National University of computer and emerging sciences

Foundation for Advancement of Science and Technology

Programming Fundamentals (CS 1002)

SPRING 2022 ASSIGNMENT # 1

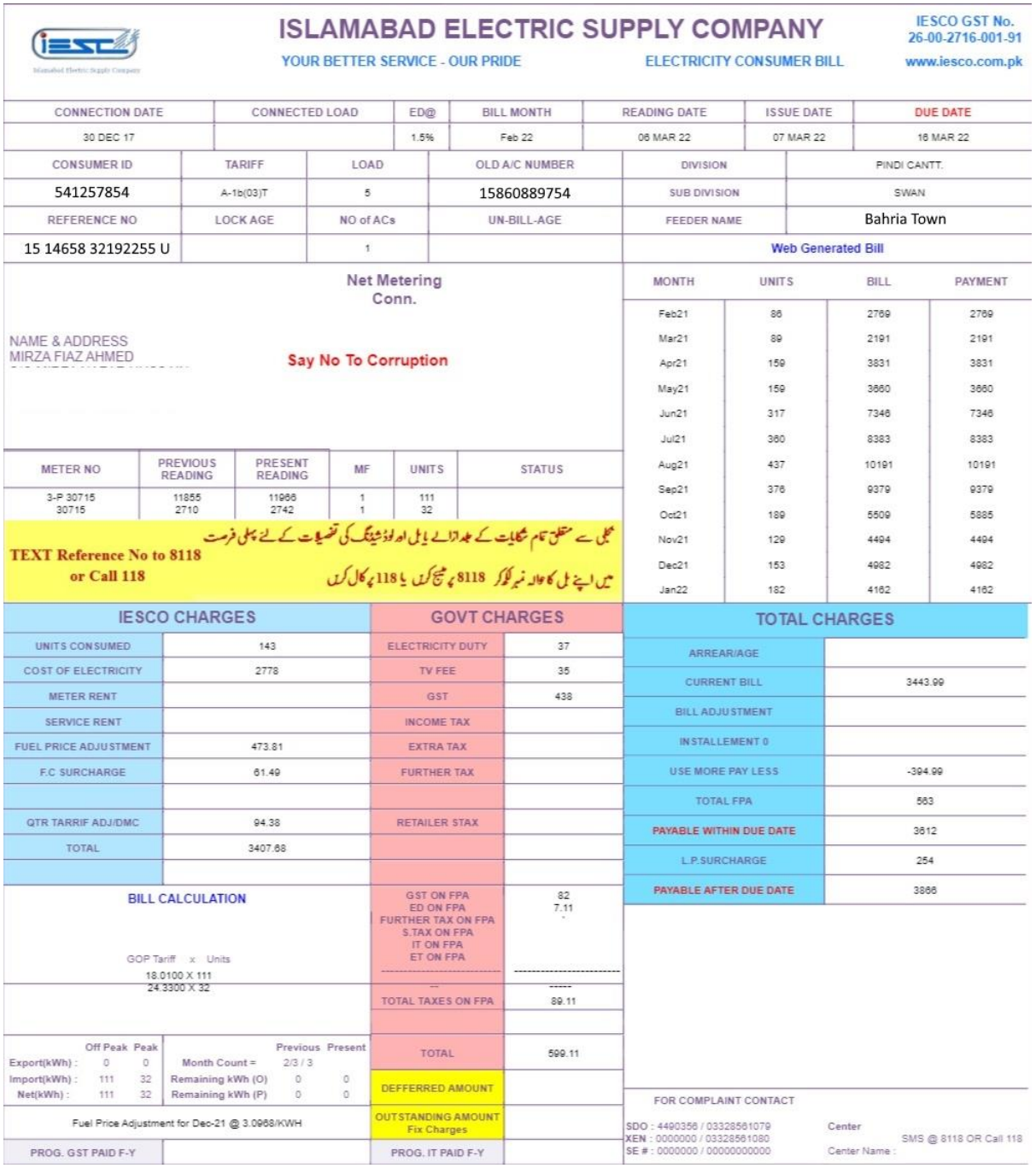
Due Date: Friday, March 18, 2022 (10:00 pm)

