

**PROPOSED CURRICULAR STRUCTURE FOR PART – 2 (2ND YEAR) OF THE
FULL- TIME DIPLOMA COURSE IN ENGINEERING AND TECHNOLOGY**

WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION											
TEACHING AND EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES											
COURSE NAME: COMPUTER SOFTWARE TECHNOLOGY											
SEMESTER: SIXTH											
BRANCH: CSWT											
SR. NO.	SUBJECTS	CREDITS	PERIODS			EVALUATION SCHEME					
			L	TU	PR	INTERNAL SCHEME			ESE	PR	TOTAL MARKS
						TA	CT	TOTAL			
1	Industrial Management	3	3			10	20	30	70		100
2	Theory Of Computation	3	3			10	20	30	70		100
3	Software Testing	3+2	3		3	10	20	30	70	50	150
4	ELECTIVE – II (Any One)										
	Compiler Design	3	3			10	20	30	70		100
	Operation Research Methods	3	3			10	20	30	70		100
	Numerical Methods	3	3			10	20	30	70		100
	Image Processing	3	3			10	20	30	70		100
5	Project (Phase-II)	6			6					200	200
6	Professional Practice-IV(Advanced Web Technology)	2			4					50	50
7	Seminar Work	1			2					50	50
8	General Viva Voce	2								50	50
TOTAL		25	12		15	40	80	120	280	400	800
STUDENT CONTACT HOURS PER WEEK: 27 HRS. Theory and Practical Periods of 60 minutes each. L-Lecture, TU-Tutorials, PR-Practical, TA-Teachers Assessment, CT-Class Test, ESE-End Semester Examination.											

INDUSTRIAL MANAGEMENT

Name of course:INDUSTRIAL MANAGEMENT	
Subject code: CSWT/S6/TH/IM	Semester : 6th
Duration : 17 weeks	Maximum Marks : 100 Marks
Teaching Scheme	Examination Scheme
Theory : 03Hrs/week	End Semester Exam.: 70 Marks
Tutorial: Hrs./Week	Teacher’s Assessment(including attendance):10 Marks
Practical: hrs./week	Internal Assesment:20 Marks
Credit: 3	
Aim :-	To study the techniques for improvement in productivity of the people and equipment. to plan the production schedule accordingly organize material supply for the manufacturing activities. To minimize the direct and indirect cost by optimizing the use of resources available. To learn accounting process, inventory control and process planning. Modern manufacturing system employ techniques such as JIT, TPM , FMS, 5’S’, kaizen which should be known to the technician.
Objective:-	The student will able to

1	Familiarize environment in the world of work	
2	Explain the importance of management process in Business.	
3	Identify various components of management	
4	Describe Role & Responsibilities of a Technician in an Organizational Structure.	
5	Apply various rules and regulations concerned with Business & Social Responsibilities of the Technician	
Pre-Requisite:- Nil		
Contents		
Chapter	<i>Name of the Topic</i>	Hours
GROUP:A		
01	Overview Of Business 1.1. Types of Business Service Manufacturing Trade 1.2. Industrial sectors Introduction to Engineering industry Process industry Textile industry Chemical industry Agro industry 1.3 Globalization Introduction Advantages & disadvantages w.r.t. India 1.4 Intellectual Property Rights (I.P.R.)	04
02	Management Process 2.1 What is Management? Evolution Various definitions Concept of management Levels of management Administration & management Scientific management by F.W.Taylor 2.2 Principles of Management (14 principles of Henry Fayol) 2.3 Functions of Management Planning Organizing Directing Controlling 2.4 Social responsibility and Environmental dimension of management.	04
GROUP:B		
03	Organizational Management 3.1 Organization :- Definition Steps in organization 3.2 Types of organization Line Line & staff Functional Project 3.3 Departmentation Centralized & Decentralized Authority & Responsibility Span of Control 3.4 Forms of ownership Proprietorship Partnership	06

