**Q1. (20 Marks)**

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1. What is Rapid Application Development (RAD)? (2 marks)
   1. ***Software development process that allows usable systems to be built within a short period (2-3 months)***
   2. ***Term for*** 
      1. ***“speedy development” or***
      2. ***“Shorter schedule”***
2. RAD methodology attempts to overcome certain issues in traditional software development methodologies. State (03) of such issues related to traditional software development and briefly explain them (2\*3=6 Marks)

* ***Cost overruns***
* ***Schedule overruns***
* ***Cancelled projects***
* ***High turn over***
* ***Friction between managers, developers and customers***
* ***Product not fit for business***

***\*\* 6 Marks may be given for any 3 of the above points and a brief explanation done on them.2 marks allocated for each point and explanation. If the explanation is missing in the answer, 1mark may be given for giving the point***

1. Compare and contrast Waterfall model, Spiral model and RAD methodology with regard to their strengths and weaknesses (4\*3=12 Marks)

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|  |  |  |
| --- | --- | --- |
| ***Waterfall Model*** | ***Spiral Model*** | ***RAD*** |
| ***Requirements should be clear*** | ***Works well with unclear requirements as well*** | ***Requirements may not need to be clearly defined*** |
| ***Risk involved in each stage of the process is not handled*** | ***Risk management for each spiral is present*** | ***Handles and manages risk throughout the process*** |
| ***Time consuming*** | ***Relatively faster process*** | ***The main focus is to complete the project within a period of 2,3 months*** |
| ***User does not see a “product” until the development process is completed*** | ***A workable product is present for the user during the development process*** | ***The process always produce a product for the user, as a deliverable and the final product is a modified version of these early products*** |
| ***Does not allows corrections to the product after the design phase is finalized*** | ***Allows corrections to some extent during development*** | ***Mid course corrections are highly supported*** |
| ***The entire process has to be planned initially and flexibility of making changes is low afterwards*** | ***Supports changes in the plan to some extent*** | ***Supports adaptive planning*** |

***\*\*1 mark may be given for each of these points, or any other reasonable point given by the students. Full marks may be given for any 4 points produced for all 3 models***

**Q2. (20 Marks)**

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Select **FIVE** from the topics given below and write short notes

1. Overly optimistic schedules

***Overly optimistic software schedules are a shopworn tradition in software development. Overly optimistic schedules are schedules made considering only on the best case scenario of the project, and not providing for the worst case scenarios.***

***In some cases, with overly optimistic schedules,***

* + ***“All significant programming problems turn out to be emergencies” (Bylinksy 1967)***
  + ***“Most software projects have gone awry for lack of calendar than all other causes combined” (Brooks 1975)***
  + ***“Deadline pressure is the single greatest enemy of software engineering” (Costello 1984)***
  + ***“Excessive or irrational schedules are probably the single most destructive influence in all of software” (Jones 1991, 1994)***

1. Properties Window

***The Properties window contains the list of design-time properties for a selected form, control, class, module, or menu. These properties can be changed at design time, and the Properties window shows each property's current setting. When you select multiple controls, the Properties window contains a list of the properties common to all the selected controls.***

***The Properties window consists of:***

* ***The Object box. Located beneath the title bar, the Object box identifies the currently selected form or the currently selected control on the form.***
* ***The Properties list. This two-column list shows all the properties that can be changed at design time, as well as their current settings. To change a property's setting, select the property name and type or select the new setting***

1. Joint Application Development

* ***A Requirements definition and user interface design methodology with end users, executives and developers to meet and develop system’s details***
* ***JAD generally focuses on business details rather than technical details***
* ***It is most applicable to the development of business systems, but it can be used successfully for shrink-wrap and systems software.***
* ***Shorten schedule through gathering requirements effectively***
* ***Its success depends on effectiveness of JAD leadership in JAD sessions, participation of key end users, decision makers and developers***
* ***and it produces its savings in several ways.***
* ***It commits top executives to the software-planning process***

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* ***It shortens the requirements-specification phase***
* ***It eliminates features of questionable value***
* ***It helps to get requirements right the first time***
* ***It helps to get the user interface right the first time.***
* ***It reduces organizational infighting(any conflicting objectives and hidden agendas brought to light early and addressed them effectively)***

