



**University of Vavuniya**

**Second Examination in Information Technology - 2021**

**First Semester - March/April 2023**

**IT2153 Computer Graphics (Practical)**

**Answer All Questions**

**Time Allowed: Two Hours**

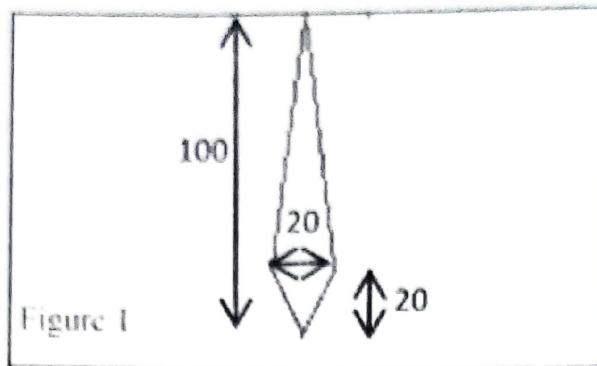
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**Instructions:**

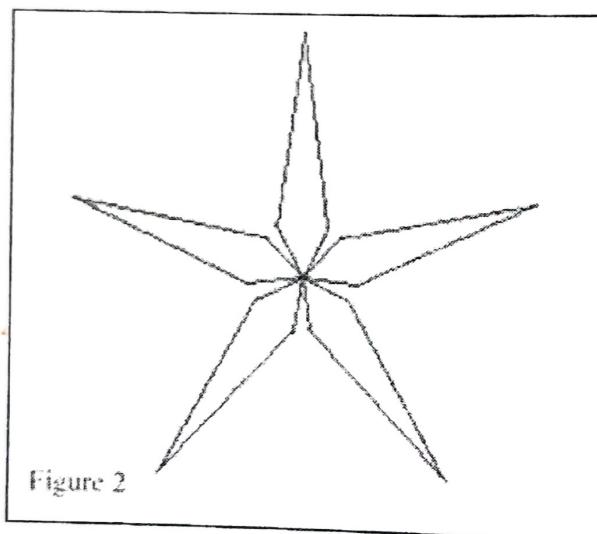
- Create a folder on the desktop with your index number and save all your files in it.
- You may submit all the necessary handwritten work for the derivations of composite matrices at the end of the examination.
- It is your responsibility to save your programs frequently.

1. Write a Java program to perform each of the following tasks:

- (a) Implement the *Bresenham's* line drawing algorithm to draw a straight line.
- (b) Construct an object as shown in Figure 1 in red with the given attributes using the line drawing algorithm in part (a) above:



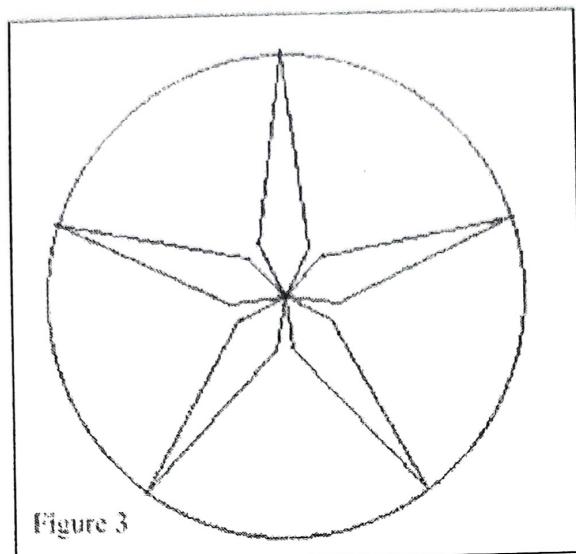
- (c) Construct an object as shown in Figure 2 in red using the appropriate transformations applying to the object constructed in part (b) above:



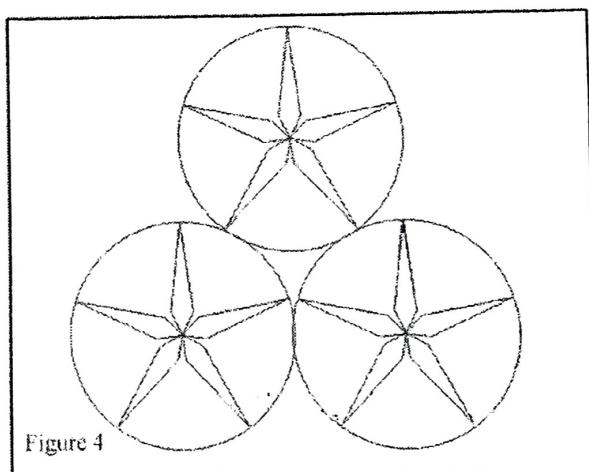
- (d) Implement *Midpoint* or *Bresenham's* circle drawing algorithm to draw a circle.

*[This question is continued on the next page.]*

- (e) Using the object in Figure 2 from part (c) and the algorithm in part (d) above, construct an object in red as shown in Figure 3:



- (f) Using the object in Figure 3 from part (e), construct an object in red as shown in Figure 4 using appropriate transformation(s):



[100%]



