School of Technology, Pandit Deendayal Energy University, Gandhinagar

Course File (A to Z Essentials)

Name of the Course:	System Software & Compiler Design
Course Code:	20CP302P
Program:	B.Tech
Department:	Computer Science and Engineering
Semester:	V
Academic Year:	Odd (2023-2024)
Name of Course Coordinator:	Dr. Shivangi Surati
Names of the Other Faculty Members:	Dr. Shivangi Surati, Dr. Rajiv Gupta, Dr. Meera Khanna

A.	Course Syllabus, Pre requisites for the Course
B.	Teaching Schemes
C.	Course Outcomes (COs)
D.	Mapping of Course Outcomes with Programme Outcomes (PO)
E.	Academic Calendar and Class Time Table
F.	Lesson Plan
G.	Evaluation Scheme and Rubrics
H.	List of Books and Reference books
I.	Class Notes, Handouts, Presentations etc.
J.	Tutorials, Assignments, Case Studies, Quiz, etc.
K.	ICT - Course related Web-links, Software, E-books, Relevant NPTEL and MOOC, Video Lectures, Blogs, Virtual Lab, Animation, Simulation, etc.
L.	Laboratory Manuals (if applicable)
M.	List of International / National Journals related to the Course (if applicable)
N.	List of Classic Journal Papers / Articles / Review Papers related to the Course
O.	List of world leading Industries / Organizations / working on the course related areas
P.	List of world leading Scientists / Academicians working on the course related areas
Q.	Copies of the Mid and End Semester Examination Question Papers (Past)
R.	Attendance Record
S.	Records of the Continuous Assessment (Assignment, Quiz, Laboratory Work, etc.)
T.	Details of Remedial Classes (with evidences)
U.	Details of Expert Lectures / Industrial Visits/Events (Only related to the course)
V.	List and Slow and Advanced Learners, activity planned and executed
W.	Direct Assessment (Result of mid, end and internal assessment components)
X.	Indirect Assessment (Exit Survey/Post Test)
Y.	Final Attainment of COs and POs and Interpretation
Z.	Actions to be taken if COs and POs are not achieved

Date:

Signature of Subject Teachers **Signature of Department Coordinator (IQAC)** **Signature of Head of the Department**

A. Teaching Scheme

20CP302T					System Software & Compiler Design					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	-	-	-	50	50	100

COURSE OBJECTIVES:

- Define and learn system Software such as Assemblers, Loaders, Linkers, macro-preprocessors.
- Familiarize with source file, object file and executable file structures and libraries.
- Describe the front-end and back-end phases of compiler and their importance to students.
- Learn Lexical Analysis, Syntax Analysis and Semantic Analysis.
- Learn to generate Intermediate Code and code optimization.

B. Course Outcomes (COs)

On completion of the course, student will be able to
CO1- Identify token in the given input string using any programming language.
CO2- Apply different parsing algorithms to check whether the given string is valid or not.
CO3- Calculate the value of a mathematical expression using parsing algorithms.
CO4- Analyze pass1 and pass2 assembler algorithms.
CO5- Apply optimization techniques related to target code generation.
CO6- Design demo compiler.

C. Mapping of Course Outcomes with Programme Outcomes (PO)

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3
CO1	3	3	3	1	2	1	-	2	2	1	1	3	3	3	3
CO2	3	3	3	1	2	1	-	2	2	1	1	3	3	3	3
CO3	3	3	3	1	2	1	-	2	2	1	1	3	3	3	3
CO4	3	3	3	1	2	1	-	2	2	1	1	3	3	3	3
CO5	3	3	3	1	2	1	-	2	2	1	1	3	3	3	3
CO6	3	3	3	2	3	1	-	3	2	2	3	3	3	3	3

Program Articulation Matrix

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3
3	3.00	3.00	3.00	1.17	2.17	1.00	0.00	2.17	2.00	1.17	1.33	3.00	3.00	3.00

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

D. Academic Calendar and Class Time Table

ACADEMIC CALENDAR 2023-24 (Odd SEMESTER)