1. Specialized Rapid Application Tools

– “***visual development”***

***– Creation of fake prototypes (pure simulations)***

***– Multiple programming languages***

***– Team scheduling***

***– Team work and collaboration***

***– Use of reusable components (e.g. STL)***

***– Use of standard APIs***

***– Content Management***

***- Version control Tools (e.g. CVS www.cvs.org)***

1. People related classic mistakes

***Undermined motivation***

***Weak personnel***

***Uncontrolled problem employees***

***Heroics***

***Adding people to a late project***

***Noisy, crowded offices***

***Friction between developers and customers***

***Unrealistic expectations***

***Lack of effective project sponsorship***

***Lack of stakeholder buy-in***

***Lack of user input***

1. Time boxed development

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* ***Construction time practice that helps a development team a sense of urgency and helps team to focus on most important features.***
* ***Saves time by redefining the product to fit the schedule rather than redefining the schedule to suit the product***
* ***Most applicable to in-house development but can be adopted for the use on others too.***
* ***Success depends on the kind of projects and client’s willingness to reduce feature rather than stretch schedule.***

1. Solution Explorer

***Solution explorer is similar to the windows explorer. This will display all the contents of application. This contains two main options that is view code and view designer***

1. Agile software development

* ***software methodologies which apply***
  + ***time boxed iterative and evolutionary development***
  + ***adaptive planning***
  + ***promote evolutionary delivery***
  + ***values and practices that encourage agility (rapid and flexible response to change)***

***\*\* The points given above are general guidelines for structuring the short note. Any brief descriptions given by students, keeping within the frame and structure close to the above guidelines may give marks. Full marks may be given for 4 key points on each topic selected. Part marks may give as 1 mark per point.***

(5\*4 =20 Marks)

**Q3. (20 Marks)**

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1. Rapid Application Development employees a Four-part Strategy which provides support for the working out of best possible Project Schedule

List down the key components of the four-part strategy (0.5\*4=2 Marks)

* + - ***Avoid classic mistakes***
    - ***Apply development fundamentals***
    - ***Manage risks to avoid catastrophic setbacks***
    - ***Apply schedule-oriented practices***

1. Give a brief account on any (02) Two components (2\*2=4 Marks)
   * ***Avoid classic mistakes***

***RAD methodology is developed when the software development world realized that a substantial amount of software projects fail due to those classic mistakes and RAD supports a number of strategies and procedures that avoid classic mistakes in software development***

* + ***Apply development fundamentals***

***RAD focus on following the fundamental practices in software development even though the approach is different than traditional methods of software development, in the same time RAD eliminates procedures that consumes considerable amount of developers time, without adding much value to the product***

* + ***Manage risks to avoid catastrophic setbacks***

***The traditional software development models did not consider on handling risks associated with each stage of the software development process. This led to catastrophic results in products and development teams. RAD methodology handles and manages the potential risks that can be materialized in each stage.***

* + ***Apply schedule-oriented practices***

***Instead of unplanned fire fighting type of practices in the grass-root levels of the project, RAD focus on concentrating on schedule oriented practices at high level as well as in lower levels in the project***

1. Give an example each for specialized tools used in RAD to support the following characteristics (1\*3=3 Marks)
   1. “Visual development” – ***VB.Net framework, Net Beans***
   2. Multiple programming languages - ***VB.Net framework*** , ***Net Beans***
   3. Content Management - ***PHPNuke***
2. Give (04) four advantages and (04) four disadvantages of RAD methodology (1\*8=8 Marks)

***Advantages:***

* + ***The time required to develop the software is drastically reduced due to a reduced requirement analysis business requirements documentation and software requirement specification) and planning stage.***

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* + ***All the software prototypes produced can be kept in a repository for future use. The reusability of the components also enhances the speediness of the process of software development.***
  + ***It is much easier for a project manager to be accurate in estimating project costs which of course means that project cost controls are easier to implement and manage as well.***
  + ***It is a big cost saver in terms of project budget as well as project time and cost due to reusability of the prototypes.***
  + ***If a component is being picked for the repository, it is already tested and hence need not be tested again. This helps in saving time required for testing.***
  + ***The project management requirements are collected in a dynamic manner. Every time there is a prototype ready, requirements are studied and matched. If there are any additional requirements, these are then included in the next prototype built.***
  + ***There is a strong and continuous participation of the project sponsor who keeps giving feedback in the whole process. Hence the end user satisfaction level is higher when the end result is produced.***
  + ***It promotes better documentation through written test cases.***