## University of Vavuniya

### Second Examination in Information Technology - 2021

First Semester - March/April 2023

#### IT2153 Computer Graphics (Theory)

Answer Four Questions Only

Time Allowed: Two Hours

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1. (a) Compare and contrast *raster graphics* and *vector graphics*. [20%]
- (b) Suppose an RGB raster system is designed using the screen of size  $8 \text{ inch} \times 10 \text{ inch}$  with a resolution of 100 pixels per inch in each direction.  
Find each of the following:
  - i. The storage size of the frame buffer in bytes to store 6 bits per pixel.
  - ii. The aspect ratio of the raster system. ↗[10%]
- (c) Derive necessary equations for *window* to *viewport* transformation of a point  $(w_x, w_y)$  in the *window* maps to the point  $(v_x, v_y)$  in the *viewport* in such a way to preserve proportion. Clearly state all assumptions made. [20%]
- (d) i. Write down the *interior defined* and *boundary defined region filling* algorithms using 8-connected neighbouring pixels. [20%]  
ii. Explain how *polygon filling* algorithms are different from *region filling* algorithms. [10%]  
iii. Explain methods for *polygon filling* with the aid of diagrams. [20%]

2. (a) Describe what is meant by *aliasing* effect in computer graphics with the aid of a diagram and describe different methods for *antialiasing* process. [25%]
- (b) Write a procedure for the *DDA* line drawing algorithm. State any assumptions that you have made. [15%]
- (c) Derive necessary equations to draw a straight line using the *Bresenham's* line drawing algorithm for a positive slope less than 1. [20%]
- (d) Briefly describe why the *Bresenham's* is better than the *DDA* line drawing algorithm. [10%]
- (e) Determine the intermediate pixel coordinates when scan converting a line with the endpoints (18,25) and (10,20) using the *Bresenham's* line drawing algorithm. [30%]
3. (a) State what is meant by *scan converting a circle*. [10%]
- (b) Derive necessary equations to draw a circle using the *Midpoint* circle drawing algorithm. [20%]
- (c) Using the *Midpoint* circle drawing algorithm, determine the pixel positions along the circle octant of radius  $r = 10$  from  $x = 0$  to  $x \leq y$ , centered at the origin. [30%]
- (d) Determine the other pixel positions of the circle described in part 3(c), using the symmetric property of a circle. [10%]
- (e) Describe each of the following methods or algorithms for hidden surface removal in computer graphics:
- i. Object-space method
  - ii. Image-space method
- [30%]

4. (a) Describe the *Cohen-Sutherland* clipping algorithm to clip a straight line against a clipping window.

[20%]

- (b) Use the *Cohen-Sutherland* line clipping algorithm to clip the lines PQ and RS against a clipping window ABCD. You are required to consider the following information:

- i. The coordinates of A and C are (100,10) and (160,40) respectively.
- ii. The coordinates of P and Q are (120,20) and (140,80) respectively.
- iii. The coordinates of R and S are (120,5) and (180,30) respectively.

[30%]

- (c) Apply the *Midpoint Subdivision* clipping algorithm to clip a line XY with the coordinates X(-10,20) and Y(50,10) against a clipping window KLMN with the coordinates at K(0,0) and M(40,40).

[20%]

- (d) The coordinates of an object ABCD in three dimensional space are A(-15,15,20), B(10,15,20), C(25,0,20), and D(0,0,20).

Find the coordinates of the projected image on the XY view plane using the perspective projection method, if the centre of the projection is (0,0,-20). [30%]

5. (a) Consider the four control points  $P_0(1, 0)$ ,  $P_1(3, 3)$ ,  $P_2(6, 3)$ , and  $P_3(8, 1)$  of a cubic *Bézier* curve. Determine any five points that lie on the curve.

[20%]

- (b) Find the coordinate functions  $x(t)$ ,  $y(t)$ , and  $z(t)$  of the *Bézier* curve with the control points  $P_0(0,0,0)$ ,  $P_1(1,0,0)$ ,  $P_2(0,1,0)$ , and  $P_3(0,0,1)$ .

[20%]

- (c) Determine the algebraic expression of the quadratic *Bézier* curve with the control points  $P_0(0, 0)$ ,  $P_1(2, 1)$ , and  $P_2(3, 7)$ .

[20%]

- (d) Consider a square object with the coordinates A(1,1), B(3,1), C(3,3), D(1,3) centered at (2,2). Suppose that the square ABCD is first translated by +5 units in the  $x$ -direction and -3 units in the  $y$ -direction then scaled by a factor of 2 in the  $x$ -direction, and 0.5 in the  $y$ -direction, and finally rotated by 90 degrees about the point (2,2) in counter clockwise direction in  $xy$  plane.

Derive the composite transformation matrix and find the coordinates of the transformed object using homogeneous coordinate system.

[40%]



## University of Vavuniya

Second Examination in Information Technology - 2021

First Semester - March/April - 2023

**IT2114 Data Structures (Practical)**

**Answer All Questions**

Time Allowed : Three hours

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### Instructions:

- Write your programs in Java.
- Create a new folder with your index no (eg. IT18001) on your PC's desktop and save all files in the folder.

1. Write a program to sort an array elements in ascending order using either *Merge sort method* or *Quick sort method*. You are required to clearly mention the method you have chosen and implemented as comments in your program.

Test your program for the array of elements [50, 60, 45, 30, 90, 20, 80, 15] [20%]

2. Write a program to find the first occurrence of the largest element in a given array.

[20%]

Test your program for the array of elements [2, 3, 15, -5, 15, 2, 15, 14].

3. A company is required to sell a particular item in a First In First Out (FIFO) method from what it has purchased first. The policy of the company stated that it should sell the previously purchased items first. i.e., it can sell the particular item of higher costs

*[This question is continued on the next page]*

only after completely selling the previously purchased items from the lowest cost. In other words, the company cannot sell particular item of higher cost without completely selling the items purchased earlier at low cost.

