PG DEPARTMENT OF COMPUTER SCIENCE				*CLASS: I M.Sc.* Computer Science				
Sem	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
II	Elective - 2	21P2DME2(D)	Compiler Design	4	5	25	75	100

Nature of Course				
Knowledge and skill	✓		Employability oriented	
Skill oriented			Entrepreneurship oriented	

Course Objectives

1. To familiarize the structure of compilers and the role of lexical analysis.
2. To construct the various parsers using parsing methods.
3. To learn various translation Techniques.
4. To understand the concepts of symbol table and various error detection and recovery methods.
5. To implement various optimization techniques and generate object code

Unit	Content	Hrs	K-Level	CLO
I	**Introduction to compilers**: Compilers and Translators – Structure of a Compiler – Lexical Analysis – Syntax Analysis – Intermediate code generation – Optimization – Code generation – Book keeping – Error handling – Compiler Writing tools – Lexical Analysis: The role of the Lexical analysis – A simple approach to the design of lexical analyzers – Regular expressions – Implementation of a lexical analyzer.	15	Up to K3	1
II	**Basic Parsing techniques:** Derivations and parse trees – Parsers – shift reduce parsing – Operator Precedence Parsing – Top-down parsing – Predictive parsing – Automatic construction of efficient parsers: LR parsers – The Canonical collection of LR (0) items – Constructing SLR parsing tables – Constructing canonical LR parsing tables – Constructing LALR parsing tables – Using ambiguous grammars.	15	Up to K4	2
III	**Syntax- Directed translation:** Syntax-directed translation schemes – Implementation of syntax-directed translators – Intermediate code – Postfix notation – Three address code, quadruples, and triples- Postfix translations.	15	Up to K3	3
IV	**Symbol tables:** The contents of a symbol table – Data structures for symbol tables – Representing scope information – Error detection and recovery: Errors – Lexical-Phase errors – Syntactic –phase errors – Semantic errors.	15	Up to K2	4
V	**Introduction to Code optimization:** The principal sources of optimization – Loop optimization – The DAG representation of basic blocks – Code generation: Object programs – Problems in code generation – A simple code generator – Peephole optimization.	15	Up to K4	5

Book for Study

1. "Principles of Compiler Design" by Alferd V.Aho and Jeffrey Ullman, Narosa Publishing House, 2002.

Chapters

Unit I: 1.1, 1.3, 1.4, 1.5 to 1.11, 3.1, 3.2, 3.3, 3.8,
Unit II: 4.2, 5, 6.1 to 6.6,
Unit-III: 7.1 to 7.4, 7.6, 7.10,
Unit-IV: 9.1 to 9.3, 11.1 to 11.4
Unit-V: 12.1 to 12.3, 15.1, 15.2, 15.4, 15.7.

Books for Reference

1. "Compilers" by Alferd V. Aho, Ravi Sethi, Jeffery D.Ullman, Narosa Publishing House, 2002.
2. "Compilers Writing" by Jean-Paul Tremblay and Paul G. Soreson, McGraw Hill International Editions, 2000.
3. Compiler Construction Principles and Practice by Kennath C. Louden, Vikas publishing House, 2004.

Web Resources

1. https://www.tutorialspoint.com/compiler_design/index.htm
2. https://www.javapoint.com/compiler-tutorial
3. http://www.geeksforgeeks.org/introduction-of-compiler-design/

Rationale for Nature of the course

- Helps to write portable programs efficiently and build compilers which translate high level programming languages.

Activities on Knowledge and Skill

- Group Discussion
- Quiz
- Seminar

Pedagogy

Chalk and Talk, PPT, Materials, Assignments, Seminar, Problem Solving, Group Discussion, and Interaction.

Course Designer(s) Name

1. Mrs. K. Vairameenakshi
2. Mrs. S. Rajalakshmi

Lesson Plan

Unit	Topics to be covered	Hours	Mode
I	Compilers and Translators	3	Lecture, GD
	Structure of Compilers and its different phases	5	Lecture, PPT
	Lexical Analysis	7	Lecture
II	Parsing techniques	7	Lecture
	LR Parsers	8	Lecture,quiz
III	Syntax – Directed Translation Scheme	5	Lecture
	Implementation of Syntax – Directed Translation	5	Lecture,
	Three address code, Quadruples, triples	5	Lecture, Seminar
IV	Symbol Tables	5	Lecture, PPT
	Data Structure for Symbol tables	5	Lecture
	Lexical Phase Error, Syntactic Phase Error, Semantic Error	5	Lecture
V	Loop optimization, The DAG representation	7	Lecture, Lecture, Assignment
	Simple code generator, Peephole optimization.	8	