	<p>Joint stock Co-operative Society Govt. Sector</p>	
04	<p>Human Resource Management 4.1 Personnel Management Introduction Definition Objectives Functions 4.2 Staffing Introduction to HR Planning Recruitment Procedure 4.3 Personnel– Training & Development Types of training Induction Skill Enhancement 4.4 Grievance handling 4.5 Leadership & Motivation Maslow's Theory of Motivation 4.6 Safety Management Causes of accident Safety precautions 4.7 Introduction to – Factory Act ESI Act Workmen Compensation Act Industrial Dispute Act</p>	10
Group: C		
05	<p>Financial Management 5.1. Financial Management- Objectives & Functions 5.2. Capital Generation & Management Types of Capitals Sources of raising Capital 5.3. Budgets and accounts Types of Budgets Production Budget (including Variance Report) Labour Budget Different financial ratios. Introduction to Profit & Loss Account (only concepts) ; Balance Sheet 5.4 Introduction to – Excise Tax Service Tax Income Tax VAT Custom Duty</p>	08
06	<p>Materials Management 6.1. Inventory Management (No Numerical) Meaning & Objectives 6.2 ABC Analysis 6.3 Economic Order Quantity(EOQ) 6.4 Stores function, Stores system, BIN card, Materials issue request(MIR), Pricing of materials Introduction & Graphical Representation 6.4 Purchase Procedure Objects of Purchasing Functions of Purchase Dept. Steps in Purchasing 6.5 Modern Techniques of Material Management Introductory treatment to JIT / SAP / ERP</p>	08

07	Safety Engineering 7.1 Accidents-causes of accidents, Welfare measures. 7.2 Need for safety 7.3 Organization for safety 7.4 Safety committee 7.8 Safety programmes 7.9 Safety measures	05
Total		45

Books:

Name of Authors	Title of the Book	Edition	Name of the Publisher
Dr. O.P. Khanna	Industrial Engg & Management		Dhanpat Rai & sons NewDelhi
V.Arun Viswanath, Anoop. S. Nair, S.L.Sabu	Industrial Engineering and Management		SCITECh Publication(s) Pvt. Ltd
A. Bhat & A. Kumar	Management Principles, Processes & Practices		Oxford University Press
Dr. S.C. Saksena	Business Administration & Management		Sahitya Bhavan Agra
W.H. Newman E.Kirby Warren Andrew R. McGill	The process of Management		Prentice- Hall
Rustom S. Davar	Industrial Management		Khanna Publication
Banga & Sharma	Industrial Organisation & Management		Khanna Publication
Jhamb & Bokil	Industrial Management		Everest Publication , Pune

Suggested List of Assignments/Tutorial :-

1. Preparation of financial budget of any organization.
2. Preparation of chart for fire safety.
3. Preparation of chart for personal, Tools & Equipments and products safety.
4. Preparation of chart to avoid accident.
5. Preparation of chart to show the different financial ratios.
6. Preparation of chart to show the different types of organization.

End Semester Examination Scheme. Maximum Marks-70, Time Allotted-3 hrs

GROUP	UNIT NO.	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		NO. OF QUESTION TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	NO. OF QUESTION TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	01, 02	7	ANY 20	ONE	20x1=20	3	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	10	10x5=50
B	03,04	7				3			
C	05,06,07	11				4			

THEORY OF COMPUTATION

Name of course: Theory of Computation									
Subject code: CSWT/S6/TH/TOC					Semester : 6th				
Duration : 17 weeks					Maximum Marks : 100 Marks				
Teaching Scheme					Examination Scheme				
Theory : 03 Hrs/week					Class Test: 20 Marks				
Tutorial: 00 Hrs./Week					Teachers Assessment(including attendance): 10 Marks				
Practical:					End Semester Exam.: 70 Marks				
Credit: 3									
Objective: student will be able to									
1	Understand Automata								
2	Able to convert NFA to DFA and vice-versa.								
3	To understand Regular Expression								
4	To understand PDA								
5	To Know Turing Machine and its working principle.								
Pre-Requisite:									
1	Basic knowledge of Set theory, graph, tree and relation is helpful.								
MODULAR DIVISION OF THE SYLLABUS									
GROUP	UNIT NO.	TOPIC						CONTACT PERIODS	
A	1,2	Introduction to Theory of Computation & Finite Automata						14	
B	3,4	Regular Expressions & Context free Languages						20	
C	5,6	Push Down Automata & Turing Machine						14	
EXAMINATION SCHEME									
GROUP	UNIT NO.	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1,2	8	ANY 20	ONE	20x1=20	4	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	10	10x5=50
B	3,4	8				3			
C	5,6	8				3			
Unit No.	Contents(Theory)						Hrs./Unit	Marks	
Unit: 1	Introduction to Theory of Computation: 1.1 Definition of Languages 1.2 Definition of Grammars 1.3 Definition of Automata 1.4 Some applications						4		
Unit: 2	Finite Automata: 2.1 Definition of an Automaton, Definition of finite Automaton, Block diagram of finite Automaton, Transition system, Properties of Transition Functions, Acceptability of a string by Finite Automaton. 2.2 Definition of DFA and N DFA, The equivalence of DFA and N DFA, A theorem on equivalence of DFA and N DFA. (Including Applications) 2.3 Mealy and Moore machine, Procedure for Transforming a Mealy Machine into a Moore Machine (with applications), Procedure for Transforming a Moore Machine to a Mealy Machine						10		