The order of the quantity and the initial unit price of the items are given in Table 1:

Quantity	Unit Price in \$
First 100 items	2
Next 100 items	3
Next 100 items	4
Next 100 items	5
Next 100 items	6

Table 1: Initial Cost

For example, if the company sold 250 items then the **only possible** option to calculate the total cost of the sold items is given in Table 2:

Quantity	Unit Price in \$	Total
First 100 items	2	200
Next 100 items	3	300
Next 50 items	4	200
Total	250	700

Table 2: The possible option

Note that the order of selling items in other combinations is not possible according to the policy of the company. Two such combinations which are not possible are given in Table 3 and Table 4:

*[This question is continued on the next page]*

Quantity	Unit Price in \$	Total
First 50 items	2	100
Next 100 items	3	300
Next 100 items	4	400
Total	250	800

Table 3: An impossible option

Quantity	Unit Price in \$	Total
First 50 items	2	100
Next 100 items	3	300
Next 50 items	4	200
Next 50 items	5	250
Total	250	850

Table 4: An impossible option

You are required to write a program defining **Queue abstract data types** to store data in **FIFO method** and to calculate the total cost of the given number of items sold.

[30%]

4. The following Figure 1 shows three nodes linked together to form the list [6, 7, 8], where the **data** in a node refers to an integer value, and the **next** refers to the next node:

- (a) Write a program to represent the linked list as given in Figure 1.

*[This question is continued on the next page]*

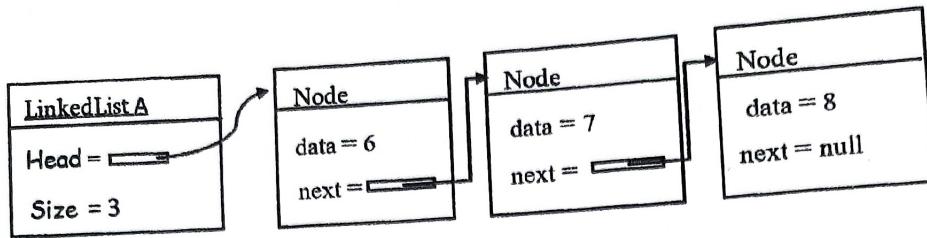


Figure 1: Linked List

- (b) Write a method to add a new node for the data 4 immediately before the node which has data 6.
- (c) Write a method to add a node for data 9 immediately after the node which has data 8.
- (d) Write a method to print all elements in the linked list and print the new list. [30%]



## University of Vavuniya

Second Examination in Information Technology - 2021

Second Semester - March/April 2023

**IT2114 Data Structures (Theory)**

Answer any Four Questions

Time Allowed : Two hours

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1. (a) State two differences between *linear* and *non linear data structures*. [15%]
- (b) Define what is *recursion* in data structures and explain how a programmer could use the *recursion* in programming with the aid of an example. [15%]
- (c) State the difference between an *algorithm*, a *pseudocode*, and a *program*. [15%]
- (d) Explain how you can measure the performance of an algorithm. *time space complexity* [15%]
- (e) i. Write the *binary search method* in Java to find an element in a sorted array. [20%]  
ii. Trace how the method mentioned above in part(e)i is used to search the target value 22 in the following array in Figure 1:  
*Y2*

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	4	5	7	8	9	14	17	19	22	12	25	27	28	33	17

Figure 1: Binary search data

[20%]

2. (a) Define each of the following data structures with its limitations:
- An Array
  - An ArrayList
  - A Node
  - A Linked List
- [30%]
- (b) Write a Java Class to define a *singly linked List*. [15%]
- (c) Describe the method in Java to insert a node at a particular position into a linked list. [25%]
- (d) Explain how the *selection sort method* works to sort the elements in the array A (refer Figure 2) by showing the step by step progress of each of the passes has been executed:

40	35	80	75	60	90
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Figure 2: Array A

[30%]

3. (a) Define the *Stack abstract data type* and *Queue abstract data type*. [15%]
- (b) Describe the following *four* methods in a Stack data type: `empty()`, `push()`, `pop()`, and `peek()`. [15%]
- (c) A Stack names contains five strings as shown in Figure 3:  
The name “Oliver” was placed on the stack before the other four names; “Daniel” is the last element placed on the stack.

*[This question is continued on the next page]*

Daniel
Jack
James
William
Oliver

Figure 3: names Stack

- i. Perform each of the following sequence of operations in the given order and write the result of each operation. Show the new stack if it is changed.
    - A. `names.push('Michael');`
    - B. `names.push('Samuel');`
    - C. `String top = names.pop();`
    - D. `String nextTop = names.peek();` [20%]
  - ii. State the output of the following code segment:
 

```
while(!names.isEmpty()) {
    System.out.println(names.pop())
}
```

 [15%]
  - iii. What would be the effect of using `peek()` instead of `pop()` in the code given above in part c(ii). [10%]
- (d)
- i. Write the steps for converting an *infix expression* to a *postfix expression* using Stack. [10%]
  - ii. Trace the algorithm given above in part d(i) to convert the following infix expression:  $m * n + (p - q) + r$  You are required to show the operand stack in each of the steps. [15%]

4. (a) Define each of the following graphs (Refer Graphs G1 & G2 in Figure 4) in data structures:

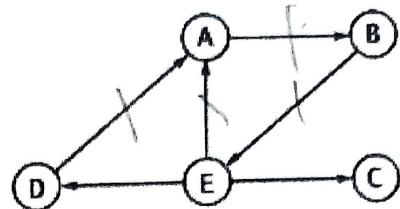
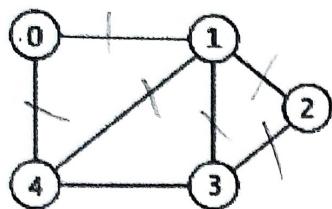


Figure 4: Graphs G1 & G2

[30%]

- (b) Describe the following types of a graph: *directed graph* and *undirected graph* [15%]

- (c) Write the *depth first search algorithm* to traverse on a graph. [25%]

- (d) Consider the graph shown in Figure 5:

Find the sequence of orders of vertices to be visited using each of the following searching methods: You can start traversing from the vertex 0.