Instructions

1. Assignments are to be done individually. You must complete this assignment by yourself. You cannot work with anyone else in the class or with someone outside of the class. The code you write must be your own and you must understand each part of your code. You are encouraged to get help from the instructional staff through google classroom.
2. Use appropriate data types, operations, and conditional structures for each problem. You cannot use advanced topics not covered so far.
3. Your code must be **generic**.
4. The output should be properly displayed and well presented. One mark will be deducted in each question if appropriate comments and indentation not done in source code.
5. **Plagiarism:** Plagiarism of any kind (copying from others, copying from the internet, etc) is not allowed. If found plagiarized, you will be awarded zero marks in the assignment. Repeating such an act can lead to strict disciplinary actions and failure in the course.
6. **Submission Guidelines**: Dear students, we will be using auto-grading tools, so failure to submit according to the below format would result in zero marks in the relevant evaluation instrument.
    a. For each question in your assignment, if necessary, make a separate .cpp file e.g. for question 1, make ROLL-NUM_SECTION_q1.cpp, and so on. Each file that you submit must contain your name, student-id, and assignment # on the top of the file in the comments.
    b. Combine all your work in one folder. The folder must contain only .cpp files (no binaries, no exe files etc.,). If we unable to download your submission due to any reason you will be awarded zero mark.
    c. Run and test your program on a lab machine before submission. If there is a syntax error, zero marks will be awarded in that specific question.
    d. Rename the folder as ROLL-NUM_SECTION (e.g. 20i-0001_A) and compress the folder as a zip file. (e.g. 20i-0001_A.zip). Only zip file will be acceptable.
    e. Submit the .zip file on Google Classroom within the deadline.
    f. Submission other than Google classroom (e.g. email etc.) will not be accepted.
    g. The student is solely responsible to check the final zip files for issues like corrupt files, viruses in the file, mistakenly exe sent. If we cannot download the file from Google classroom due to any reason it will lead to zero marks in the assignment.
7. **Late submission:** 10% marks will be deducted for every hour of late submission, i.e. assignments submitted 10 hours late will get zero marks. 10% will be deducted with the start of hour so both submissions on 10:01 and 10:59 will get 10% deduction.

Problem 1: An egg distribution company uses different sizes of packings for eggs, that is, 30 eggs packing, 24 eggs packing, 18 eggs packing, 12 eggs packing and 6 eggs packing. Write a program which prompts user to enter total number of eggs (input validation is always must) to be packed and then calculate how many packings of each size will be possible. Also tell if there will be any eggs left to be packed. (10 marks)

Problem 2: (IESCO Bill) A copy of IESCO bill is given below. See all details in the bill carefully. Your task is to correctly understand each data type, inputs, outputs, fixed billing rates, taxes, etc. Write a C++ program to get user input (suppose meter reader) and calculate correct bill amount. Your output should be formatted as close as possible with the template of the bill. Use of manipulators for formatting also carries marks. (20 marks)



ISLAMABAD ELECTRIC SUPPLY COMPANY

IESCO GST No. 26-00-2716-001-91

YOUR BETTER SERVICE - OUR PRIDE — ELECTRICITY CONSUMER BILL — www.iesco.com.pk

CONNECTION DATE	CONNECTED LOAD	ED@	BILL MONTH	READING DATE	ISSUE DATE	DUE DATE
30 DEC 17		1.5%	Feb 22	06 MAR 22	07 MAR 22	16 MAR 22

CONSUMER ID	TARIFF	LOAD	OLD A/C NUMBER	DIVISION	PINDI CANTT.
541257854	A-1b(03)T	5	15860889754	SUB DIVISION	SWAN
REFERENCE NO	LOCK AGE	NO of ACs	UN-BILL-AGE	FEEDER NAME	Bahria Town
15 14658 32192255 U		1		Web Generated Bill	

Net Metering Conn.