	(with applications).		
Unit: 3	<p>Regular Expressions:</p> <p>3.1 Definition of Regular expression and regular set, Identities of regular expressions, Arden's theorem (statement & application)</p> <p>3.2 Relation between regular expression and finite automata, Transition system containing \wedge-mores (application), Conversion of Non-deterministic systems to deterministic system (application), Construction of finite automata equivalent to a regular expression (with application), Equivalence of two finite automata (application), Equivalence of two regular expressions; Pumping lemma (Statement & application), Closure properties of regular sets, Construction of regular grammar for a given DFA and a transition system for a given regular grammar G.</p>	10	
Unit: 4	<p>Context free Languages:</p> <p>4.1 Context free Grammars, Example of context free Languages and grammars, Leftmost and rightmost derivation, Derivation tree</p> <p>4.2 Ambiguity in Context free Grammar and Parse tree, Removal of ambiguity</p> <p>4.3 Simplification of Context free grammar, Removal of Useless symbols, Removal of Unit production, Removal of ϵ-Production.</p> <p>4.4 Chomsky normal form and Greibach normal form.</p>	10	
Unit: 5	<p>Push Down Automata:</p> <p>5.1 Definition of a Pushdown Automaton</p> <p>5.2 Two types of acceptance by PDA</p> <p>5.3 Correspondence between PDA and Context Free Language – PDA corresponding to a given CFG – CFG corresponding to a given PDA – Only Concept of Deterministic PDA and Deterministic CFL.</p>	8	
Unit: 6	<p>6.1 Structure and working of a simple Turing Machine. Turing Machine</p> <p>6.2 Instantaneous description of Turing Machine</p> <p>6.3 Turing Machine as Language acceptor</p> <p>6.4 Universal Turing Machine.</p>	6	
Total		48	

Reference Books:

Name of Authors	Title of the Book	Edition	Name of the Publisher
Kulkarni	Theory of Computation		Oxford
Mishra & Chandrasekaran	Theory of Computer Science (Automata, Languages and Computation)3rd ed.		PHI
Hopcroft	Introduction to Automata Theory, Languages, and Computation, 3e		Pearson
Mahesh	Theory of Computation		Willy

Software Testing

Name of course: Software Testing									
Subject code: CSWT/S6/TH/ST					Semester : 6th				
Duration : 17 weeks					Maximum Marks : 150 Marks				
Teaching Scheme					Distribution of Marks				
Theory : 03 Hrs/week					Class Test: 20 Marks				
Tutorial: 00 Hrs./Week					Teachers Assessment(including attendance): 10 Marks				
Practical: 03 hrs./week					End Semester Exam.: 70 Marks				
Credit: 3+2					Practical / Sessional : 25 (Internal) +25 (External)				
					<p>1. Continuous Internal Assessment of 25 marks is to be carried out by the teachers throughout 6th Semester. Performance of job-18, Notebook-7</p> <p>2. External Assessment of 25 marks shall be held at the end of 6th Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system.</p>				
Objective: student will be able to									
1	Understand the impact of software bugs and importance of software testing								
2	Develop the skills necessary to find bugs in any types of software								
3	Learn how to effectively plan your tests, communicate the bugs you find, and measure your success as a software tester.								
4	Use your new testing skills to test not just the software , but also the product specification the raw code, and even the user's manual								
5	Learn how to test software for compatibility, usability and cultural issues								
6	Discover how to improve your testing efficiency by automating your tests								
Pre-Requisite:									
1	Basic knowledge of software engineering								
2	Idea of software development life cycle								
3	Programming convention and knowledge of programming								
MODULAR DIVISION OF THE SYLLABUS									
GROUP	UNIT NO.	TOPIC						CONTACT PERIODS	
A	1	Purpose of Testing						05	
	2	Testing Fundamentals						09	
	3	Examining the Code						08	
B	4	Applying Your Testing Skills						04	
	5	Foreign Language Testing						02	
	6	Usability Testing						06	
C	7	Supplementing Your Testing						03	
	8	Working With Test documentation						05	
	9	The Future						03	
EXAMINATION SCHEME									
GROUP	UNIT NO.	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1,2,3	11	ANY 20	ONE	20x1=20	4	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	10	10x5=50
B	4,5,6	07				3			
C	7,8,9	07				3			

