ADANA ALPARSLAN TÜRKEŞ
SCIENCE AND TECHNOLOGY UNIVERSITY

EEE110 - Computer Programming
Online Midterm Exam

Exam Start: 22th Apr 2021, 14:15
Exam End: 22th Apr 2021, 17:00

Full Name : _____ Student ID: _____

Grade Table (for Lecturer use only)

Question	Points	Score
1	5	
2	5	
3	10	
4	10	
5	30	
6	30	
7	10	
Total:	100	

Instructions for Online Midterm Exam

Welcome to the midterm exam of EEE110-Computer Programming and good luck!

- The midterm exam will be conducted between 14:15 and 17:00. The system will be closed at 17:00. Students must finalise the exam by saving before 17:00.
- The students are also responsible to have a fully-charged laptop computer and 3G internet connection against an interruption in the electricity or internet services. Please note that, allowed number of entries during the exam is determined as 3 due to the internet disconnections.
- This is a closed-book exam that means students are not allowed to take notes, books, or any other reference material into the exam. Students need to rely entirely on their memory to answer questions.
- The exam must be taken completely alone. Showing it or discussing it with anybody is forbidden, including (but not limited to) the other students in the course in current or previous years. Absolutely no communication is allowed between or among students.
- An incorrect answer to a question is awarded no marks with no consideration of any partial credit. Therefore, no partial credit will be given.
- Please sign the below Honour Code statement.

In recognition of and in the spirit of the above rules which constitute Adana Alparslan Türkeş Science and Technology University Honour Code, I certify that I will neither give nor receive unpermitted aid on this examination.

Signature: _____

1. **(5 points)** Which of the followings is **TRUE**? Select all that apply.

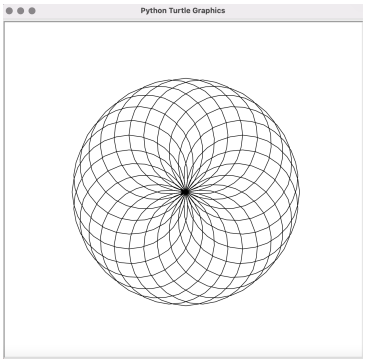
☐ An interpreter translates and executes instructions in a program written via using a low-level language such as Python
☐ Negative numbers are encoded by using 2's complement.
☐ All data in a computer is stored in sequences of 0s and 1s.
☐ ASCII defines codes for only 128 characters.
☐ CPU stands for Central Processing Unit.

2. **(5 points)** Which of the followings is **FALSE**? Select all that apply.

☐ CPU executes program in the fetch-decode-execute cycle.
☐ Main memory is also known as RAM which is an abbreviation used for Random Augmented Memory.
☐ A byte is composed of 8 bits.
☐ A bit is an electrical component that is similar to an on/off switch.
☐ Contents of RAM are not deleted when the computer is off, because it is nonvolatile.

3. **(10 points)** Develop a Python program that draws the design in the below link:

   - https://tinyurl.com/EEE110



   according to the following instructions:

   - The design shall be formed by using 24 number of circles.
   - The radius of each circle shall be equivalent to 100 px.

4. **(10 points)** Develop an algorithm in pseudocode to create a new Python 3 Notebook on the launcher of JupyterLab by using Anaconda Navigator and to develop a Python program in order to calculate and display the average of three test scores requested from the user.

5. **(30 points)** Electrical energy production from wind power is one of the fastest growing technologies and an economically viable option among renewable energy resources. Basically, E_{annual} which corresponds to the annual electrical energy (in Wh) generation from wind power is calculated as follows

$$E_{annual} = 8760 C_F P_{wind} c_p$$

where C_F, P_{wind}, and c_p stand for capacity factor, wind power (in W), and power coefficient respectively. Subsequently, P_{wind} can be yielded as

$$P_{wind} = \frac{1}{2}\rho\pi(\frac{D}{2})^2 v^3$$

where ρ is the density of air (in kg/m^3), D is the rotor diameter (in m), and v is the average wind speed (in m/s).

According to the aforementioned formulae, design a Python program that separately computes annual energy production of a wind turbine within two different auxiliary function named as *Onshore* and *Offshore* via calling them in the main function by considering the followings:

- Auxiliary functions shall be developed as return-type functions.
- The density of air ρ, the average wind speed v, and the power coefficient c_p shall be declared as *global constants* and sequentially equal to 1.2 kg/m^3, 10 m/s, and 0.48.
- User shall be initially informed in the main function to select and call either *Onshore* or *Offshore* auxiliary function wherein all computations shall be performed.
- The user shall enter D and C_F values in both *Onshore* and *Offshore* auxiliary functions.
- The conditions for the capacity factor C_F
  - For onshore wind turbines: $0.20 \leq C_F \leq 0.35$,
  - For offshore wind turbines: $0.35 \leq C_F \leq 0.50$,

  shall be validated against erroneous entries.

6. **(30 points)** Assume a hospital, which serves to a rural area in Iraq, is fed continuously by a group of diesel engine driven permanent magnet synchronous generators. The real electric output power of a synchronous generator can be expressed in line quantities as

$$P_{out} = \sqrt{3} V_L I_L \cos\theta$$

where V_L and I_L are the magnitudes of line voltage and current, while $\cos\theta$ stands for power factor.

Design a Python program by utilising from lists to define the number of generators n at first, then compute and display the average output power of n number of generators, the lowest output power, and the highest output power (in kW) respectively by taking into account the following considerations:

- The line voltage V_L shall be declared as a *global constant* and corresponds to 0.4 kV.
- n, I_L (in A), and θ (in °) values shall be entered by the user.
- The conditions for
  - $n \geq 1$,
  - $I_L > 0$,
  - $35° \leq \theta \leq 40°$

  shall be validated against erroneous entries.

7. **(10 points)** Adana Demirspor is a football club founded in 1940 by local railway workers in Adana and the club has been struggling to promote from Turkish 1st Football League to the Turkish Super League in recent years.

Assume that result of a football match is evaluated as three points for a win, one point for a draw, and no points for a defeat.

Design a Python program that allows user to enter the result (in points) of each match of Adana Demirspor. The results shall be saved to a file. Next, the program shall read the contents of the file, display the results (in points), and then show the total points that Adana Demirspor gets.