- i. *Depth first search*

0 3 2 9 1 8 4 7 5 6

[15%]

- ii. *Breadth first search*

0 4 5 3 1 6 2 7 9 8

[15%]

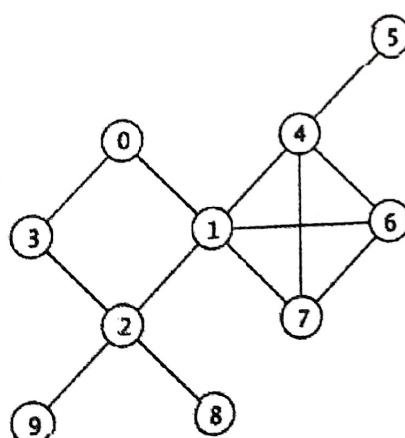


Figure 5: Graph

connection of nodes non linear data structure

[10%]

5. (a) Define *trees* in the context of data structures. [10%]
- (b) Define the *max heap* and *min heap* to arrange list of elements using *heap sort method*. [20%]
- (c) Write an algorithm to sort a list of integers using the *heap sort method*. [15%]
- (d) Build the *max heap* from the numbers in the following list: [25%]  
~~[55, 50, 10, 40, 80, 90, 60, 100]~~
- (e) Determine the *inorder*, *preorder*, and *postorder* traversal of the following tree in Figure 6 by assuming that visiting a node displays the stored integer value into the node.

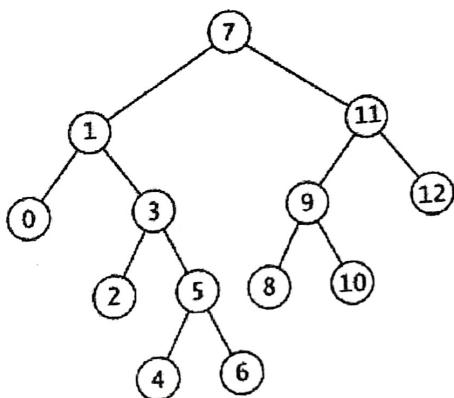


Figure 6: Tree

[30%]

100

order      root, left, right  
 order      root, right, left  
 + order      left, right, root

80            90  
 55            10        60

40

5



## University of Vavuniya

Second Examination in Information Technology – 2021

First Semester – March/April 2023

**IT2133 – Advanced Web Programming (Theory)**

**Answer any Four Questions**

Time Allowed : Two hours

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1. (a) Explain the necessity of mobile-friendliness in the website design. [15%]  
*easy to learn*
  - (b) Briefly explain why PHP is the best choice for web application development. [15%]  
*open source*
  - (c) What is meant by 'this' keyword in JavaScript? *to refer object* [10%]
  - (d) State significant differences between **static** and **dynamic** web pages. [15%]
  - (e) Briefly explain the steps of how a web page is loaded into a web browser when the user types Uniform Resource Locator (URL: <https://vau.ac.lk/>) of the website in the address bar. [25%]  
*URL address connection browser sends to server*
  - (f) What is DNS (Domain Name System) and describe its four features? [20%]
2. (a) What is meant by Secure Socket Layer (SSL) encryption? *coercion* [10%]
  - (b) List down the four most common attacks against a web application. [10%]
  - (c) Explain briefly the main risk of using cookies to store session information. [15%]  
*history of browsing*  
~~*client is communicating with web*~~
  - (d) Briefly discuss the best practices to prevent the cyber-attack. [20%]
  - (e) Someone tries to access a site that doesn't exist on one of our servers. Will they see all our other domains or just the error page? [10%]

*[This question is continued on the next page]*

(f) Briefly explain why would a man-in-the-middle attack be launched against a web server. when client is communicating with web server [15%]

(g) Write short notes on each of the following types of cyber-attacks: [20%]

i. DNS Spoofing

ii. Phishing

iii. Denial of Service

iv. SQL injection

Runs on clients computer  
no security for data  
code is not visible

Runs on servers  
high security for data  
code is in HTML

3. (a) Briefly discuss the differences between **Client side** and **Server side** JavaScript.

function( )

[15%]

Ans (b) Write the code segment to use an external JavaScript file (e.g. function1.js). [10%]

(c) Briefly explain the use of the debugger keyword in JavaScript with an example. [15%]

(d) List the steps for creating HTML elements using JavaScript with examples. [20%]

(e) Briefly explain the Document Object Model (DOM) tree structure of HTML elements with suitable elements. [20%]

(f) Give the output to the console for the following codes and justify your answer:

i. console.log(1 + "5" + "5");

155

ii. console.log(1 + + "5" + "5");

65

[20%]

4. (a) Identify the object, property and method in the following JavaScript code segment and add a new property to the given object: [15%]

var student = { name: "saman", age: 20, getdata: function()  
{ return this.name + " " + this.age; } };

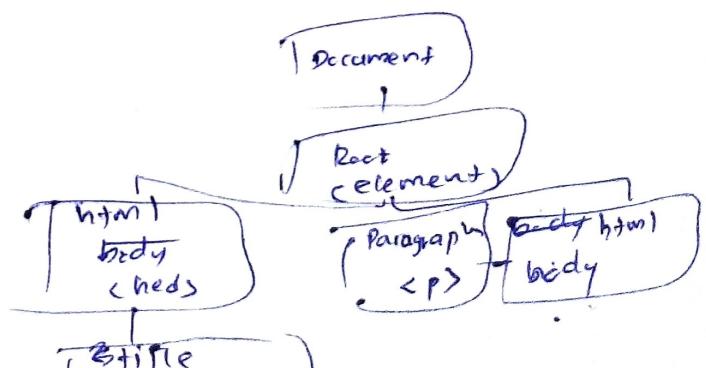
(b) List down the five advantages of jQuery. [15%]