Unit No.	Contents(Theory)	Hrs./Unit	Marks
GROUP-A			
Unit: 1	<p>Purpose of Testing:</p> <p>1.1 Software Testing Background- Software Error Case Studies:- Disney Lion King, Intel Pentium Floating Point Division Bug, NASA Mars Polar Lander, Patriot Missile Defense System, Y2K Bug. What is Bug? Terms for software Failures, Software Bug: A Formal Definition, Why do Bug occurs? , cost of bugs, What Exactly does a software tester do? What makes a good software tester?</p> <p>1.2 Software Development Process- Product Components:- What Effort Goes into a software product?, What parts make up a software product? , Software Project Staff , Software Development Lifecycle Models :- Big-Bang Model , Code and fix Model, Waterfall model, Spiral Model</p> <p>1.3 The Realities of Software Testing- Testing Axioms: - It's impossible to test a program completely, software testing is a risk-based exercises, testing can't show that bug don't exist, the more bug you find, the more bugs there are, the pesticide paradox.</p>	05	
Unit: 2	<p>Testing Fundamentals:</p> <p>2.1 Examining the Specification- Getting Started :- Black-Box and white-box Testing, Static and Dynamic Testing , Static Black Box Testing :- Testing the Specification Performing a High Level Review of the Specification:- Pretend to be a customer, Research Existing Standards and guidelines , Review and test similar software Low Level Specification Test Techniques:- Specification Attributes Checklist , Specification Terminology Checklist.</p> <p>2.2 Testing the software with Blinders On- Dynamic Black-Box Testing : testing the software While, Blindfolded, Test-to- pass and Test-to-fail, Equivalences Partitioning , Data Testing :- Boundary Condition, Sub-Boundary Conditions, default, empty, blank, Null, Zero and None, Invalid, Wrong, Incorrect and garbage data. State Testing:- Testing Software 's Logic Flow, Testing States to Fail. Other Black Box Test Techniques :- Behave like a Dumb User, Look for bugs where you have already found them, follow experience, intuition and hunches</p>	09	
Unit: 3	<p>Examining the Code:</p> <p>3.1 Static White Box Testing- Examining the design and code, Formal Review: - Peer Review, Walkthroughs, Inspections. Coding Standards and Guidelines:- Examples of Programming Standards and Guidelines, Obtaining Standards. Generic Code Review Checklist:- Data Reference Errors, Data Declaration Errors, Computation Errors, Comparison Error, Control Flow Errors, Subroutine Parameter Errors, Input/Output Errors, Other checks.</p> <p>3.2 Testing the software with X-Ray Glasses- Dynamic White Box Testing, Dynamic white box testing versus debugging,</p>	08	