Odd Semester: UG Sem.1/3/5/7 & PG Sem. 1/3 (FoET) & UG Sem. 1/3/5/7 & PG Sem 1/3 (FoLS)	
Particulars	Date
Semester Registration & Commencement of classes-FoET & FoLS- 1st Sem	17th July (Mon) 2023
Semester Registration, Department Orientation & Commencement of classes for 3/5/7 Sem – FoET & FoLS	24th Jul (Mon). 2023
Evaluation of Rural Internship/CSSI & Evaluation of Industry Orientation, & Evaluation of Industrial Internship	7th (Mon)-11th (Fri)Aug. 2023
Independence Day Celebration	15th Aug. (Thes) 2023
Attendance Review-1 (After 4 week)	17th (Thur)-18th (Fri) Aug. 2023
Internal Assesment-1 (Quiz, Test, Assignment etc.)** Student mentoring week – 1	21st (Mon)-25th (Fri)Aug. 2023
Mid Semester Examination / Project Phase 1 Review	11th Sept. (Mon) 2023 Onwards
Attendance Review-2 (After 8 week)	14th (Thur)-15th (Fri)Sept 2023
Parent Teacher Meeting (Saturday)	23rd Sept.(Sat) 2023
Last date of showing evaluated answer books of Mid Semester Examination	27th Sept. (Wed) 2023
Declaration of Mid Semester Exam Result	6th Oct. (Fri) 2023
360 Degree Feedback from Students by School Admin	9th (Mon)-13th (Fri)Oct. 2023
Attendance Review-3 (After 12 week)	12th (Thur)-13th (Fri)Oct 2023
Rangtaal – Navratri Celebration	13th Oct.(Fri) 2023
Internal Assesment-2 (Quiz, Test, Assignment etc)** Student mentoring week – 2	25th (Wed)-31st (Tues)Oct. 2023
Tesseract – The Science & Technical Fest	03(Fri)-04(Sat)-05(Sun) Nov. 2023
Declaration of Detention list of students (during 13th Week)	By 20th Oct (Fri) 2023
Diwali Vacation	13th (Mon)-17th (Fri) Nov. 2023
Classes End	21st (Tues) Nov. 2023
Practical Examinations, submission of Term Work and Seminars	22nd Nov.(Wed) 2023 Onwards
Dissertation presentation for UG and PG for FOLS	22nd Nov.(Wed) 2023 onwards
End Semester Examinations - FoET& FoLS	28th Nov.(Tues) 2023 Onwards
Last date of Submission of Marks of End sem. Exam	15th Dec. (Fri) 2023
Rural Internship for FoLS students	During Dec 2023
Project Phase I Exam for PG program of FoET & Progress Review for Ph. D.	18th (Mon)-22nd (Fri)Dec. 2023
Winter Break	26th (Tues)-29th (Fri)Dec. 2023
Alumni Day	29th Dec (Fri) 2023
Even Semester: UG Sem. 2/4/6/8 & PG Sem. 2/4 (FoET) & UG Sem.2/4/6/8 & PG Sem. 2/4 (FoLS)	
Next semester registration	27th (Wed)-30th (Sat) Dec. 2023
Start of Next Semester	1st Jan. (Mon) 2024

Class Time Table and Faculty Time Table with office hours

Class Time-table (Semester-5, Div-3)

