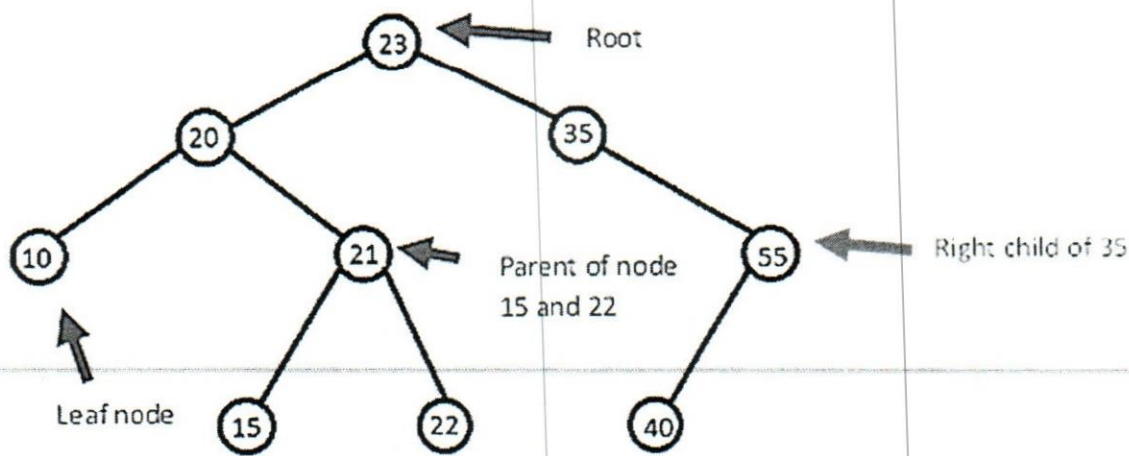


d.