***Disadvantages:***

* ***This method may not be useful for large, unique or highly complex projects***
* ***This method cannot be a success if the team is not sufficiently motivated and nor is unable to work cohesively together.***
* ***Success depends on the extremely high technical skills of the developers.***
* ***There are times when the team ignores necessary quality parameters such as consistency, reliability and standardization. Hence this can make project quality management hard to implement during the project management life cycle***

***\*\****

***1 mark each may be given for a combination of eight of any four advantages and four disadvantages given by the students***

1. “Rapid Application Development is known as a Customer Oriented Methodology”. Evaluate this statement (3 Marks)

***Projects developed with RAD methodology that allows the customer involvement in the process to very high levels, thus ensuring the requirements captured by the developer is exactly the customers’ demand.***

***Therefore RAD can be considered a Customer Oriented Methodology***

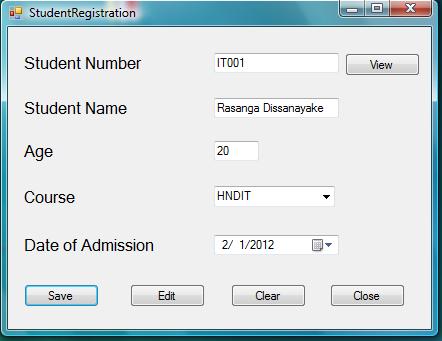
***\*\* Any answer that carries the above idea may given full marks***

***Part marks may be granted accordingly***

**Q4. (20 Marks)**

The following interface is taken from a Windows Application creating using VB.Net, to support student registration activities of SLIATE. The back end of this system is a database creating using Microsoft SQL Server

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1. Provide the code segment for connecting this interface with the SQL Database

*Hint: Data Source=ATI; Initial Catalog=Student; Integrated Security=True*

(Indicate any relevant libraries/ packages/etc, required to create the connection)

(5 Marks)

Imports System.Data.SqlClient

Public Class StudentRegistration

Dim myconn As New SqlConnection

Dim mycmd As New SqlCommand

Dim reader As SqlDataReader

Private Sub StudentRegistration\_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles MyBase.Load

myconn.ConnectionString = "Data Source=ATI;Initial atalog=Student;Integrated Security=True"

End Sub

***\*\* 1 Mark for importing statements, 1 mark for declaring connection, command and data reader objects, 3 marks for correct connection string***

1. Write down the code segment to add the information displayed on the form into the database (5 Marks)

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(Assume the database contains a table with the following structure:

StuReg (StuNo, StuName, Age, Course, DoA)

Private Sub btnSave\_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles btnSave.Click

Try

myconn.Open()

mycmd.Connection = myconn

mycmd.CommandText = "INSERT INTO StuReg VALUES (" & txtStuNum.Text & ",'" & txtStuName.Text & "'," & txtAge.Text & ",'" & cmbCourse.SelectedItem.ToString() & "','" & DateTimePicker1.Text & "')"

mycmd.ExecuteNonQuery()

MsgBox("Data Added")

Catch ex As Exception

MsgBox(ex.Message.ToString())

Finally

myconn.Close()

End Try

End Sub

***\*\* Equal marks can be given if the students have specified fields of the database table in the query***

1. Write down the code segment to modify the Course of a student who has already registered as a student (5 Marks)

(Change the course from HNDA to HNDIT)

Private Sub btnEdit\_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles btnEdit.Click

Try

myconn.Open()

mycmd.Connection = myconn

mycmd.CommandText = "UPDATE StuReg SET StuName='" & txtStuName.Text & "', StuAge = " & txtAge.Text & ",Course = '" & cmbCourse.SelectedItem.ToString() & "',DOA= '" & DateTimePicker1.Text & "'"

mycmd.ExecuteNonQuery()

MsgBox("Data updated")

Catch ex As Exception

MsgBox(ex.Message.ToString())

Finally

myconn.Close()

End Try

End Sub

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1. Write down the code to be executed when the View button is hit with a student number entered in the relevant text box (5 Marks)

Private Sub btnview\_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles btnview.Click

Try

myconn.Open()

mycmd.Connection = myconn

mycmd.CommandText = "SELECT \* FROM StudReg WHERE StuNumber=" & txtStuNum.Text & ""

reader = mycmd.ExecuteReader()