Fast  
Remove browser errors

[This question is continued on the next page]

Allow in multiple browsers

2



- (c) Write a script that uses only jQuery to list all of the attributes of the following HTML element. [20%]

```
<div id="parent" name="name_of_parent" class="parentClass">  
    This is the parent division  
    <div id="child" name="name_of_child">  
        This is the child division  
    </div>  
</div>
```

- (d) Write the syntax for the following jQuery selectors:

i. Tag name

ii. ID

iii. Class

iv. Attribute

v. Attribute value

[20%]

- (e) What is the use of a Date object in JavaScript? [10%]

- (f) Briefly explain the use of *addClass*, *hasClass*, *toggleClass* and *removeClass* jQuery functions with a specified syntax. [20%]

[10%]

5. (a) Write the output of the given code segment.

```
<?php  
function setMarks($minMarks=50){  
    echo '$minMarks<br>';  
}  
setMarks(95);  
setMarks();  
setMarks(75);  
?>
```

*[This question is continued on the next page]*

- (b) State the significant difference between functions *mysqli\_fetch\_object()* and *mysqli\_fetch\_array()*. [15%]
- (c) Briefly discuss the difference between session and cookies. [15%]
- (d) Discuss the differences between functions *require( )* and *include( )*. [20%]
- (e) Compare and Contrast “GET” and “POST” methods in PHP. [20%]
- (f) Discuss why the PHP framework is commonly used for web application development in software industries. [20%]



## University of Vavuniya

Second Examination in Information Technology - 2021

First Semester - March 2023

**IT2143 Visual Programming (Theory)**

**First Question is compulsory and answer any One from the rest of the questions**

Time Allowed : One hour

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1. (a) State three differences between Regular programming languages and Visual Programming languages. [15%]
- (b) Give two examples for Visual programming languages and state how they are used. *C#* [10%]
- (c) State what are executable files and give two examples for executable file types. [10%]
- (d) Give any five User Interface (UI) principles. [15%]
- (e) List any three classic mistakes that were caused by people during software development. [15%]
- (f) What is Application Programming Interface (API)? Why is it necessary in an application? [15%]
- (g) State the general steps involved in event handling. [20%]

2. (a) State what is Rapid Application Development (RAD) and the instances where it is applicable. *space low scope  
team member, low (2-6)* [25%]  
*[This question is continued on the next page]*

*software development 1 methodology  
developed within 60-90 days.  
when the project can be divided into small  
parts.*

- (b) Briefly explain the process of Software Testing Life Cycle. [25%]
- (c) Describe software localization and internationalization. Discuss the roles of developers and localizers in software localizing and internationalizing. [25%]
- (d) Briefly explain the process of ISO 9001 certification that ensures the Software Quality requirements. [25%]
3. (a) State four reasons why well-designed interfaces and screens are important for users. [20%]
- (b) Describe five project templates that are used in Microsoft Foundation Class (MFC) Framework. [20%]
- (c) Explain the process of a source code becoming an executable file with an aid of a diagram. State how they are executed in a Graphical User Interface (GUI) and Command-Line Interface (CLI). [30%]
- (d) Explain the structure of Model-View Controller (MVC) and how it is handling method invocations and events. [30%]

CVI GUI C-LI

slow fast

appearance change

more memory

anyone can



**University of Vavuniya**  
Second Examination in Information Technology - 2021  
First Semester – March 2023  
**IT2143 Visual Programming (Practical)**  
Answer All Questions

**Time Allowed : Three hours**

*IT 15098*

Instructions:

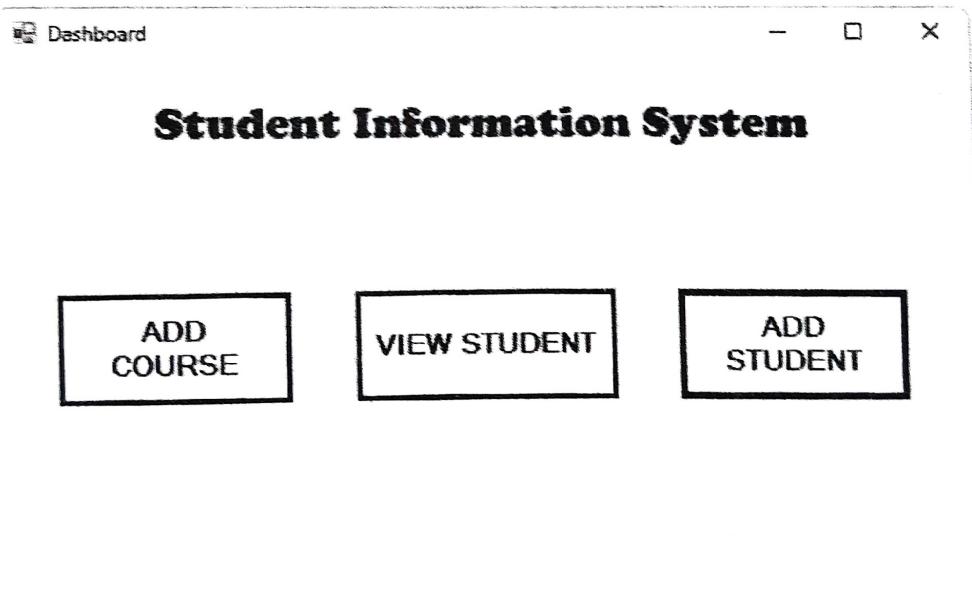
- All the necessary images are given in the folder *IT2143-Resources* on your PC's Desktop.
  - Create a new folder with your index number (e.g IT15099) on your PC's Desktop and use it to save your files.
  - You should use C# programming language and Visual Studio IDE to write the programs.
1. You are required to develop a console-based system that deals with some operations on course and student details.
- (a) The file *Course.cs* containing the class *Course* under the namespace *University* has the following:
- i. a *private string* variable for the title (Course Title)
  - ii. a *private int* variable for the duration (Course Duration)
  - iii. a *private string* variable for faculty (that offers the course)
  - iv. a *Constructor* for the Course class to initialize those variables
  - v. public properties for all variables
- (b) The file *Student1.cs* containing the class *Student* under the namespace *University* has the following:
- i. a *private string* variable for the registration number
  - ii. a *private string* variable for student name
  - iii. a *private int* variable for age
  - iv. a *private char* variable for sex

