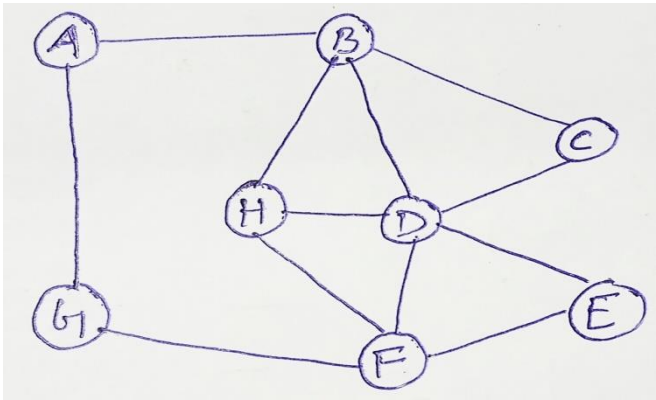
	<b>ITER, SIKSHA 'O' ANUSANDHAN (Deemed to be University)</b>		<b>Assignment</b>
<b>Branch</b>	<b>CSE/CSIT</b>	<b>Programme</b>	<b>B.Tech</b>
<b>Course Name</b>	<b>Introduction to the Theory of Computation</b>	<b>Semester</b>	<b>5<sup>th</sup></b>
<b>Course Code</b>	<b>CSE3731</b>	<b>Academic Year</b>	<b>2023-24</b>
<b>ASSIGNMENT - II</b>			
<b>Submission due date: 05/01/2024</b>			
<b>Learning Level (LL)</b>	<b>L1: Remembering</b>	<b>L3: Applying</b>	<b>L5: Evaluating</b>
	<b>L2: Understanding</b>	<b>L4: Analysing</b>	<b>L6: Creating</b>
<b>Q's</b>	<b>Questions</b>		<b>COs</b>
<b>1</b>	i) Define Pumping Lemma for Regular language and Context-free language.  ii) Using pumping lemma prove that the language $L = \{ a^n \mid n \text{ is a prime} \}$ is not a Context-free language.		<b>CO3</b>
<b>2</b>	i) Design a PDA that recognizes the Language $L = \{ a^i b^j c^k \mid i, j, k \geq 0 \text{ and } i=j \text{ or } i=k \}$  ii) Construct the PDA that recognizes the Language $L = \{ ww^R \mid w \in \{0,1\}^* \}$		<b>CO3</b>
<b>3</b>	i) Construct a Turing Machine that recognizes the language $L = \{ n^{2^n} \mid n \geq 0 \}$  ii) Construct a TM that decides the language $L = \{ w\#w \mid w \in \{0,1\}^* \}$		<b>CO4</b>
<b>4</b>	i) What do you mean by decidable and un-decidable problems? Give some examples.  ii) Show that halting problem of a Turing Machine is un-decidable.		<b>CO5, CO6</b>
<b>5</b>	i) What is a P, NP, NP-Complete and NP-Hard problem? Explain the relationship of these concepts with the help of a Venn-diagram and give some examples for each problem.  ii) Define reducibility. Find the vertex cover for the given graph by reducing it to an independent set. <div>  </div>		<b>CO5, CO6</b>

Course Outcomes	By the end of the course, through lectures, readings, home works, assignments, and exams, students will be able to:	
	CO1	Enhance/develop ability to understand and conduct mathematical proofs for computation and algorithms.
	CO2	Design and analyze finite automata and regular expression for describing regular languages.
	CO3	Design and analyze pushdown automata, and context-free grammars.
	CO4	Design and analyze Turing machines.
	CO5	Enhance the ability to understand the decidability, undecidability, and reducibility criteria of various computational problems.
	CO6	Demonstrate the understanding of key notions, such as algorithm, computability and complexity through problem solving.

- ✓ *Assignment scores/markings depend on neatness and clarity.*
- ✓ *Plagiarized assignments will be given a zero mark.*
- ✓ *Submit the hard binding copy of your assignment by the due date, i.e. 05.01.2024*
- ✓ *Submit the assignment handwritten on A4 size papers and spirally bound to your ITC class teacher. A front page must be present containing the details of the subject, the assignment and the student. Furthermore, on the top of each program, you must mention your full name, registration number, title of the program and date.*