While (reader.Read())

txtStuName.Text = reader.GetString(1)

txtAge.Text = reader.GetValue(2).ToString()

cmbCourse.Text = reader.GetString(3)

DateTimePicker1.Text = reader.GetString(4)

End While

Catch ex As Exception

MsgBox(ex.Message.ToString())

Finally

myconn.Close()

End Try

End Sub

***\*\* Full Marks may be given if the student has produced the query in the right format and syntax***

**Q5. (20 Marks)**

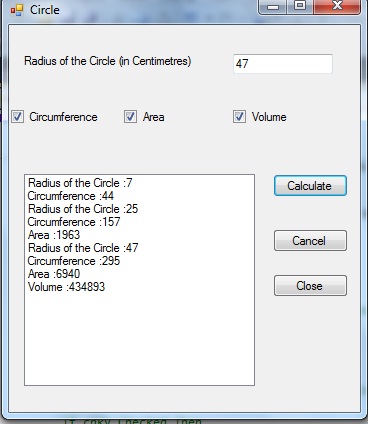
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Consider the following interface, which takes a radius of a circle as an input and output certain metrics of the circle

The user is given the option of calculating Circumfeence, Area and Volume of the circle when the Radius is entered.

After calculating Circumference of a circle with a particular radius, the user can calculate the area and volume of two other circles with different radius values. Also the user is able to calculate the same metric for circles with varying radius.

All results will be displayed in the List box.



* 1. Write a VB.Net function to take the radius of the circle as a parameter, and output the Circumference, Area and Volume of the circle.Indicate how you would capture the choice of user given using check boxes, in your calculation

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*Hint: C= 2πr, A = πr2, V= 4/3πr3* (8 Marks)

*Ex. If user selects Circumference only, the list box should display only the Radius and Circumference. If user selects Area and Volume also, all results*

*should be displayed*

Private Function MetricCalculator(ByVal R As Double) As Double

If chkC.Checked Then

ResC = 2 \* Math.PI \* Radius

ResC = Math.Round(ResC)

lstRes.Items.Add("Circumference :" + ResC.ToString())

End If

If chkA.Checked Then

ResA = Math.PI \* Math.Pow(Radius, 2)

ResA = Math.Round(ResA)

lstRes.Items.Add("Area :" + ResA.ToString())

End If

If chkV.Checked Then

ResV = (4 / 3) \* (Math.PI \* Math.Pow(Radius, 3))

ResV = Math.Round(ResV)

lstRes.Items.Add("Volume :" + ResV.ToString())

End If

End Function

***\*\* Full marks may be given for the full text of the function. 2 Marks each for each condition blocks given for check box check events. (2\*3 Marks for 3 if blocks) 2 Mrks for the correct syntax of function with parameters***

***\*\* Any other correct method given by the student may be given full or part marks accordingly, that fulfills the same functionality***

* 1. This function should be called when the user clicks on the Calculate button. Write down the code for calling the function (3 Marks)

Private Sub btnCalc\_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles btnCalc.Click

Radius = CDbl(txtRadius.Text)

lstRes.Items.Add("Radius of the Circle:"+ Radius.ToString())

MetricCalculator(Radius)

End Sub

* 1. The user should be able to enter Radius values with decimal numbers as well as whole numbers. How would you facilitate this in your program ? (2 Marks)

***By declairing the variables as any of floating point data types***

***Double, decimal, long,etc***

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* 1. Explain how you would print the results in whole numbers only, omitting the decimal part of the number (2 Marks)

ResC = Math.Round(ResC)

***Using the Round function in Math class***

* 1. Write down a VB.Net sub procedure to be called when the Cancel button is clicked, to clear the text boxes and list box and to uncheck the check boxes

(3 Marks)

Private Sub ClearControls()

txtRadius.Clear()

chkC.Checked = False

chkA.Checked = False

chkV.Checked = False

lstRes.Items.Clear()

End Sub

* 1. Give the coding of the Close button (2 marks)

Private Sub btnClose\_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles btnClose.Click

Me.Close()

End Sub

***\*\* Full marks may give for students who have given the coding without the event generated by VB.Net***

**Q6. (20 Marks)**

1. Assume a simple VB.Net application that takes a string as an input and manipulate the string in many ways to give different types of string outputs. Let the input string be named “Test”
   1. What is the built in class in VB.Net that supports handling strings?