[This question is continued on the next page]

- v. a *private int* variable for the year of study
  - vi. a *private string* variable for the filename of an image.
  - vii. a private *Course* variable for course
  - viii. a *Constructor* for the *Student* class to initialize those variables
- (c) The file *Student2.cs* containing the same class *Student* under the namespace *University* has the following:
- i. public properties for all variables
- (d) Generate a library file ***University.dll*** in which class *Course* and *Student* are bundled under the namespace *University*.

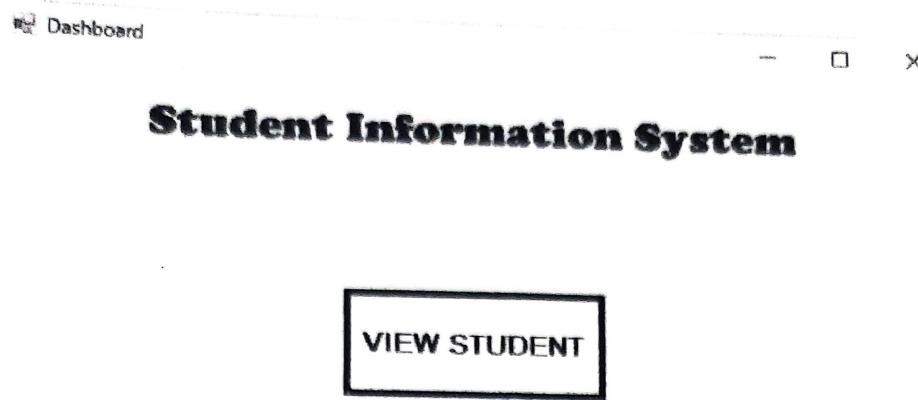
[35%]

2. you are required to develop a windows-based system, which consists of several windows forms to manage the information of students in a University.
- (a) The following login form should be the initial user interface of the system.
  - (b) The admin user can log in with username *admin* and password *admin@is*. And also the user can login with username *user* and password *user@is*.
  - (c) The following windows form dashboard should be displayed after a successful login as an admin:

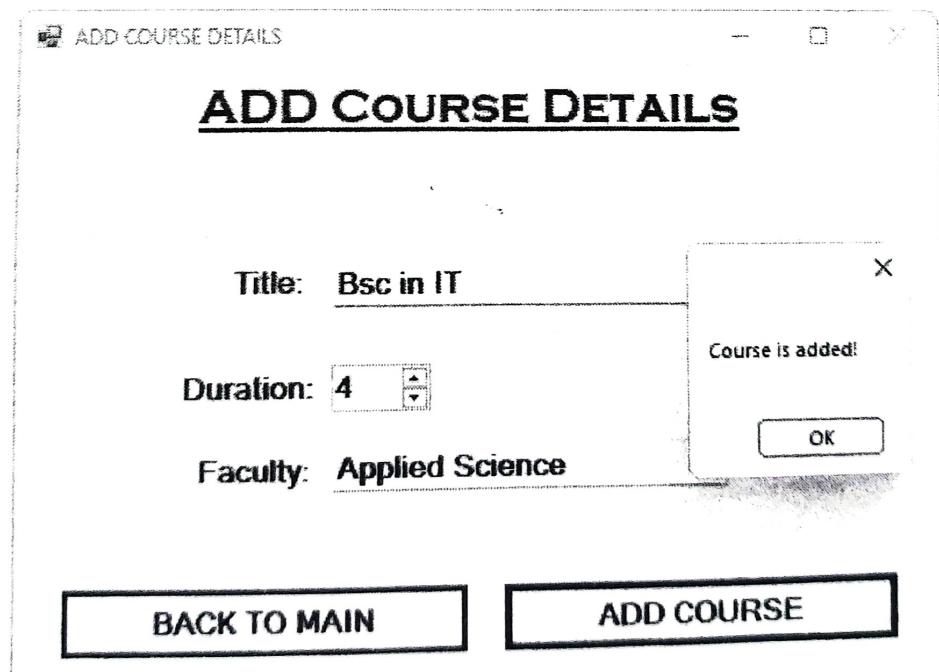


*[This question is continued on the next page]*

- (d) The following windows form dashboard should be displayed after a successful login as a user:



- (e) The button *ADD COURSE* in the dashboard should display the *Add Course* form shown below with the following functionalities:
- The fields for title, duration, and faculty.
  - The button *Back To Main* should display back the dashboard while hiding the form *ADD COURSE* itself.
  - The button *Add Course* should add or store the course information by displaying a message like *Course is added!* on a message box.
  - You should use the class *Course* in the library file *University.dll*, to store the course information as an array of Courses.