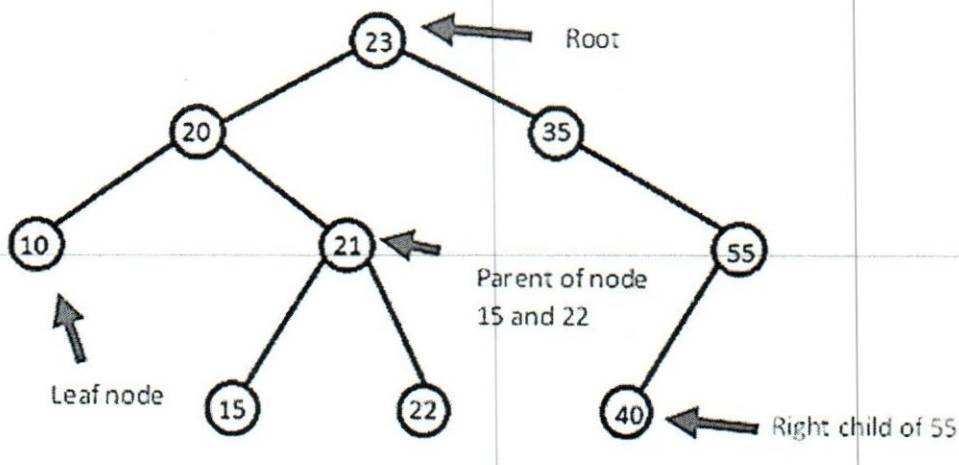


4. Select the correct representation of tree.

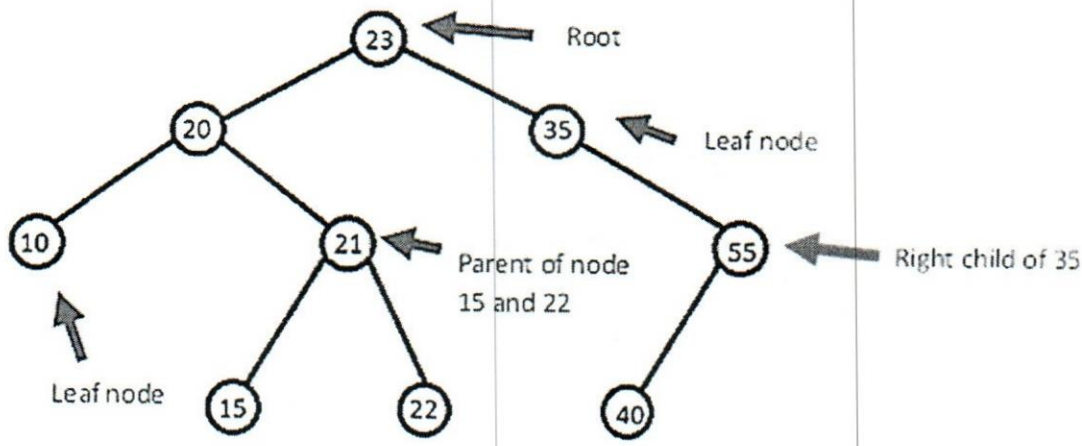
a.



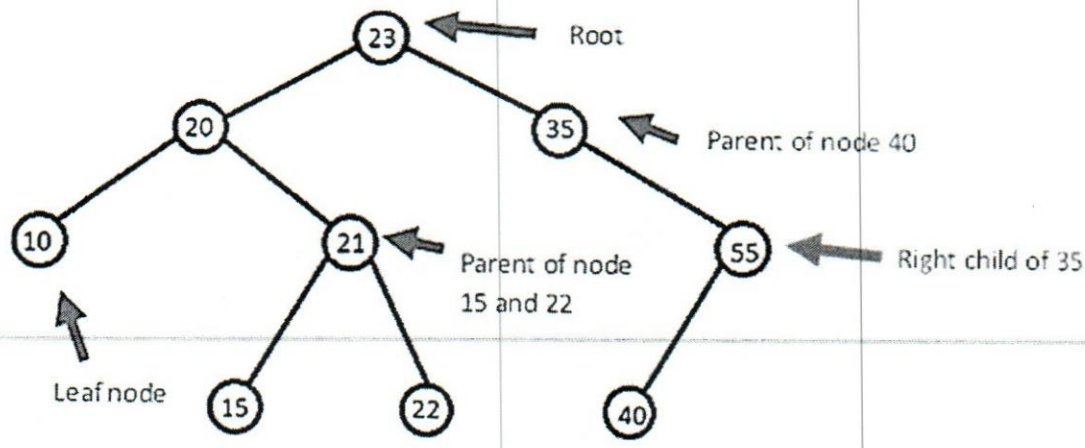
b.


23
Root
20
35
10
21
55
Parent of node
15 and 22
Leaf node
15
22
40
Right child of 55

c.


23
Root
20
35
Leaf node
10
21
55
Right child of 35
Parent of node
15 and 22
Leaf node
15
22
40

d.


23
Root
20
35
Parent of node 40
10
21
55
Right child of 35
Parent of node
15 and 22
Leaf node
15
22
40

5. Select the incorrect statement.

   a. InOrder is a way to traverse a tree.
   b. PreOrder: travelling through Parent, Left node, Right node.
   c. PostOrder: travelling through Left node, Right node then Parent.
   d. InOrder: travelling through Parent, Right node, node Left.

6. Select the incorrect answer.

   a. Stack data structure is using Last In First Out principal.
   b. Circular Queue data structure is using First In Last Out principal.
   c. Stack data structure is using First In Last Out principal.
   d. Linear Queue data structure is using First In First Out principal.