Pandit Deendayal Energy University
School of Technology

Autumn Semester 2023

Day	09:00-10:00	10:00-11:00	11:00-12:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00
Monday	G7&8&9 (20CP301T) D008, SOVY-L G1&2 (20CP305T) F-504, POH-L G4&5&6 (20CP301T) E203, VIMI-L G1&2&3 (20CP301T) E304, RUZ-L G1&2 (20CP302T) F-401, SVS-L		G5&6 (20CP301T) F-504, MAPL-L	G (OE3) F-404, OE4F-L	G6 (20CP301P) E112-113, KSL-P G5 (20CP301P) E112-113, MAPL-P		G1 (20CP302P) F-104, SVS-P G2 (20CP301P) F-203, RUZ-P G4 (20CP301P) F-401, VIMI-P G5&6 (20CP305P) E112-113, POH-P G7 (20CP301P) E216, SOVY-P	
Tuesday	G1&2 (20CP302T) F-401, SVS-L G1&2&3 (20CP301T) E204, RUZ-L G4&5&6 (20CP301T) E203, VIMI-L G1&2 (20CP305T) F-504, POH-L G7&8&9 (20CP301T) D007, SOVY-L	G5&6 (20CP302T) F-504, SVS-L	G5&6 (20CP301T) F-504, MAPL-L	G (OE3) F-404, OE4F-L	G5&6 (CDC) F-402, CDCT-L	G5&6 (20CP304T) F-404, HAK-L	G5 (20CP306P) F-202, KMS-P G6 (20CP304P) F-101, ABL-P	
Wednesday	G5&6 (20CP302T) F-504, SVS-L	G5&6 (20CP303T) F-504, KBT-L	G5&6 (20CP303T) F-504, KBT-L	G (OE3) F-404, OE4F-L	G5&6 (20CP301T) F-504, MAPL-L	G5&6 (20CP304T) E005, HAK-L	G5 (20CP304P) E216, HAK-P G6 (20CP302P) F-504, SVS-P	
Thursday	G5 (20CP301P) F-202, VIMI-P G8 (20CP301P) E215, SOVY-P G2 (20CP301P) F-203, RUZ-P	G5&6 (20CP303T) F-504, KBT-L	G5&6 (20F201T) E004, BSX-L G5&6 (20F201T) E004, I4-E-L G5&6 (20F201T) E004, I4-M-L G5&6 (20F210T) E004, HV1-L	G6 (20CP306P) F-203, RJSC-P G5 (20CP302P) F-401, SVS-P			G5&6 (20F210P) F-PDH-SE, CHH-P G5&6 (20F210P) F-AMI.-SE, MBK-P G5&6 (20F201P) C203, GAM-P G5&6 (20F201P) C206, MNP-P	
Friday	G6 (20CP305P) E213, VIMI-P G9 (20CP301P) E216, SOVY-P G3 (20CP301P) F-203, RUZ-P	G5&6 (20CP302T) F-504, SVS-L	G5&6 (20F201T) E004, BSX-L G5&6 (20F201T) E004, I4-E-L G5&6 (20F201T) E004, I4-M-L G5&6 (20F210T) E004, HV1-L	G5&6 (23CP306T) F-403, RIMO-L	G5&6 (CDC) F-403, CDCT-L			

Faculty Abbr.	Faculty Name
ABL	Ashka Raval
CDCT	CD Cell Trainer
CHH	Chandan Kumar Jha (Visiting Fac)
GAM	Garima Mishra
HAK	Hargeet Kaur
I4-E	Industrial 4.0 Electrical Faculty
I4-M	Industrial 4.0 Mechanical Faculty
HV1	Industry4.0 Faculty_ICT_1
KBT	Krishna Brahmabhatt
KMS	Komal Singh
KSL	Ketan Sable
MAPL	Manish Pathak
MBK	M.B KIRAN
MNP	Manan Pathak-VT
ODEF	OE Fac
POH	Payal Chaudhari
PCH	Payal Chaudhary
RIMO	Rittisha Modi (ADF)
RJSC	Rinkle Jain
RSX	Rajat Saxena
RUZ	Ruzvi[H Jhaveri
SOVY	Soham Vyas
SVS	Shivangi Surati
VIMI	Vipul Mishra

Subject Abbr.	Subject Name
20CP301T	Computer Network
20CP302P	System Software & Compiler Design - Lab
20CP302T	System Software & Compiler Design
20CP303T	Software Engineering
20CP304T	Information Security
20CP301P	Computer Network - Lab
20CP304P	Information Security - Lab.
20F201P	Industry 4.0 Lab
20F201T	Industry 4.0
23CP201P	Advanced Python Programming - Lab.
23CP201T	Advanced Python Programming
23CP302P	Computer Graphics - Lab.
23CP302T	Computer Graphics
23CP205P	Advanced Java - Lab
23CP205T	Advanced Java
23CP206P	Introduction to Web Technology - Lab
23CP206T	Introduction to Web Technology
CDC	CDC
OE3	OE Sem 5