[This question is continued on the next page]

- (f) The button *ADD STUDENT* in the dashboard should be displayed the *Add Student* form shown below with the following functionalities:
- Student's Photo should be loaded into the picture box with the help of the Load Image button to browse the photo.
  - The other fields in the form should be included.
  - The combo box for the Course should be loaded with the courses, which have been added using *Add Course* form.
  - The button *Back To Main* should display back the dashboard while hiding the form *Add Student* itself.
  - The button *ADD STUDENT* should add the student's information by displaying a message like *Student is added!* on a message box.
  - You should use the class *Student* in the library file *University.dll*, to store the student information as an array of Students.

**ADD STUDENTS DETAILS**

Reg No: 2022/ICT/001

Name: K.Ramanayakke

Age: 23

Sex:  Male  Female

Year Of Study: 2

Course:

**Bsc in IT**  
**BSc in Physics**

**BACK TO MAIN** **ADD STUDENT**

- (g) The button *VIEW STUDENT* in the dashboard will display the *View Student* form shown below with the following functionalities:
- The combo box for the Registration Number should be loaded with the registration numbers of the students, which have been added using *Add Student* form.

*[This question is continued on the next page]*

- ii. The details including course details should be displayed based on the selection of the registration number in the combo box for the Registration Number.
- iii. The button *Back To Main* should display back the dashboard while hiding the form *View Student* itself.

VIEW STUDENT DETAILS

## VIEW STUDENT DETAILS

Reg No: 2022/ICT/002  
Name: K.Ramanayekke

Age: 23

Sex:  Male  Female

Year Of Study: 2

Photo:



**Course Details:**

Title: Bsc in IT

Duration: 4

Faculty: Bsc in IT

**BACK TO MAIN**

[6/16]



## University of Vavuniya

Second Examination in Information Technology - 2021

First Semester - March/April 2023

**IT2122 Software Engineering**

**Answer Four Questions Only**

**Time Allowed: Two hours**

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1. (a) Explain in your own words what Software Engineering refers to. [10%]
- (b) Provide a brief overview of five key characteristics that make a software application “good”. [25%]
- (c) Compare and contrast generic software products and customized software products, along with two examples for each category. [20%]
- (d) What are the professional responsibilities and ethical considerations that software engineers must adhere to in order to be recognized as reputable engineering professionals? Discuss the relevant issues. [20%]
- (e) Assume you are the scrum master for a team that is using the Scrum framework to develop a web application. The team consists of 7 members, including 2 developers, 2 testers, 1 designer, 1 product owner, and 1 Scrum Master (you). The team has just started a new Sprint of 2 weeks and has a backlog of 10 user stories. During Sprint planning, the team estimates that they can complete 6 user stories. However, after 1 week, the team realizes that they are behind in this Sprint. What actions can you take as the Scrum Master to help the team get back on track and complete the Sprint successfully within the remaining time? [25%]

Specification Development Validation Evaluation

2. (a) Briefly explain the fundamental process activities that are common to all software development processes. [20%]
- (b) Identify and explain three primary challenges that Software Engineering currently encounters. *Social changes, security & threat, deadline* [15%]
- (c) What are the distinctions between the roles of product manager, Product Owner, and Scrum Master in software development? [15%]
- (d) Discuss the contrasting characteristics of incremental software development and waterfall software development methodologies. [20%]
- (e) Given the following requirements, identify an appropriate software process model for each and provide a justification for your selection:
- Design a petrol pump system that incorporates a credit card reader to deduct the required amount from the customer's account after selecting the fuel amount. *Incremental* [15%]
  - A large bank plans to create a new system with similar functionalities to its existing loans software, but with modern hardware and techniques to replace the current 30-year-old system. *Spiral* [15%]
- what user need derived from user require.*
3. (a) Differentiate user requirements and system requirements in the context of software development. [15%]
- (b) Define the concepts of functional and non-functional requirements in software development, and provide examples of each. [15%]
- (c) Explain the problems associated with requirement elicitation for software engineers and describe the methods that can be used to effectively collect relevant requirements from customers. [20%]
- (d) Consider the following required functionality of a print-on-demand service:  
The print-on-demand service provides customers with the possibility to print posters, flyers, or books on demand. The customer should be able to select a type of product (poster, flyer, or book), a desired quantity, and a paper type. In case a book has to be printed, additionally the customer can choose between hard cover and soft cover.

Finally, the customer needs to provide a PDF file containing the desired content. In order for the customer to be able to place an order, he or she must have an account. The customer can create an account by choosing a username/password combination. Furthermore, his or her address and credit card number can be linked to the account, which is required information when placing an order. Once a customer has provided the information for an order, the system checks if all the required information is there, either given in the order (type of product, quantity, etc.), or in the account (address and payment information). If any information is lacking, the system will inform the customer that it needs to be added before the order can be placed. Once all the information is in place, the order is placed, and the credit card information is sent to the bank for approval. If the bank approves the card, the order is finalized.

A printing agent is in charge of actually performing the printing. He or she inspects the provided PDF files of finalized orders. If a file does not meet the quality requirements, the customer will be informed about this, and the order is temporarily put on hold until the customer has provided a new PDF file. Finally, the administrator ensures that there is always enough paper and ink on stock. Whenever the amount of paper or ink is running low, an order must be placed at the appropriate supplier (either the paper or ink supplier).