7. Process of deleting an element in stack is called _____

   a. Create
   b. Push
   c. Evaluation
   d. pop

8. What is the incorrect operation for a binary tree?

   a. Insert
   b. Find
   c. Traversal
   d. Push

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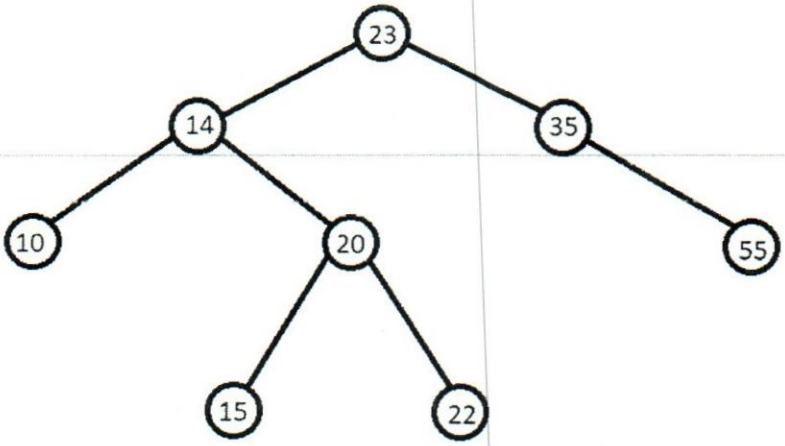
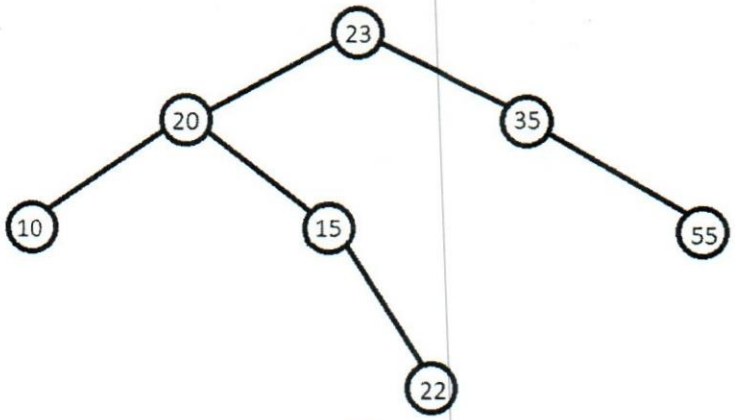
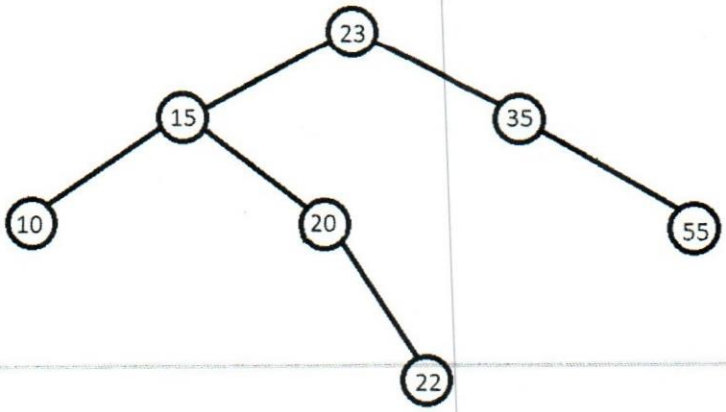
9. What is the correct answer when delete the node 14 from the following tree?



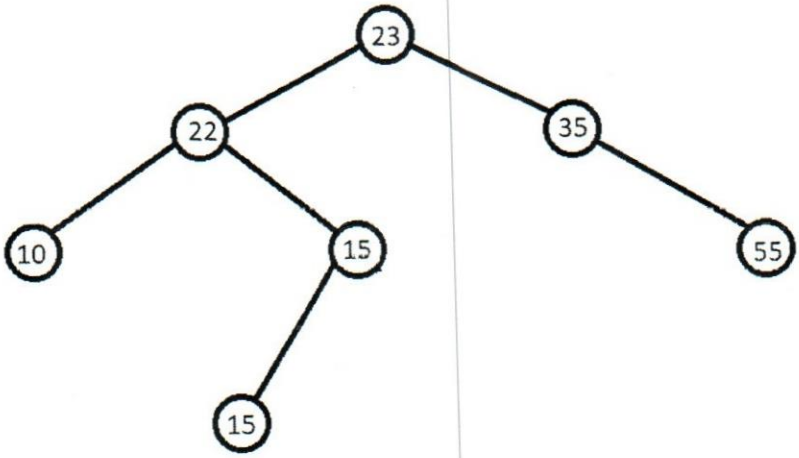
a.