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLOs	COURSE LEARNING OUTCOMES	K - Levels
CLO 1	Understand the structure of compilers, Application of Lexical Analyzers.	Up to K3
CLO 2	Evaluate various Parsing methods.	Up to K4
CLO 3	Compute and Translate various intermediate codes	Up to K3
CLO 4	Construct symbol tables and detect errors	Up to K2
CLO 5	Recommend Code Generation Technique to convert Source Code into Object Code.	Up to K4

Mapping of CLOs with POs

CLOs / POs	PO1	PO2	PO3	PO4	PO5	PO6
CLO 1	2	2	2	2	3	-
CLO 2	2	3	2	2	3	-
CLO 3	2	1	2	2	3	-
CLO 4	2	1	2	2	3	-
CLO 5	2	3	3	2	3	2

(3 –Advanced Application, 2 – Intermediate Level, 1- Basic Level)

Continuous Internal Assessment (CIA): 25 Marks

Components	Marks	K Level
Test (Average of two tests) (Conducted for 40 marks and converted into 10 marks)	10	(Refer Next Table)
Assignment	5	K4
Seminar	5	K4
Quiz	5	K4
Total	25	

Learning Outcome Based Education & Assessment (LOBE)

Formative - Blue Print – Model for Compiler Design
Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

Internal	CLOs	K- Level	Section A		Section B (Either/or Choice)	Section C (Open Choice)
			Short Answers			
			No. of Questions	K- Level		
CIA I	CLO 1	Up to K3	2	K1	2(K3&K3)	2(K3)
	CLO 2	Up to K4	3	K2	2(K4&K4)	1(K3)
CIA II	CLO 3	Up to K3	2	K1	2(K2&K2)	2(K3)
	CLO 4	Up to K2	3	K2	2(K1&K1)	1(K2)
Question Pattern (CIA I & II)	No. of Questions to be asked		5		4	3
	No. of Questions to be answered		5		2	2
	Marks for each question		2		5	10
	Total Marks for each section		**10**		**10**	**20**

- *CLO5 will be allotted for individual Assignment which carries five marks as part of CIA component.*

Distribution of Section-wise Marks with K Levels *

K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	**Total Marks**	% of Marks without choice	Consolidated %
K1	4	-	-	**4**	6.67	**17**
K2	6	-	-	**6**	10	
K3	-	10	30	**40**	66.67	**66**
K4	-	10	-	**10**	16.67	**17**
Total Marks	**10**	**20**	**30**	**60**	**100**	**100**
K Levels	Section A (No Choice)	Section B (Either/or)	Section C (Open Choice)	**Total Marks**	% of Marks without choice	Consolidated
K1	4	10	-	**14**	23.33	**67**
K2	6	10	10	**26**	43.33	
K3	-	-	20	**20**	33.33	**33**
K4	-	-	-	**-**	-	**-**
Total Marks	**10**	**20**	**30**	**60**	**100**	**100**

Learning Outcome Based Education & Assessment (LOBE)
Summative - Blue Print – Model for Compiler Design
Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

UNITS	**CLOs**	**K- Level**	**Section A**		**Section B**		**Section C (Either/or Choice)**	**Section D (Open Choice)**
			MCQs		**Short Answers**			
			No of Questions	**K - Level**	**No of Questions**	**K - Level**		
1	CLO 1	Up to K3	2	K2 & K3	1	K1	2(K3&K3)	1(K3)
2	CLO 2	Up to K4	2	K3 & K4	1	K2	2(K4&K4)	1(K4)
3	CLO 3	Up to K3	2	K2 & K3	1	K1	2(K2&K2)	1(K3)
4	CLO 4	Up to K2	2	K1 &K1	1	K2	2(K1&K1)	1(K2)
5	CLO 5	Up to K4	2	K3 & K4	1	K3	2(K4&K4)	1(K4)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30

- K1 – Remembering and recalling facts with specific answers
- K2 – Basic understanding of facts and stating main ideas with general answers
- K3 – Application oriented – Solving Problems
- K4 – Examining, analyzing, presentation and make inferences with evidences

Distribution of Section – wise Marks with K Levels

K Levels	**Section A (No Choice)**	**Section B (No choice)**	**Section C (Either/or)**	**Section D (Open choice)**	**Total Marks**	**% of Marks without choice**	**Consolidated**
K1	2	4	10	-	**16**	13.33	**13%**
K2	2	4	10	10	**26**	21.67	**22%**
K3	4	2	10	20	**36**	30.00	**30%**
K4	2	-	20	20	**42**	35.00	**35%**
Total Marks	10	10	50	50	**120**	100	**100%**