(2 Marks)

***The String class***

* 1. Write down the coding to perform following changes on the string – “Test”

1. Change it to the upper case

***Res1=Test.ToUpperCase ()***

1. Count the number of characters in the string

***Res2=Test.Length ()***

1. Display the first 4 letters only

***Res3=Test.Substring (0, 4)***

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(2\*3=6 Marks)

1. SLIATE is in need of a software application to calculate the grades obtained by the students in end semester examinations, which considers the final examination marks, assignment marks and mid semester examination marks for each student. (12 Marks)

*A – 75 and above*

*B – 60 to 74*

*C – 50 to 59*

*S – 25 to 49*

*F – below 25*

The above data is used in generating the grades, for a total mark out of 100%.

The final mark for the subject is calculated using the following guidelines

*Overall Final Marks (100) = 60% of Final Exam Marks*

*+ 20% of Assignment Marks*

*+ 20% of Mid Semester Exam Marks*

*Assume that all assessments are given marks out of 100*

*The percentages of assignment marks and mid semester marks considered for the calculation may differ from subject to subject. But if other percentages are not specified, the above values are used for the calculation, generally*

*Final exam marks, assignment marks and the Mid Semester marks are whole numbers.*

*The percentage values considered from final exam marks, assignment marks and mid semester marks, to calculate the overall final marks may be whole numbers or floating point numbers (with decimal places)*

Given below is a class written by one of the ATI students to calculate student grades based on the above scenario. Consider the code and fill in the blanks with most appropriate terms (6 Marks)

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Public Class GradeCalculator

Private finalExamWeight As (1)**Double (1 Mark)**

Private midExamWeight As (2) **Double (1 Mark)**  Private assignmentWeight As (3) **Double (1 Mark)**

Public Sub New()

Me.finalExamWeight = 0.6

Me.midExamWeight = 0.2

Me.assignmentWeight = 0.2

End Sub

Public Sub New(ByVal finalExamWeight As Double, ByVal midExamWeight As Double, ByVal assignmentWeight As Double)

Me.finalExamWeight = finalExamWeight

Me.midExamWeight = midExamWeight

Me.assignmentWeight = assignmentWeight

End Sub

Public Function calculateGrade(ByVal finalExamMarks As Integer, ByVal midExamMarks As Integer, ByVal assignmentMarks As Integer) As String

Dim finalMarks As **Double**

Dim grade As (4) **String (1 Mark)**

finalMarks = (5) (finalExamMarks \* finalExamWeight) + (midExamMarks \* midExamWeight) + (assignmentMarks \* assignmentWeight(2 Marks)

If finalMarks >= 75 Then

grade = "A"

ElseIf finalMarks >= 60 Then

grade = "B"

ElseIf finalMarks >= 50 Then

grade = "C"

ElseIf finalMarks >= 25 Then

grade = "S"

Else

grade = "F"

End If

Return grade

End Function

End Class

Explain how the student has facilitated calculating grades with given percentages for final, assignments and mid semester marks and changing the given values when different percentages are needed? (6 Marks)

***This program employs 2 ways for the calculateGrade function to get arguments.***

***Through the constructor that gets data provided by the user, for the parameters (finalExamWeight,midExamWeight,assignmentWeight)***

***Through the default constructor that hold default values for the same parameters***

***If the user specifies the weights, which is the special case, the calculateGrade will be invoked with user provided arguments***

***If the user does not pass any specific values, the default constructor is called and the calculateGrade function is then invoked with the default values for parameters***

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**Q7. (20 Marks)**

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Project estimation is one of the highly critical areas in software development

1. List down the key steps in estimation process of RAD (3 Marks)

***Size estimation***

***Effort estimation***

***Schedule estimation***

1. What is Function Point Analysis (FPA), what is the purpose of performing it in RAD? (4 Marks)

***Function point analysis is an estimation technique used in measuring the size estimation of a RAD project. This method follows a parametric approach for size estimation***

***The number of function points in a program is based on the number and complexity of the following items***

* ***Inputs***
* ***Outputs***
* ***Inquiries***
* ***Internal logical files***
* ***External interface files***

1. Apart from FPA there are many alternative methods of achieving the same purpose in RAD. State (02) such methods (2 Marks)

* ***Use of size-estimation software that estimate progress size from your description of factors   
  (Screens, dialogs, files, database tables etc.)***
* ***Use of knowledge on similar previous projects***