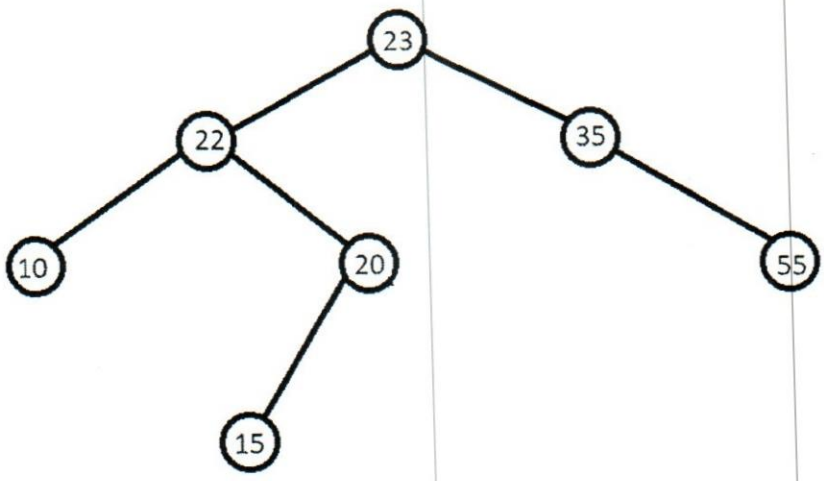
b.



c.



d.



10. Select the incorrect real-world example for Stack.

a. Write a word document and do the corrections.
b. Undo/Redo content in a Word document.
c. Enter data to an excel sheet and undo the data if needed.
d. Wear bangles to the hand and pull out them.

11. What are the searching algorithms that use to search a given value from the list.

    a. Insertion and selection
    b. Bubble and linear search
    c. Linear and binary search
    d. Not given

12. Assume that there is a Stack as bellow. What will be the output when it executes the given code?

Stack

55
90
75
50

Code

```
while(!isempty())
{
    int data = pop();
    printf("%d",data);
  }
```

a. 55
   90
   75
   50

b. 50759055

c. 55907550

d. 50
75
90
55

13. Select the correct function names use in queues.

a. Push(), Pop(), Peek()
b. Insert(), Remove(), PeekFront()
c. DeleteFirst(), InsertFirst(), Find()
d. PrintList(), Find(), length()

14. Assume that functions are already implement in a program call MyStack. Find the correct representation of Stack according to the given function calls. Maximum size of the stack is four (4).

```
push(8);
push(10);
push(15)
pop();
push(20);
pop()
puh(90)
```

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a.

3	
2	
1	10
0	8

b.

3	90
2	20
1	10
0	8

c.

3	
2	90
1	10
0	8

d.

3	8
2	10
1	20
0	

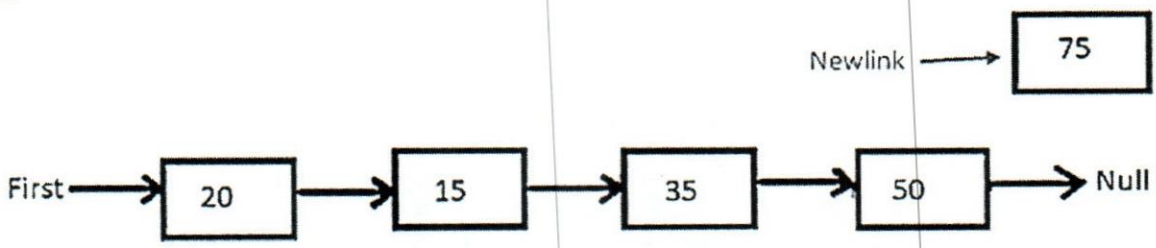
15. Select the incorrect statement on Tree data structure.

a. Tree represents the nodes connected by edges.
b. In a tree, the nodes represent the data items and the edges represent the way the nodes are related.
c. A tree with nodes which has maximum of two children is called a binary tree
d. A node that has no children is called a binary tree.