NAME & ADDRESS
MIRZA FIAZ AHMED

Say No To Corruption

METER NO	PREVIOUS READING	PRESENT READING	MF	UNITS	STATUS
3-P 30715	11855	11966	1	111	
30715	2710	2742	1	32	

MONTH	UNITS	BILL	PAYMENT
Feb21	86	2769	2769
Mar21	89	2191	2191
Apr21	159	3831	3831
May21	159	3660	3660
Jun21	317	7346	7346
Jul21	360	8383	8383
Aug21	437	10191	10191
Sep21	376	9379	9379
Oct21	189	5509	5885
Nov21	129	4494	4494
Dec21	153	4982	4982
Jan22	182	4162	4162

بجلی سے متعلق تمام شکایات کے جلد ازالے یا بل اور لوڈشیڈنگ کی تفصیلات کے لئے پہلی فرصت
میں اپنے بل کا حوالہ نمبر لکھ کر 8118 پر میسج کریں یا 118 پر کال کریں

TEXT Reference No to 8118
or Call 118

IESCO CHARGES		GOVT CHARGES	
UNITS CONSUMED	143	ELECTRICITY DUTY	37
COST OF ELECTRICITY	2778	TV FEE	35
METER RENT		GST	438
SERVICE RENT		INCOME TAX	
FUEL PRICE ADJUSTMENT	473.81	EXTRA TAX	
F.C SURCHARGE	61.49	FURTHER TAX	
QTR TARRIF ADJ/DMC	94.38	RETAILER STAX	
TOTAL	3407.68		

TOTAL CHARGES	
ARREAR/AGE	
CURRENT BILL	3443.99
BILL ADJUSTMENT	
INSTALLEMENT 0	
USE MORE PAY LESS	-394.99
TOTAL FPA	563
PAYABLE WITHIN DUE DATE	3612
L.P.SURCHARGE	254
PAYABLE AFTER DUE DATE	3866

BILL CALCULATION

GOP Tariff x Units
18.0100 X 111
24.3300 X 32

GST ON FPA	82
ED ON FPA	7.11
FURTHER TAX ON FPA	
S.TAX ON FPA	
IT ON FPA	
ET ON FPA	
TOTAL TAXES ON FPA	89.11
TOTAL	599.11
DEFFERRED AMOUNT	
OUTSTANDING AMOUNT Fix Charges	
PROG. IT PAID F-Y	

	Off Peak	Peak
Export(kWh) :	0	0
Import(kWh) :	111	32
Net(kWh) :	111	32

	Previous	Present
Month Count =	2/3 / 3	
Remaining kWh (O)	0	0
Remaining kWh (P)	0	0

Fuel Price Adjustment for Dec-21 @ 3.0968/KWH

PROG. GST PAID F-Y

FOR COMPLAINT CONTACT

SDO : 4490356 / 03328561079
XEN : 0000000 / 03328561080
SE # : 0000000 / 00000000000

Center
SMS @ 8118 OR Call 118
Center Name :

Problem 3: Memory constrained embedded systems, IoT devices cannot have liberty to use lots of memory. You are tasked to store the result of a NUCES-FAST student in one single variable. This can be done using all bits of that variable in an efficient way. Write a program which prompts user to enter the following student data and convert all this information to store in a single variable (see sample run). Use bitwise AND, OR and SHIFT operators. Also use if-else where needed. (20 marks)

Data to Store	
Registration number	21I-1724 (year 2021, Islamabad Campus, Registration#)
Calculus	85
PF	92
English	78
Physics	69
CGPA	3.22

