Sir Syed University of Engineering & Technology
Faculty of Basic & Applied Sciences
Department of <u>Computer Science.</u>

End Semester Examinations (Spring 2020)

Course Title with Code	CS-310: Compiler Construction		Program	BS(CS)
Instructor	**Ayesha Urooj , Mehwish Wahid**		**Semester**	5th
Start date & Time	June 25, 2020 at 11:30 AM	**Submission Deadline**	June 25, 2020 at 05:30PM	
Maximum Marks	50			

<u>IMPORTANT INSTRUCTIONS</u>:

Read the following Instructions carefully:

- Attempt All Questions on MS-Word. Font theme and size must be Times New Roman and 12 points respectively. Use line spacing 1.5. *<u>Convert file to **PDF** format before submitting</u>*.

- You may provide answers HANDWRITTEN. *<u>The scanned solution must be submitted in **PDF** format</u>* (Use any suitable Mobile Application for Scanning).

- For Diagrams, you can use paper and share a clear visible snapshot in the same Answer Sheet.

- Arrange questions and their subsequent parts in sequence.

- Make sure that your answers are not plagiarized or copied from any other sources. In case of plagiarism, **ZERO** marks will be awarded.

- Provide relevant, original and conceptual answers, as this exam aims to test your ability to examine, explain, modify or develop concepts discussed during the course.

- Recheck your answer before the submission on **VLE** to correct any content or language related errors.

- You must upload your answers via the **VLE platform ONLY**.

<u>You must follow general guideline for students before online examination and during online examination which had already been shared by email and WhatsApp.</u>

This paper has a total of _03_ pages including this title page

Sir Syed University of Engineering & Technology
Faculty of Basic & Applied Sciences
Department of <u>Computer Science.</u>

Question 1   [10 marks]

Construct a Context Free Grammar which can generates a program written in your own language, your program should start with the keyword which shows the beginning of code and ends with the keyword of your own choice. It takes your **Roll number** like if your roll number is 66 it means it first stores 6 in integer type variable and then again stores 6 in another variable of integer type, passing these values as an argument to the function where it is sum up all the digits of your roll# and then multiply with the last 3 digits of your NIC#, complete expression is computed in this function and then the final value should be return to the main body. If the value of the expression exceeds from the range of integer then the message will be displayed on the screen that "OUT OF SCOPE VARIABLE" else it will display the value which is generated from the function.
Eliminate left recursion and perform left factoring from the above generated grammar and parse the above given program scenario by making the parse tree.

Question 2(a)   [10 marks]

Design the **NON RECURSIVE PREDICTIVE PARSER** for the conditional statement grammar that you have define in Question#1.With respect to the same grammar, discuss why left recursion and left factoring is used before the implementation of said parser. Suggest if grammar has both, left recursion and left factoring, which should be resolved first? Justify your answer.

Question 3 (a)   [05 marks]

When you are implementing the SLR parser the first step is to change your existing non-terminal into another start symbol why do you require this additional step and if you are not changing it then what happens? Give the proper reason for the above mentioned act?

Question 3(b)   [5 marks]

While mapping the conditions for the Shift and Reduce actions in SLR table, if both the conditions occur at the same state number then what action should you take first and Why?

Sir Syed University of Engineering & Technology
Faculty of Basic & Applied Sciences
Department of <u>Computer Science.</u>

Question 4(a)   [5 marks]

Construct a dependency graph for the grammar of multiple declaration type generated in Q#1.Use proper attributes at each node.

Question 4(b)   [5 marks]

Are the following statements correct? If not then correct it and give proper reasoning.

    I.   An array of pointer to integer, where the array index ranges from 0 to your roll number, if your roll number is under 10 then you have to add the last two digits of your NIC# in your roll number and set as the last index of an array .
               Array (0------roll# Pointer (real))

    II.   Functions whose domain are functions from integers to pointers to integers and whose ranges are records consisting of an integer and a character
               [int →(int)→[int x string]]

Question 5   [10 marks]

Write the complete translation scheme of the below mentioned grammar, by taking your complete **Roll number** as an input string **(e.g. 2001-CS-066)** .What do you suggest that this translation scheme should compute from Left to Right or from bottom to up. Specify the attributes at each node with proper justification.

Grammar:
    R_N →year dash tech dash roll#
    year → **2000|2001………|2020**
    tech →**BS | IT**
    dash → -
    roll#→ digits
    digits→ digit digits| €
    digit → **0|1|2|……|9**