16. Pushing an element into stack already having five elements and stack size of 5, then stack becomes _____

    a. Overflow
    b. Crash
    c. Underflow
    d. User flow

17. Find the correct algorithm when insert a data (data value is 75) as the last link of the list



    a. T1 = first.next.next
       T2 = T1.next.next.next
       NewLink
       NewLink.next=T2
       T1.next=NewLink

    b. Newlink
       T1=first.next.next.next.next
       NewLink.next=Null
       T1.next=NewLink

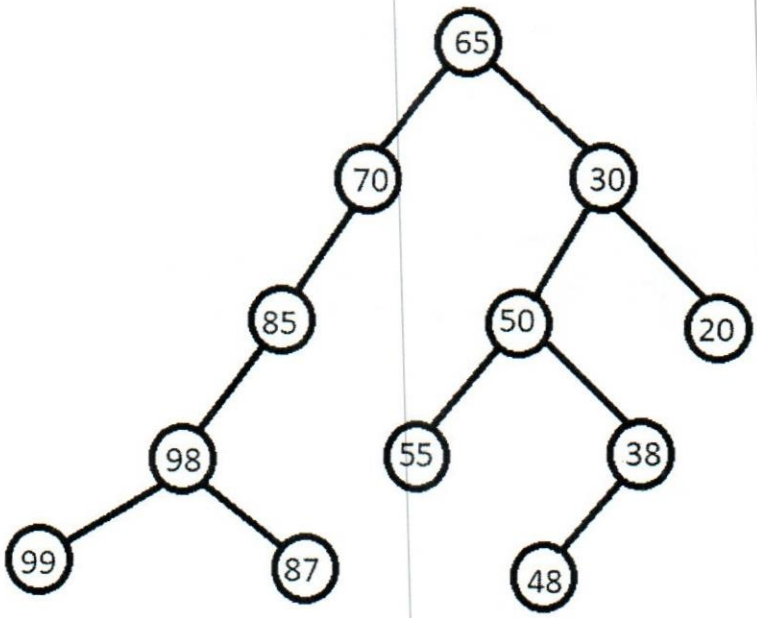
    c. Newlink
       T1 = First.next.next.next
       Newlink.next = Null
       T1.next = Newlink

d. T1.next=NewLink
NewLink.next=T2

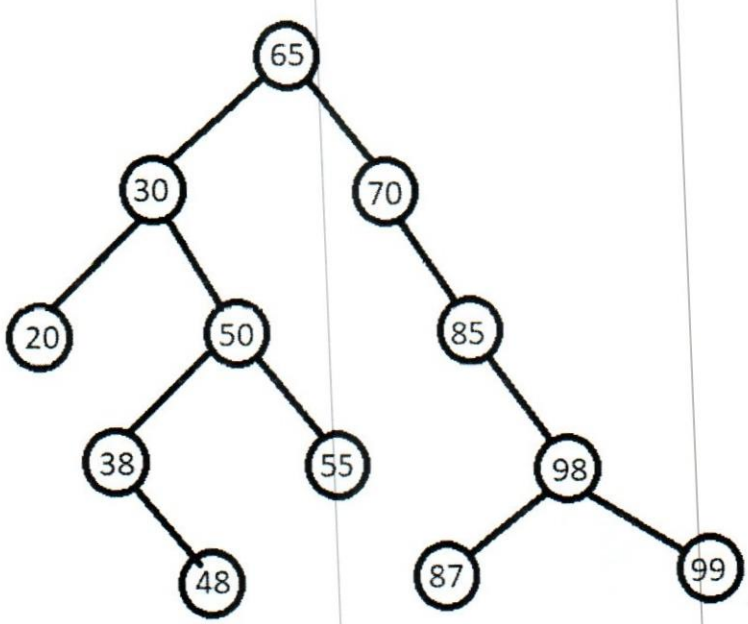
18. Select the correct tree after inserting given data.