Dr. Santosh Bharti
Timetable-Coordinator

Dr. Shakti Mishra
HoD

Prof. Dhaval Pujara
Director
(School of Technology)

Class Time-table (Semester-5, Div-6)

Pandit Deendayal Energy University
School of Technology
B.Tech - Computer Engineering

Autumn Semester 2023

Day	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00
Monday	G4G5G6 [20CP301P] E203, VIMI-L G1G2G3 [20CP301P] E204, RUZ-L G7G8G9 [20CP301P] D008, SOVY-L G1G2 [20CP305T] F-506, PCH-L G1G2[20CP302T] F-401, SVS-L		G1G12 | 20CP302T] D009, SVS-L		G [OE3] F-403, OE4F-L	G12 [20CP306P] F-401, HAK-P G11 | 20CP302P] F-306, DHI-P		G1G2 [20CP302P] F-104, SVS-P G1G2 [20CP305P] E112-113, PCH-P G7 [20CP301P] E216, SOVY-P G1 [20CP302P] F-304, RUZ-P G4 [20CP301P] F-401, VIMI-P	
Tuesday	G7G8G9 [20CP301P] D007, SOVY-L G1G2 [20CP302T] F-401, SVS-L G1G2 [20CP305T] F-506, PCH-L G1G2G3 [20CP301P] E204, RUZ-L G4G5G6[20CP301P] E203, VIMI-L		G1G12 | 20CP303T] F-402, TUKA-L		G [OE3] F-403, OE4F-L	G12 [20CP306P] F-202, RISC-P G11 [20CP304P] F-306, RUZ-P		G1G12 | 20CP301T] F-402, DHI-L	G1G12 | 20CP304T] F-403, RUZ-L
Wednesday	G1G12 | 20CP303T] D009, TUKA-L	G1G12 | 20CP303T] D009, TUKA-L	G1G12 [20CP306T] D009, KMS-L		G [OE3] F-403, OE4F-L	G1G12 | 20CP302T] E203, SVS-L	G1G12 | 20CP302T] E203, SVS-L	G9G10 [CDC] F-302, CDCT-L	G9G12 [CDC] E002, CDCT-L
Thursday	G8 [20CP301P] E215, SOVY-P G2 [20CP301P] F-202, RUZ-P G5 [20CP305P] F-202, VIMI-P			G1G12 [20IF201T] E203, SMIT-L G1G12 [20IF201T] E203, I4-E-L G1G12 [20IF201T] E203, I4-M-L G1G12 [20IF201T] E203, I4I2-L		G12 [20CP301P] E112-113, KSL-P G11 [20CP301P] E112-113, NIPA-P		G1G12 | 20CP301T] D030, DHI-L	G1G12 | 20CP301T] D030, DHI-L
Friday	G6 [20CP301P] E212, VIMI-P G3 [20CP301P] F-202, RUZ-P G9 [20CP301P] E216, SOVY-P		G1G12 | 20CP306T] D102, RUZ-L	G1G12 [20IF201T] E203, SMIT-L G1G12 [20IF201T] E203, I4-E-L G1G12 [20IF201T] E203, I4-M-L G1G12 [20IF201T] E203, I4I2-L		G12 | 20CP302P] E004, SVS-P G11 [20CP306P] F-313, CHB-P		G1G12 [20IF201P] E-AMS-SB, MBK-P G1G12 [20IF201P] E111B, GAM-P G1G12 [20IF201P] E-POV-SB, CHJH-P G1G12 [20IF201P] C208, MNP-P	

