BRAC UNIVERSITY
Department of Computer Science and Engineering

Examination: Midterm | Semester: Fall 2023
Duration: 1 hour | Full Marks: 25

CSE 420: Compiler Design

Figures in the right margin indicate marks.

Answer all the questions

COs	Questions	Marks
CO2	1. Consider the following grammar and look at the SLR(1) parse table below:	10

1. $E \rightarrow E + T$
2. $E \rightarrow T$
3. $T \rightarrow T * F$
4. $T \rightarrow F$
5. $F \rightarrow (E)$
6. $F \rightarrow id$

STATE	ACTION						GOTO		
	id	+	*	(	)	$	E	T	F
0	s5			s4			1	2	3
1		s6				acc			
2		r2	s7		r2	r2			
3		r4	r4		r4	r4			
4	s5			s4			8	2	3
5		r6	r6		r6	r6			
6	s5			s4				9	3
7	s5			s4					10
8		s6			s11				
9		r1	s7		r1	r1			
10		r3	r3		r3	r3			
11		r5	r5		r5	r5			

Show the parsing simulation using **stack** for the input string, ***(id+id)*(id*id)***

CO2	2. Consider the following information of an *SLR Grammar*. Draw **LR(0) automaton** from this information, then fill up the missing entries of the incomplete **SLR parse table** below	15

Item Sets:	**Goto:**
I0 = {S -> .A X, A -> .a A, A -> .} **I1 = {S -> A.X, X -> .b X, X -> .c X, X -> .Y Z, Y -> .d Y, Y -> .}** **I2 = {A -> a.A, A -> .a A, A -> .}** **I3 = {S -> A X.}** **I4 = {X -> b.X, X -> .b X, X -> .c X, X -> .Y Z, Y -> .d Y, Y -> .}** **I5 = {X -> c.X, X -> .b X, X -> .c X, X -> .Y Z, Y -> .d Y, Y -> .}** **I6 = {X -> Y.Z, Z -> .e Z, Z -> .f Z, Z -> .}** **I7 = {Y -> d.Y, Y -> .d Y, Y -> .}** **I8 = {A -> a A.}** **I9 = {X -> b X.}** **I10 = {X -> c X.}** **I11 = {X -> Y Z.}** **I12 = {Z -> e.Z, Z -> .e Z, Z -> .f Z, Z -> .}** **I13 = {Z -> f.Z, Z -> .e Z, Z -> .f Z, Z -> .}** **I14 = {Y -> d Y.}** **I15 = {Z -> e Z.}** **I16 = {Z -> f Z.}**	**Goto(I0, A) -> I1** **Goto(I0, a) -> I2** **Goto(I1, X) -> I3** **Goto(I1, b) -> I4** **Goto(I1, c) -> I5** **Goto(I1, Y) -> I6** **Goto(I1, d) -> I7** **Goto(I2, A) -> I8** **Goto(I2, a) -> I2** **Goto(I4, X) -> I9** **Goto(I4, b) -> I4** **Goto(I4, c) -> I5** **Goto(I4, Y) -> I6** **Goto(I4, d) -> I7** **Goto(I5, X) -> I10** **Goto(I5, b) -> I4** **Goto(I5, c) -> I5** **Goto(I5, Y) -> I6** **Goto(I5, d) -> I7** **Goto(I6, Z) -> I11** **Goto(I6, e) -> I12** **Goto(I6, f) -> I13** **Goto(I7, Y) -> I14** **Goto(I7, d) -> I7** **Goto(I12, Z) -> I15** **Goto(I12, e) -> I12** **Goto(I12, f) -> I13** **Goto(I13, Z) -> I16** **Goto(I13, e) -> I12** **Goto(I13, f) -> I13**

SLR Parsing Table												
STATE	ACTION							GOTO				
	a	b	c	d	e	f	$	S	A	X	Y	Z
		r_2	r_2	r_2	r_2	r_2	r_2					
					r_7	r_7	r_7					
		r_2	r_2	r_2	r_2	r_2	r_2					
							acc					
					r_7	r_7	r_7					
					r_7	r_7	r_7					
							r_{10}					
					r_7	r_7	r_7					
		r_1	r_1	r_1	r_1	r_1	r_1					
							r_3					
							r_4					
							r_5					
							r_{10}					
							r_{10}					
					r_6	r_6	r_6					
							r_8					
							r_9					