65 70 30 50 55 85 20 38 48 98 87 99

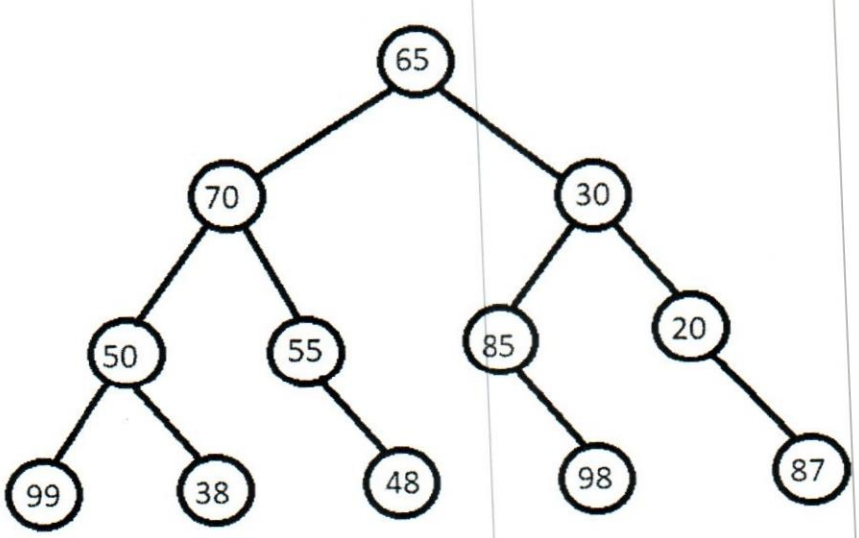
a.



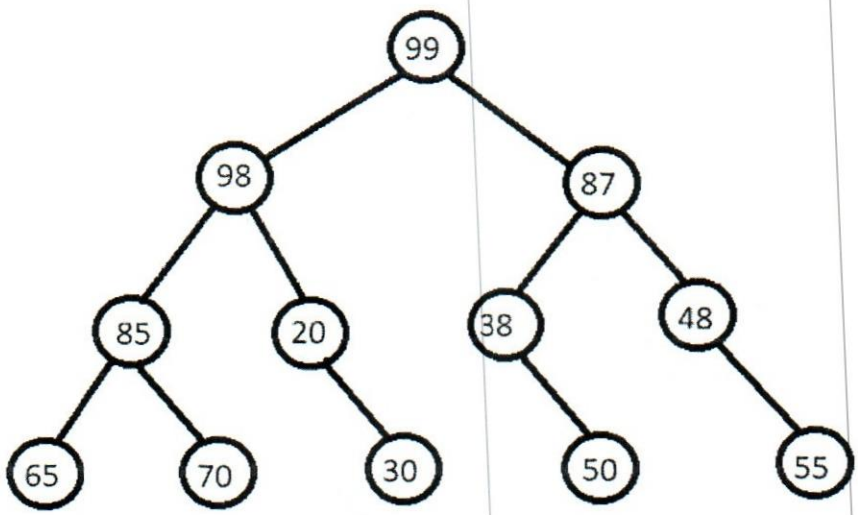
b.



c.



d.



19. Find the correct coding segment for search() function of tree data structure.

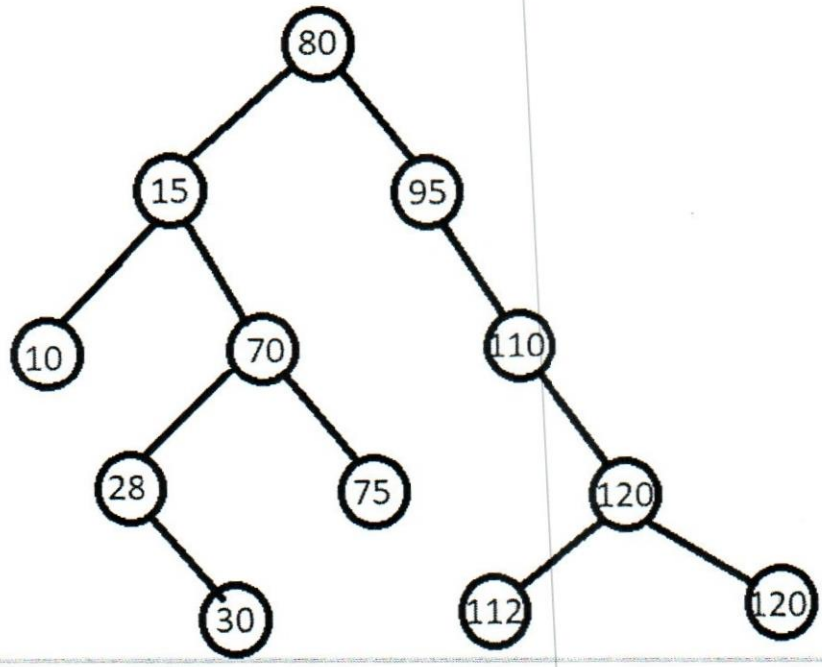
a.
```
struct node* search(struct node *root){
    if(root==NULL || root->data==x)
        return root;
    else if(x>root->data)
        return search(root->right_child, x);
    else
        return search(root->left_child,x); }
```