Faculty Abbr.	Faculty Name	Subject Abbr.	Subject Name
CDCT	CD Cell Trainer	20CP301T	Computer Network
CHB	Chintan Bhatt	20CP302P	System Software & Compiler Design - Lab
CHJH	Chandan Kumar Jha (Visiting Fac)	20CP302T	System Software & Compiler Design
DHJ	Dhara Joshi (ADF)	20CP303T	Software Engineering
GAM	Garima Mishra	20CP304T	Information Security
HAK	Hargeet Kaur	20CP301P	Computer Network - Lab
I4-E	Industrial 4.0 Electrical Faculty	20CP304P	Information Security - Lab.
I4I2	Industry4.0 Faculty_ICT_2	20IF201P	Industry 4.0 Lab
I4-M	Industrial 4.0 Mechanical Faculty	20IF201T	Industry 4.0
KMS	Komal Singh	23CP301P	Advanced Python Programming - Lab.
KSL	Ketan Sable	23CP302P	Computer Graphics - Lab.
MBK	M B KIRAN	23CP302T	Computer Graphics
MNP	Manan Pathak-VF	23CP305P	Advanced Java - Lab
NIPA	Nitin Padaria (VF)	23CP305T	Advanced Java
OE4F	OE Fac	23CP306P	Introduction to Web Technology - Lab
PCH	Payal Chaudhari	23CP306T	Introduction to Web Technology
RISC	Rinkle Jain	CDC	CDC
RUZ	Rutvij H Jhaveri	OE3	OE Sem 5
SMIT	Shirshendu Mitra		
SOVY	Soham Vyas		
SVS	Shivangi Surati		
TUKA	Tushar Kakaiya (VF)		
VIMI	Vipul Mishra		

Dr. Santosh Bharti
Timetable Coordinator

Dr. Shakti Mishra
HoD

Prof. Dhaval Pujara
Director
(School of Technology)

Faculty Time Table

Shivangi Surati

Day	09:00-10:00	10:00 to 11:00	11:00 to 12:00	12:00 to 13:00	13:00 to 14:00	14:00 to 15:00	15:00 to 16:00	16:00-17:00	17:00-18:00
MON	CG (23CP302T) – all div F401, CP(5) - L		G11G12 (20CP302T) D-009, CP(5) - L					CG (23CP302P) – all div F-104, CP(5) - P	
TUE	CG (23CP302T) – all div F401, CP(5) - L	G5G6 (20CP302T) F-504, CP(5) - L							
WED	G5G6 (20CP302T) F-504, CP(5) - L					G11G12 (20CP302T) E-203, CP(5) - L	G11G12 (20CP302T) E-203, CP(5) - L	G6 (20CP302P) F-504, CP(5) - P	
THURS						G5 (20CP302P) F-401, CP(5) - P			
FRI			G5G6 (20CP302T) F-504, CP(5) - L			G12 (20CP302P) E004, CP(5) - P			
SAT									

Office hour: Friday, 12:00 pm to 2:00 pm

E. Lab Plan

Division-3 (G5, G6)

Sr. No.	Index	CO	Planned date	Actual Date	Remarks
1	Write C/C++ program to identify keywords, identifiers and others from the given input file.	CO1	G5- 27/7/23 G6- 26/7/23	G5- 27/7/23 G6- 2/8/23	Orientation on 26/7/23
2	a. Write a LEX program to count the number of tokens and display each token with its length in the given statements. b. Write a LEX program to identify keywords, identifiers, numbers and other characters and generate tokens for each.	CO1	G5- 3/8/23 G6- 2/8/23	G5- 3/8/23 G6- 9/8/23	
3	a. Write a LEX program to eliminate comment lines (single line and multiline) in a high-level program and copy the comments in comments.txt file and copy the resulting program into a separate file input.c. b. Write a LEX program to count the number of characters, words and lines in the given input. c. Write a LEX program that read the numbers and add 3 to the numbers if the number is divisible by 7.	CO1	G5- 10/8/23, 17/8/23 G6- 9/8/23, 16/8/23	G5- 10/8/23,	
4	WAP to implement Recursive Decent Parser (RDP) parser for given grammar.	CO2	G5- 24/8/23 G6- 23/8/23		
5	Write a program to calculate first and follow of a given LL (1) grammar.	CO2	G5- 31/8/23 G6- 6/9/23,		
6	WAP to construct operator precedence parsing table for the given grammar and check the validity of the string.	CO3	G5- 7/9/23 G6-		
7	a. Write a YACC program for desktop calculator with ambiguous grammar (evaluate arithmetic expression involving operators: +, -, *, / and ↑). b. Write a YACC program for desktop calculator with ambiguous grammar and	CO3			

	additional information. c. Design, develop and implement a YACC program to demonstrate Shift Reduce Parsing technique for the grammar rules: E→ E + T | T T→ T * F | F F → P ↑ F | P P → (E) | id And parse the sentence: id + id * id.				
8	Write a program to implement pass-I and pass-II of an assembler.	CO4			
9	Implement menu driven program to execute any 2 code optimization techniques on given code.	CO5			
10	Select one block or expression from C language and generate symbol table and target code for the same.	CO6			

