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| **ASSIGNMENT** | |
| **Course Code** | ESC108A |
| **Course Name** | Elements of Computer Science and Engineering |
| **Programme** | B.Tech Computer Science and Engineering |
| **Department** | Computer Science and Engineering |
| **Faculty** |  |

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| **Name of the Student** | Satyajit Ghana |
| **Reg. No** | 17ETCS002159 |
| **Semester/Year** | 1st Semester 2017 |
| **Course Leader/s** |  |

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| **Declaration Sheet** | | | | | | | | |
| Student Name | Satyajit Ghana | | | | | | | |
| Reg. No | 17ETCS002159 | | | | | | | |
| Programme |  | | | | | Semester/Year |  | |
| Course Code |  | | | | | | | |
| Course Title |  | | | | | | | |
| Course Date |  | | to | |  | | | |
| Course Leader |  | | | | | | | |
| **Declaration**  The assignment submitted herewith is a result of my own investigations and that I have conformed to the guidelines against plagiarism as laid out in the Student Handbook. All sections of the text and results, which have been obtained from other sources, are fully referenced. I understand that cheating and plagiarism constitute a breach of University regulations and will be dealt with accordingly. | | | | | | | | |
| Signature of the Student | |  | | | | | Date |  |
| Submission date stamp  (by Examination & Assessment Section) | |  | | | | | | |
| Signature of the Course Leader and date | | | | Signature of the Reviewer and date | | | | |
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|  |  |  |
| --- | --- | --- |
| **Symbol** | **Description** | **Units** |
| A | Current | Amp |
| g | Acceleration due to gravity - 9.81 | m/s2 |
| V | Voltage | Volts |
| w | Width | mm |
|  |  |  |

< Arrange in alphabetical order>

# **Question No. 1 Part A**

**Solution to Question No. 1 Part A:**

## A1.1 Need for programming in industry and academia:

Programming has become a necessity in the era of computing, as technology advances everything starts becoming more and more robotic and automated, these robots need a human mind to be programmed and function as intended. It could be said that a person in this era is illiterate if he/she doesn’t know at least one programming language, let it be C, Python or Java. As programming makes human’s life easier, industries have moved on to make very efficient machines in every field of work.

## A1.2 Discussion on the importance of C programing with applications:

C language is at the heart of most programming languages and rely on C to make its execution time efficient. Most microcontrollers rely on C for their working as C is very robust and portable. For example the infamous Arduino UNO makes use of C and its libraries for its essential functioning. The memory usage is less and response time is very quick as C is considered to be more closer to your bare machine and hence is able to achieve this.

## A1.3 Discussion on other modern programming languages with applications:

As evolution needs to happen, new programming languages come up. One such rising Programming Language is Python which is ranked 5th as per Tiobe. While there have many many other popular languages which deserve a mention such as Go, Swift, Rust, Perl, Ruby, C# and R. Every language finds its own way to implement programming essentials such as Data Structures and Object Oriented Programming.

## A1.4 Stance taken and justification with the support of examples:

Students are expected to draw conclusions based on the discussions and suggestions (not to exceed 100 words)

# **Question No. 1 Part B**

**Solution to Question No. 1 Part B:**

## B1.1 Introduction and Problem solving approach:

The question involves finding the acceleration when the initial velocity in km/hr and final velocity in km/hr and the time taken is given. It is also given that the car accelerates uniformly over the given interval, which makes it easy to use linear equations such as:

Acceleration can also be defined as the rate in change of velocity, i.e.

Where is the initial velocity.

These Kinematic equations could be used to evaluate the acceleration of the car.

To calculate the distance travelled this equation is used:

All of these equations hold true as long as the acceleration is linear.

## B1.2 Algorithm/Flow chart:

Step 1: Start

Step 2: Declare vel\_i,vel\_f, time, acceleration and distance

Step 3: Read variables vel\_i,vel\_f and time

Step 4: time <- time/3600

Step 6: acceleration <- (vel\_f - vel\_i) / time

Step 7: Display acceleration

Step 8: distance <- vel\_i\*time+0.5\*acceleration\*time\*time

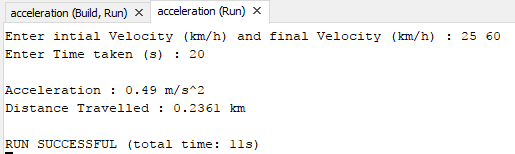
Step 9: Display distance

Step 10: Stop

## B1.3 Implementation:



## B1.4 Results and analysis:



The program runs successfully and gives the expected output.

Inputs taken are the Initial Velocity, Final Velocity and the time taken to do so. Do note that that velocities are taken in km/h and the time is taken in seconds, hence when the acceleration is calculated the time is converted in terms of hours. The acceleration hence calculated is in km/h^2, which is a unconventional way of expressing accelerations hence the unit is converted to m/s^2 for better readability to the user. Distance travelled is then easily calculated using the formulas discussed in B1.1.