b.
```
struct node* search(struct node *root, int x){
    if(root==NULL || root->data==x)
        return root;
    else if(x>root->data)
        return search(root->right_child, x);
    else
        return search(root->left_child,x); }
```

c.
```
struct node* search(struct node *root, int x){
    if(root==NULL || root->data==x)
      return root;
    else
      return search(root->left_child,x); }
```

d.
```
struct node* search(struct node *root, int x){
    if(root==NULL || root->data==x)
      return root;
    else
      return search(root->right_child, x);  }
```

20. Select the answer for InOrder and PreOrder traversings.



a. InOrder: 10 15 28 30 70 75 80 95 110 112 120 120
PreOrder: 80 15 10 70 28 30 75 95 110 120 112 120

b. InOrder: 80 15 95 10 70 110 28 75 120 30 112 120
PreOrder: 120 112 30 120 75 28 110 70 10 95 15 80

c. InOrder: 10 30 20 75 70 15 112 120 120 110 95 80
PreOrder: 80 15 10 70 28 30 75 95 110 120 112 120

d. InOrder: 80 15 10 70 28 30 75 95 110 120 112 120
PreOrder: 10 15 28 30 70 75 80 95 110 112 120 120

----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester 2

SEMESTER MID EXAMINATION

Fundamentals of Computer Networks - IT1205

- This paper contains five (05) questions and three (03) pages.
- Students should provide answers to all the questions.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 22/03/2021 Time: 01 Hour

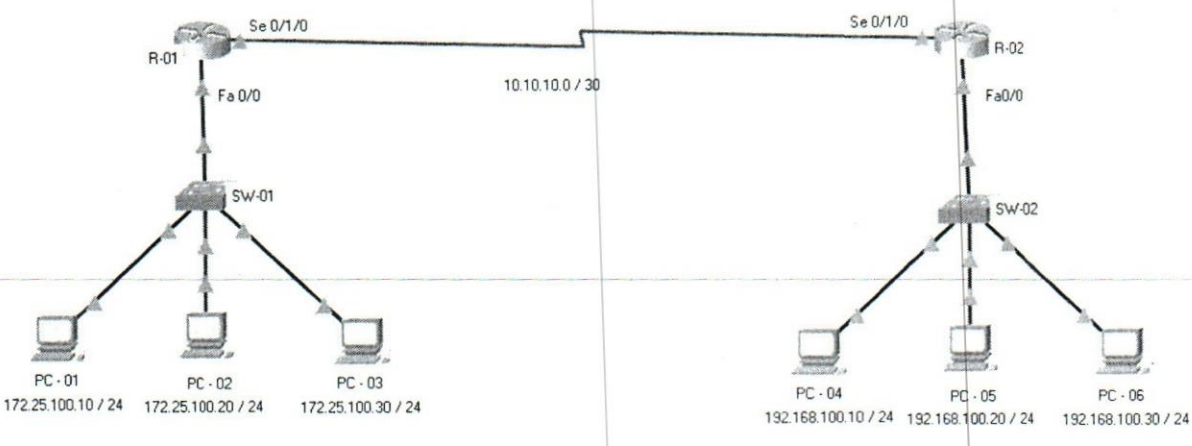
Question 01 (20 Marks)