Division-6 (G12)

Sr. No.	Index	CO	Planned date	Actual Date	Remarks
1	Write C/C++ program to identify keywords, identifiers and others from the given input file.	CO1	28/7/2023	28/7/2023	
2	a. Write a LEX program to count the number of tokens and display each token with its length in the given statements. b. Write a LEX program to identify keywords, identifiers, numbers and other characters and generate tokens for each.	CO1	4/8/2023		
3	a. Write a LEX program to eliminate comment lines (single line and multiline) in a high-level program and copy the comments in comments.txt file and copy the resulting program into a separate file input.c. b. Write a LEX program to count the number of characters, words and lines in the given input. c. Write a LEX program that read the numbers and add 3 to the numbers if the number is divisible by 7.	CO1	11/8/23, 18/8/23		
4	WAP to implement Recursive Decent Parser (RDP) parser for given grammar.	CO2	25/8/23		

5	Write a program to calculate first and follow of a given LL (1) grammar.	CO2	1/9/23		
6	WAP to construct operator precedence parsing table for the given grammar and check the validity of the string.	CO3	8/9/23		
7	a. Write a YACC program for desktop calculator with ambiguous grammar (evaluate arithmetic expression involving operators: +, -, *, / and ↑). b. Write a YACC program for desktop calculator with ambiguous grammar and additional information. c. Design, develop and implement a YACC program to demonstrate Shift Reduce Parsing technique for the grammar rules: E→ E + T | T T→ T * F | F F → P ↑ F | P P → (E) | id And parse the sentence: id + id * id.	CO3			
8	Write a program to implement pass-I and pass-II of an assembler.	CO4			
9	Implement menu driven program to execute any 2 code optimization techniques on given code.	CO5			
10	Select one block or expression from C language and generate symbol table and target code for the same.	CO6			

F. Evaluation Scheme and Rubrics

Co Assessment Tools (Direct Assessment):

Various assessment tools used to evaluate CO's (Rubrics) and the frequency with which the assessment processes are carried out are listed below.

Assessment Method	Assessment Tool	Description	Marks	Mapping with CO	Contribution to CO's
Direct (Internal Evaluation)	Continuous evaluation	Implementation and attendance	50	CO1,CO2, CO3,CO4,CO5, CO6	It contributes to 50% weightage of Direct Assessment to CO attainment.
Direct	End-Sem Examination	Viva, Program	50	CO1,CO2,	It contributes to 50%

				CO3,CO4, CO5, CO6	weightage of Direct Assessment to CO attainment.

G. List of Books and Reference books

TEXT/REFERENCE BOOKS

1. Alfred V Aho, M S. Lam, R Sethi, Jeffrey D. Ullman. Compilers-Principles, Techniques and Tools, Pearson.
2. John R. Levine, Tony Mason, Doug Brown, lex & yacc, 2nd Edition, O'Reilly.

K. ICT - Course related Web-links, Software, E-books, Relevant NPTEL and MOOC, Video

NPTEL:

Compiler Design By Prof. Santanu Chattopadhyay, IIT Kharagpur
https://onlinecourses.nptel.ac.in/noc23_cs57/preview

Other course:

Compilers by Alex Aiken
https://online.stanford.edu/courses/soe-ycscs1-compilers

Software:

1. Flex Compiler:

https://gnuwin32.sourceforge.net/packages/flex.htm

2. Bison

https://gnuwin32.sourceforge.net/packages/bison.htm

L. Laboratory Manuals (if applicable)

Will be given separately.