## B1.5 concluding remarks:

Students are expected to draw conclusions based on the discussions and suggestions (not to exceed 100 words)

# **Question No. 2 Part B**

**Solution to Question No. 2 Part B:**

## B2.1 Introduction and Problem solving approach:

A Tax automation system is to be implemented under the following constraints:

|  |  |  |
| --- | --- | --- |
| **Income slab (in ₹) for individuals** | **Income slab (in ₹) for senior citizens** | **Tax Rate** |
| Income up to 2,50,000 | Income up to 3,00,000 | No tax |
| Income from 2,50,000 to 5,00,000 | Income from 3,00,000 to 5,00,000 | 5% |
| Income from 5,00,000 to 10,00,000 | Income from 5,00,000 to 10,00,000 | 20% |
| Income more than 10,00,000 | Income more than 10,00,000 | 30% |

Where a senior citizen is defined as a person with age more than or equal to 60.

Analyzing from the given data, Senior Citizens are relaxed from paying up-to an income of 3,00,000 while for those of individuals is up-to an income of 2,50,000. For other cases the Tax Rates for both the type of individuals is same. Hence the problem can be solved by evaluating the first case with No Tax first for the different age groups and then evaluating the Tax Rate for them respectively. The program can be implemented by using an else if ladder.

## B2.2 Algorithm:

Step 1: Start

Step 2: Declare age and salary

Step 3: Read variables age and salary

Step 4: If age 60 AND salary < 250000 OR age > 60 AND salary < 500000

Display No Tax Payable

Else If salary < 500000

Display Tax Payable = 0.05\*salary

Else If salary < 1000000

Display Tax Payable = 0.20\*salary

Else

Display Tax Payable = 0.30\*salary

Step 5: Stop

## B2.3 Implementation



## B2.4 Results and analysis

Students are expected to draw conclusions based on the discussions and suggestions (not to exceed 100 words)

# **Question No. 3 Part B**

**Solution to Question No. 3 Part B:**

## B3.1 Introduction and Problem solving approach:

Overview to the question (students are expected to give a brief introduction on the context on which the question is set, applications, limitations, new developments happening and students own views on the question and the paragraph should not exceed more than 200 words and references should be cited and it should be authored by the students means to say students should not be borrowing sentences as they are from any referred literature)

## B3.2 Algorithm:

Students are expected to provide the solution to the question considering the points mentioned in the marking scheme of the assignment question

## B3.3 Implementation:

Students are expected to discuss the solutions obtained in section 1.2 and present their views/suggestions/recommendations (not to exceed 150 words)

## B3.4 Results and analysis:

Students are expected to draw conclusions based on the discussions and suggestions (not to exceed 100 words)

# **Question No. 4 Part B**

**Solution to Question No. 5:**

## 5.1 Overview:

Overview to the question (students are expected to give a brief introduction on the context on which the question is set, applications, limitations, new developments happening and students own views on the question and the paragraph should not exceed more than 200 words and references should be cited and it should be authored by the students means to say students should not be borrowing sentences as they are from any referred literature)

## 5.2 Solution to the question:

Students are expected to provide the solution to the question considering the points mentioned in the marking scheme of the assignment question

## 5.3 Discussions /Suggestions/Views/Recommendations

Students are expected to discuss the solutions obtained in section 1.2 and present their views/suggestions/recommendations (not to exceed 150 words)

## 5.4 Conclusions

Students are expected to draw conclusions based on the discussions and suggestions (not to exceed 100 words)

**Bibliography**

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1. Kinicki and Williams Irwin. (2008) *Management*, McGraw Hill.
2. Decenzo David and Robbin Stephen A. (1996) *Personnel and Human Reasons Management*, Prentice Hall of India.
3. J.A.F. Stoner, Freeman R. E and Daniel R Gilbert. (2004) *Management*, 6th Edition, Pearson Education.
4. Fraidoon Mazda. (2000) *Engineering Management*, Addison Wesley.

All referencing, bibliography needs to be done as described in the following article:

<http://www.msruas.ac.in/pdf_files/VCBlogs/Academic%20Good%20Practices.pdf>

***Guidelines for writing the report***

Font and Font size of the text: Calibri, 11

Line Spacing: 1.5, Justified

All mathematical equations be edited using Microsoft Equation Editor

All figures, tables, equations taken from reference material be cited

1. **Inserting a table**

Title of the table should be at the top of the table and be left justified with ref to table

**Table 1.1 Properties of Air at Low Pressure [Ref.]**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **T (K)** | **h (J/kg)** | **p (atm)** | **u (J/kg)** | **φ (J/kg K)** |
|  |  |  |  |  |
|  |  |  |  |  |
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[Note: the table should be centered w.r.t the page width. Use suitable SI units]

**Referring to a table in the text:**

The data is tabulated as shown in Table 1.1.

[Note: Please do not write as *“As shown below”* or *“As shown above”*]

1. **Inserting a figure, a photo or screen shot**

The figure should be sufficiently large and legible. It should be centered w.r.t the page width.

Figure

Figure 2.1 Machining Process [Ref.]

Title of the Figure should be at the bottom of the figure and be left justified. The reference must be quoted.

**Referring to a figure in the text:**

The machine is shown in Figure 7.1

[Note: Please do not write as *“As shown below”* or *“As shown above”*]

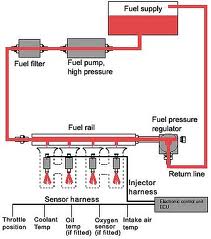


Figure 7.1 The Wonder Machine [2]

**[5]….. reference number; this should be quoted in the References.**

1. **Quoting the references in the text**

According to Kestin[5], “ the science of thermodynamics is a branch of physics. It describes natural processes in which changes in temperature play an important part. Such as the …………………………..”

1. **The Appendix if any should be the last section in the report.**