Using the ip address 192.168.100.10 / 25 answer the questions from a) to d):

a) Network Address? (05 Marks)
b) Broadcast Address? (05 Marks)
c) Subnet Mask? (05 Marks)
d) Total IP Address Range? (05 Marks)

Question 02 (20 Marks)

Using the below-indicated diagram (Figure 01) answer from (a) to (d)



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Follow the instructions provided:

1) R-01 LAN should be having the network of 172.25.100.0 / 24
2) R-01 is the default gateway for its LAN
3) Use the last usable ip address of 172.25.100.0 / 24 as the default gateway of R-01 LAN
4) R-02 LAN should be having the network of 192.168.100.0 / 24
5) R-02 is the default gateway for its LAN
6) Use the last usable ip address of 192.168.100.0 / 24 as the default gateway of R-02 LAN
7) Use the first usable IP address of 10.10.10.0 / 30 to R-01 Serial 0/1/0
8) Use the last usable IP address of 10.10.10.0 / 30 to R-02 Serial 0/1/0
9) EIGRP is the routing protocol to be used
10) EIGRP AS number that needs to be configured is 100
11) In EIGRP Summarization of routes should be stopped

Configure R-01 configuration for the shown below:

(a) Host Name (05 Marks)

(b) Fast Ethernet Port 0/0 (05 Marks)

(c) Serial Interface Port 0/1/0 (05 Marks)

(d) EIGRP Configuration (05 Marks)

Question 03 (20 Marks)

(a) With a diagram explain "Transmission Media" (10 Marks)

(b) How is "LAN" different from "MAN" (10 Marks)

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Question 04

(20 Marks)

(a) How is "Analog" different from "Digital" (10 Marks)

(b) Briefly explain "Cross Talk" in Transmission Media (10 Marks)

Question 05

(20 Marks)

(a) What is a "Bottle Neck Situation"? (10 Marks)

(b) How is "Centralized Networks" different from "Distributed Networks" (10 Marks)

----------*END OF THE QUESTION PAPER*----------

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Year 1 Semester 2

SEMESTER MID EXAMINATION

Discrete Mathematics – MA1202

- This paper contains two (02) pages.
- Students should provide answers to all the questions.
- Calculators are not allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 22/03/2022 Time: 01 Hour

Question 01 (50 Marks)

(a) In a town of 20000 families, it was found that 30% of families buy newspaper A, 30% family buy newspaper B, 10% family buy newspaper C, 5% family buy newspaper A and B, 3% family buy newspaper B and C and 4% family buy newspaper A and C. If 2% family buy all the newspaper. Find the number of families which buy

I. Number of families which buy all three newspapers.
II. Number of families which buy None of A, B, C
III. Number of families which buy exactly only one newspaper
IV. Number of families which buy at least two newspapers
V. Number of families which buy at most two newspapers
VI. Number of families which buy exactly two newspapers

(25 Marks)

(b) How many numbers below 100 are divisible by 2,3, or 5? (12 Marks)
(IIint-Inclusion-Exclusion principle)

(c) Suppose you need to come up with a password that uses only the letters A, B, and C and which must use each letter at least once. How many such passwords of length 8 are there? (Hint-Inclusion-Exclusion principle) (13 Marks)

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Question 02

(50 Marks)

(a) Let K = {1, 2, 4, 5}. Consider the relation X and Y on K defined by
X = {(1, 2), (1, 4), (2, 4), (2, 5), (4, 4), (4, 5), (5, 5), (5, 1)}

Y = {(2, 4), (2, 5), (1, 4), (4, 2), (4, 1), (4, 5), (5, 2), (5, 5)}.

Find the matrices of the above relations.

Use matrices to find the following composition of the relation X and Y.

(i) XoY
(ii) XoX
(iii) YoX

(30 Marks)

(b) The relation R on the set of real numbers **R** is defined by

$$R = \{ (x,y) / y=x-1\}$$

Find the composition of relations R^2

(20 Marks)

----------*END OF THE QUESTION PAPER*----------