- i. Create a UML Use Case Diagram for the print-on-demand service. In addition, give a detailed scenario (pre-condition, trigger, guarantee, main scenario, etc.) of the use case for “place an order”. [20%]
- ii. Based on your use case description of “place an order”, create a UML Sequence Diagram. [30%]

4. (a) Consider the following simplified description of a university where professors teach seminars and students can enroll in them. Professors have a name, address, phone number, email address, and salary. Students have a name, address, phone number, email address, and an average mark. Seminars have a name, a number, and can either be bachelor or master. Each seminar can have at least one and at most three teachers. Students can enroll in seminars, and when they do, their marks

are recorded, and the current average as well as the final mark (if there is one) can be obtained from the enrollment. A student can obtain a list of the seminars they are enrolled in. From a professor, a list of seminars they teach can be obtained. Draw a class diagram for this university, including attributes and methods as necessary. You do not have to include getters and setters for attributes, and visibility modifiers (public, private, etc.) are not required. [40%]

- (b) Testing is important for the effective performance of a software application or product.

- i. Write down the purpose of testing a software before installation. [20%]
- ii. Describe the phases involved in the software testing life cycle. [20%]
- iii. Explain the difference between validation and verification, and provide examples of each. [20%]

5. (a) Suppose you are hired as a quality assurance engineer for a software development company that is developing a new mobile application for a social media platform.

- i. Describe the specific testing activities that you would perform to ensure the quality of the mobile application, including the types of tests that you would perform. [20%]
- ii. Identify any potential risks or issues that could arise during the validation and verification process, and describe how you would mitigate or address them. [20%]

- (b) Software maintenance stands for all the modifications and updates done after the delivery of software product.

- i. List down four types of software maintenance. [20%]
- ii. Briefly describe four techniques for software maintenance. [20%]
- iii. Discuss the advantages of re-engineering a legacy system. [20%]



## University of Vavuniya

### Second Examination in Information Technology - 2020

First Semester - June 2022

**IT2133 Advanced Web Programming (Theory)**

**Answer any Four Questions**

Time Allowed : Two hours

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1. (a) List five basic elements of web design. [10%]  
(b) Describe the roles of a web server and a web browser. [20%]  
(c) Briefly describe four ways to reduce the page loading time. [20%]  
(d) Describe the significant differences between *static* and *dynamic* web pages and list down sample web contents for each of these types. [20%]  
(e) Explain the steps of how a webpage is loaded into a web browser when a user types a Uniform Resource Locator (e.g.: <https://fas.vau.ac.lk/>) in the address bar. [20%]  
(f) Briefly describe four features of Domain Name System. [10%]
  
2. (a) Define what is meant by a security threat to a system with aid of an example. [15%]  
(b) Briefly describe four key elements of computer security. [20%]  
(c) Discuss the best practices required to follow by users to prevent a system from cyber-attacks. [25%]

*[This question is continued on the next page.]*

(d) Describe the four consequences of ignoring the importance of computer security. [20%]

(e) Write short notes on each of the following types of cyber-attacks: [20%]

- i. DNS Spoofing
- ii. Phishing
- iii. Denial of Service
- iv. SQL injection

3. (a) Discuss on how JavaScript differs from Java.

(b) Briefly describe each of the following types of *Error Name Values* in JavaScript with aid of an example:

- i. *EvalError*
- ii. *RangeError*
- iii. *ReferenceError*
- iv. *SyntaxError*

(c) Explain the importance of jQuery in JavaScript. [15%]

(d) State two different ways of embedding a JavaScript code in an HTML file. [15%]

(e) Briefly describe Document Object Model (DOM) tree structure of HTML elements with the aid of suitable elements. [20%]

(f) Write a code to demonstrate how to attach an event handler to the specified element in JavaScript. [15%]

4. (a) Describe three forms of INPUT tag in HTML with aid of an example. [15%]

(b) Describe the differences between <frame> and <div> in HTML documents. [20%]

(c) Compare and contrast XHTML and HTML. [20%]

*[This question is continued on the next page.]*

- (d) Discuss the advantages and the limitations of CSS framework [15%]
- (e) Describe three different ways to integrate CSS into a web page. [15%]
- (f) Briefly describe each of the following attributes in HTML with aid of specified syntax:  
i. Empty attribute  
ii. Unquoted attribute  
iii. Single-quoted attribute [15%]

5. (a) State the significant difference between `echo` and `print` commands in PHP. [15%]
- (b) Describe what is meant by `HTTP cookies` and list down its components. Describe the advantages of `web cookies`. [25%]
- (c) Describe the differences between the functions `require( )` and `include( )` in PHP. [20%]
- (d) Compare and contrast `GET` and `POST` in PHP. [20%]
- (e) Discuss why PHP framework is commonly used for web application development in software industries. [20%]



## University of Vavuniya

Second Examination in Information Technology - 2020

Second Semester - June 2022

**IT2143 Visual Programming**

**Answer First Question and One from the rest of the Questions**

Time Allowed : One hour

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1. (a) State the four key activities of software process. [10%]  
(b) Define 5Ds of Interaction Design. [10%]  
(c) List down three problems with Command Interfaces. [15%]  
(d) State any five User Interface (UI) principles. [15%]  
(e) State any five wireframe tools. [15%]  
(f) List three issues in traditional software development. [20%]  
(g) Discuss four characteristics of Sequential Programming. [20%]
2. (a) Describe four GUI characteristics. [25%]  
(b) Explain the advantages and disadvantages of Interaction styles with suitable examples. [25%]  
(c) Discuss the reasons which cause software projects failure. [30%]  
(d) Briefly explain the categories of classic mistakes in the context of software development projects.

*[This question is continued on the next page]*

3. (a) Define each of the following words in your own words:
- i. Event
  - ii. Event trigger
  - iii. Event handling
  - iv. Event handler [20%]
- (b) State any four reasons to internationalize or localize an app. [20%]
- (c) Explain the Software design process using a diagram. [30%]
- (d) Describe the logical components of Model-View Controller (MVC). [30%]