Assignment Set 3 (Functional Programming with Haskell)

- **Assignment will be evaluated by the TAs.**
- **You should submit report (for answering non-code related questions), complete source codes and executable files.**
- **All codes must be properly documented and good code writing practice should be followed (carry marks).**
- **Copying is strictly prohibited. Any case of copying will automatically result in F for the whole course, irrespective of your performance in the other parts of the lab.**

- **Submission deadline: 30th November, 2017**

- **Total weight = 20%**
- **Marks distribution: 10, 30, 60**

Assignment – 1: Implement Haskell Functions for Basic Set Operations (10 Marks).

Implement the Haskell functions for the following operation on set.

A) Check whether a set is empty (NULL SET),
B) Union of two sets,
C) Intersection of two sets,
D) Subtraction one set from another set and
E) Addition of two sets.

In each of the cases check the possibility of the particular operation.

Assignment – 2: Billing System for Fast Food Stall (30 Marks).

Assume that there are 10 items in a temporary fast food stall at IITG for the duration of four days of ALCHERINGA 2018. Each of the items has a unique code, name and price. Write a Haskell code for the generating bill for customers of the stall. There should also be a provision for checking the availability of any item for any particular moment. Based on the choice of item(s), a bill will be generated for any customer. The input will be the unique 4-digit code and quantity for an item. The output will be the bill containing the serial number, item-code, item-name, rate, quantity and price of each item as well as total amount (also in words) for the item(s) chosen. For example (inputs are in blue color):

Enter code: 4719 Enter Quantity: 2 (Fish Fingers) AVAILABLE More Items? (Y/N): Y

Enter code: 1234 Enter Quantity: 1 (Chicken Lollypop) AVAILABLE More Items? (Y/N): Y

Enter code: 99999 **WRONG CODE, NO ITEM FOUND** More Items? (Y/N): Y

Enter code: 2222 Enter Quantity: 120 (Chili Mushroom) NOT AVAILABLE More Items? (Y/N): Y

Enter code: 1111 Enter Quantity: 2 (Paneer Pakora) AVAILABLE More Items? (Y/N): N

ALCHERINGA 2018, STALL 14: TANGO FAST FOOD CENTER

1.	4719	Fish Fingers	121.00	2	242.00
2.	1234	Chicken Lollypop	250.00	1	250.00
3.	1111	Paneer Pakora	170.00	2	340.00

Total ********** Rs. 832.00

RUPEES EHIGHT HUNDRED AND THIRTY TWO

THANK YOU ** HAVE A NICE DAY ** PLEASE VISIT OUR STALL AGAIN

Assignment – 3: Generating Cipher text from Plaintext and Vice Versa (60 Marks).

3. A: Generating Cipher text from plain text (25 Marks)

Assume that the process to generate a particular cipher text from any plaintext follows the following set of rules:

(i) It takes two input strings: the plaintext and the key to generate the cipher text

(ii) First character of the plaintext rotates by the amount specified in the first character of the given key, the second character rotates by the amount specified in the second character in the key and so on. This is done by adding up the ASCII values of the two character.

(iii) If the resulting character is beyond the range of the English alphabet, wrap around by subtracting 26.

(iv) When the key run outs its characters, it again starts with its first character and continue the same procedure.

(v) If the plaintext contains any uppercase letter, do not change that, only encode the lower case letter.

(vi) If your plaintext contains a number, encode each digit by putting a special symbol in place of the digit (0=*, 1=`, 2=~, 3=!, 4=@, 5=#, 6=$, 7=%, 8=^, 9=&).

Example: Plaintext = Hello90, key = iitg

H(cap)	e (101)	l (108)	l (108)	o (111)	9 (digit)	0 (digit)
no change	i (105)	i (105)	t (115)	g (103)	put &	put *

H	206	213	223	214	&	*

[wrap until less than or equal to 122 (z)]

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H	f (102)	m (109)	w (119)	n (110)	&	*

So the cipher text for plaintext **Hello90** with key **iitg** = **Hfmwn&***.

Hint:

```
import Data.Char
  chr n        -- returns the character of an ASCII value
  ord c        -- returns the ASCII value of a character
```

3. B: Generating Plaintext from Cipher text (20 Marks)

In this part, the input is cipher text and the key; output is plaintext.

For instance, in case of the example in part A, the plaintext for the cipher text **Hfmwn&*** with key **iitg** = **Hello90**.

Hint:
Symmetric key cryptography.

3. C: Report the algorithm for encryption and deception you followed. Describe the algorithms with a suitable example (15).