Bit Code	**Data**	**Example**	**Value for above data**
0-5 (6 bits)	Registration Year	a 2 digits value (21 instead of 2021)	010101 (21)
6-8 (3 bits)	Campus	I for Islamabad (001) P for Peshawar (010) L for Lahore (011) F for Faisalabad (100) K for Karachi (101)	001 (I)
9-22 (14 bits)	Registration number	a four digit value	00011010111100 (1724)
23-29 (7 bits)	Calculus Marks	3-digit value	1010101 (85)
30-36 (7 bits)	PF marks	3-digit value	1011100 (92)
37-43 (7 bits)	English marks	3-digit value	1001110 (78)
44-50 (7 bits)	Physics marks	3-digit value	1000101 (69)
51-52 (2 bits)	CGPA – integer part	1-digit value	11 (3)
53-59 (7 bits)	CGPA – fractional part	2-digit value	0010110 (22)
60-63 (4 bits)	Not used (reserved)		0000
Binary number stored		00000010110111000101100111010111001010101000110101111000010101	
Decimal Equivalent		206138463618955349	

Sample run of the program:

```
Enter Registration Year: 2021
Enter Campus: Islamabad
Enter Registration Number: 1724
Enter Calculus Marks = 85
Enter PF Marks       = 92
Enter English Marks  = 78
Enter Physics Marks  = 69
Enter CGPA           = 3.22

All data is stored in a record variable whose value is 206138463618955349
```

Problem 4: A New Telephone Company has the following rate structure for long distance calls:

- The regular rate for a call is $0.10 per minute. (10 marks)
- Any call started at or after 6:00P.M. (1800 hours) but before 8:00A.M. (0800 hours) is discounted 50 percent.
- Any call longer than 60 minutes receives a 15 percent discount on its cost (after any other discount is subtracted).
- All calls are subject to a 4 percent federal tax on their final cost.

Write a program that reads the start time for a call based on a 24-hour clock and the length of the call. The gross cost (before any discounts or tax) should be printed, followed by the net cost (after discounts are deducted and tax is added). Print instructions to the user and compute the net cost.

Problem 5: Write a program which takes a number n as input and prints YAYY if the sum of all digits except the rightmost digit is equal to the rightmost digit., otherwise print OOPS. (10 marks)

For example: If user enters 2237, it will print YAYY because 2+2+3 is equal to 7.
Whereas, if user enters 3425, it will print OOPS because 3+4+2 is not equal to 5.

Problem 6: Write a program which takes a 9-digit number input from user, converts it into its reverse and then display one of the following statements: (10 marks)

- Original number is x steps bigger (where x is the difference between the two)
- Reversed number is x steps bigger
- Both numbers are equal; hence it is a palindrome.

```
Enter a 9-digit number : 367548912
Reverse number: 219845763
Original number is 147,703,149 steps bigger

Enter a 9-digit number : 367548
It is not a 9-digit number. Please enter correct number.

Enter a 9-digit number : 259757952
Reverse number: 259757952
Both numbers are equal; hence it is a palindrome
```

Problem 7: Write a program that will ask user to enter a digit character (i.e. '0' or '1' .... or '9'). If user enters a non-digit character then the program should display message to re-enter correct input. If user enters a correct character (i.e. a digit character) then your program should convert that character to a same digit but in integer type. Do this for five inputs. Finally, add all digits and display their sum. Do not use any library function or loops. (10 marks)

```
Enter a digit-character: 8 (please note that this is to be stored in char variable)
Enter a digit-character: 6
Enter a digit-character: 0
Enter a digit-character: +
Wrong character. Please enter again.
Enter a digit-character: 2
Enter a digit-character: 7
Sum of digits is 23.
```

Problem 8: Write a program that takes five integer numbers (range 0 to 10). And display horizontal bar chart. Do not use loops. You can use <iomanip> header file for printing bar chat. (10 marks)

```
Input Five integer numbers:
N1=1
N2=5
N3=9
N4=0
N5=2
```

```
Number01:*
Number02:*****
Number03:*********
Number04:
Number05:**
```