1. A given project has following figures in the following program characteristics

|  |  |  |  |
| --- | --- | --- | --- |
| **Program characteristic** | **Function point Multipliers** | | |
| **Low complexity** | **Medium**  **complexity** | **High complexity** |
| Number of inputs | x3 | x4 | x6 |
| Number of outputs | x4 | x5 | x7 |
| Inquiries | x3 | x4 | x6 |
| Logical internal files | x7 | x10 | x15 |
| External interface files | x5 | x7 | x10 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Program characteristic** | **Function points** | | |
| **Low complexity** | **Medium complexity** | **High complexity** |
| Number of inputs | 3 | 6 | 2 |
| Number of outputs | 0 | 7 | 7 |
| Inquiries | 4 | 0 | 2 |
| Logical internal files | 3 | 5 | 2 |
| External interface files | 2 | 9 | 0 |

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* 1. Calculate the unadjusted function point total (5 Marks)

|  |  |  |  |
| --- | --- | --- | --- |
| **Program characteristic** | **Function points** | | |
| **Low complexity** | **Medium complexity** | **High complexity** |
| Number of inputs | 3\*3=9 | 6\*4=24 | 2\*6=12 |
| Number of outputs | 0\*4=0 | 7\*5=35 | 7\*7=49 |
| Inquiries | 4\*3=12 | 0\*4=0 | 2\*6=12 |
| Logical internal files | 3\*7=21 | 5\*10=50 | 2\*15=30 |
| External interface files | 2\*5=10 | 9\*7=63 | 0\*10=0 |
| Unadjusted function points | 52 | 172 | 104 |
| **Total** | **52+172+104=328** | | |

* 1. Assuming an Influence multiplier of 0.95, find the adjusted function point total

(2 Marks)

***Total unadjusted function points = 328***

***Influence multiplier = 0.95***

***Total adjusted function points = 328\*0.95***

***= 311.6***

1. Experts believe it is necessary to refine the estimate as much as possible, in order to come up with the “Best possible” schedule. DO you agree with this statement? Justify your answer (4 Marks)

***Research has shown that product estimates tend to fail within predictable precision at various stages of projects. Therefore it is always safe and better to refine the estimate as much as possible. Refinements can be done by reviewing software requirements, design in detail.***

**Q8. (20 Marks)**

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This interface allows the user to enter a time and display a greeting depending on the time.

1. Write down the steps of displaying the actual time on the top of the form (4 Marks)

lblShowTime.Text = System.DateTime.Now.ToLongDateString()

1. State the classes/ methods/ procedures/events you can used to break down the date, month and year and display them separately (5 Marks)

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Private Sub Form1\_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles MyBase.Load, Timer1.Tick

Timer1.Enabled = True

txtYear.Text = Now.Year()

txtMonth.Text = Now.Month()

txtDate.Text = Now.Day()

lhour.Text = Now.Hour()

lminutes.Text = Now.Minute()

lsecond.Text = Now.Second()

End Sub

1. Write down the coding for the “Show Message” button, when the user enters the time in 24 hour format (6 Marks)

Private Sub btnMessage\_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles btnMessage.Click

If txtTime.Text < 12 Then

greeting.Text = "Good Morning"

ElseIf txtTime.Text < 15 Then

greeting.Text = "Good Afternoon"

ElseIf txtTime.Text < 18 Then

greeting.Text = "Good Evening"

ElseIf txtTime.Text < 24 Then

greeting.Text = "4. Good Night"

Else

greeting.Text = "it's not a time"

End If

1. Assume you are asked to make this interface look more attractive for the user, by making it more colorful, etc., (3 Marks)

Write down the steps you follow in

* 1. Changing the back ground color of the interface

***Properties 🡪Background Color 🡪 Browse🡪 Select the Color 🡪Apply***

* 1. Changing the fonts of labels

***Properties 🡪Font 🡪 Select the font 🡪Apply***

* 1. Having a picture displayed on the side

***Tool box 🡪 Insert a Picture box 🡪 Picture box Properties 🡪 Image 🡪 Browse Image (myPictures/ Bin) 🡪 Select an image 🡪 Open***

1. What are other ways that you can make the interface more attractive? (Give 2 points)

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(2 Marks)

***Inserting background images, graphics, animations if necessary, calendars, scroll bars, etc depending on the purpose of the interface***