	<p>Testing the Pieces:- Unit and Integration Testing, An Example of Module Testing.</p> <p>Data Coverage: - Data Flow, Sub-Boundaries, Formula and Equations, Error Forcing. Code Coverage: - Program Statements and Line Coverage, Branch Coverage, Condition Coverage.</p>		
GROUP-B			
Unit: 4	<p>Applying Your Testing Skills:</p> <p>4.1 Configuration Testing - An Overview of Configuration Testing: - Isolating Configuration Bugs, Sizing up the job.</p> <p>Approaching the Task: - Decide the Types of Hardware You'll Need, Decide What Hardware Brands, Model, and Device Drivers are available. Decide which Hardware features, modes and options are possible. Pare Down the identified Hardware Configuration to a Manageable Set.</p> <p>Identify your Software's Unique Features that work with the Hardware Configurations. Design the test Cases to Run on each configuration. Execute the tests on each configuration. Rerun the tests until the results satisfy your team. Obtaining the hardware, Identify hardware standards, configuration testing other hardware.</p> <p>4.2 Compatibility Testing - Compatibility Testing Overview, Platform and Application Versions, Backward and forward compatibility, the impact of testing multiple versions. Standards and Guidelines: - High-Level standards and Guidelines, Low- level standards and Guidelines, Data Sharing Compatibility.</p>	04	
Unit: 5	<p>Foreign Language Testing:</p> <p>Making the words and Pictures Make Sense , Translation Issues :- Text Expansion , ASCII , DBCS and Unicode , Hot Keys and shortcuts , Extended Characters , Computation on characters , Reading Left to Right and Right to Left , Text on Graphics, Keep the Text out of the code.</p> <p>Localization Issues: - Content, Data Formats.</p> <p>Configuration and Compatibility Issues: - Foreign platform configurations, Data Compatibility. How much should you Test?</p>	02	
Unit: 6	<p>Usability Testing:</p> <p>6.1 User Interface Testing- What makes a Good UI? , Follows standards or Guidelines, Intuitive, Consistent, Flexible, Comfortable, Correct, Useful. Testing for the Disabled: Accessibility Testing: - It's the Law, accessibility features in software.</p> <p>6.2 Testing the Documents- Types of Software Documentation, The importance of documentation testing, what to look for when reviewing documentation, the realities of documentation testing.</p> <p>6.3 Web site Testing- Web Page Fundamentals, Black-Box Testing: - Text, Hyperlinks, graphics, forms, object and other simple miscellaneous Functionality. Gray Box Testing, White Box Testing, Configuration and compatibility testing, Usability Testing, Introducing Automation.</p>	06	
GROUP-C			
Unit: 7	<p>Supplementing Your Testing:</p> <p>7.1 Automation Testing and test tools- The benefits of automation and tools, Test tools: - Viewers and Monitors, Drivers, Stubs, Stress and load tools, Interference injectors and noise generators, analysis</p>	03	

	<p>tools. Software Test Automation: - Macro Recording and playback, programmed macros, Fully Programmable Automated Testing Tools. Random Testing: monkeys and gorillas, Dumb monkeys, Semi-smart monkeys, Smart Monkeys, Realities of using test tools and automation.</p> <p>7.2 Bug Bashes and Beta Testing- Only as far as the eye can see, Test sharing, beta testing, out sourcing your testing.</p>		
Unit: 8	<p>Working With Test documentation:</p> <p>8.1 Planning your test effort - the goal of the test planning , test planning topics :- high level expectations , people , places , and things , definitions , Inter group Responsibilities , what will and won't be tested , test phases , test strategy , resource requirements, tester assignments , test schedule , test cases , bug reporting , metrics and statistics , Risk and Issues.</p> <p>8.2 Writing and Tracking Test Cases- The goal of test case Planning, Test case planning overview, test design, test cases, test procedures, test case organization & tracking.</p> <p>8.3 Reporting What you Find- Getting your bugs fixed, isolating & reproducing bugs , Not all bugs are created equal , a bug's life cycle, bug tracking system :- The standard : The test incident Report , annual Bug Reporting and Tracking , Automated bug reporting and tracking.</p> <p>-Measuring Your Success Using the information in the bug tracking database, Metrics that you'll use in your daily testing, Common Project level Metrics.</p>	05	
Unit: 9	<p>The Future:</p> <p>9.1 Software Quality Assurance - Quality is free, testing and quality assurance in the workplace , software testing , Quality Assurance, other names for software testing groups, Test management and organizational structures, Capability Maturity Model (CMM), ISO 9000</p> <p>9.2 Your Careers as a Software Tester- Your job as a software tester, finding software testing position, gaining hands-on experience, Internet links, Professional Organizations.</p>	03	
Total:		45	
Practical / Sessional			
Name of course: Software Testing Lab			
Subject code: CSWT/S6/PR/STL			
<p>Practical:</p> <p>Skills to be developed:</p> <p>Intellectual Skills:</p> <ol style="list-style-type: none"> 1. Use installation procedure 2. Creation of GUI objects and their applications 3. Know various tools 4. Know Test procedures <p style="text-align: center;">List of Practical:</p> <p style="text-align: center;">LIST OF SAMPLE PROBLEMS FOR SOFTWARE TESTING LAB(for example)</p> <ol style="list-style-type: none"> 01. Introduction To Software Testing Concepts. 02 Case Study:- Study any system specification and report bugs. 03. Write Test Cases For any Application (e.g. Railway Reservation Form). 			

04. Display "Hello World".
05. Write a program to demonstrate use of...
- For ...Loop
 - Switch ... Case
 - Do...While
 - If....else
06. Automate Notepad Application.
07. Automate any installation procedure (e.g. WinZip)
- 08.. Automate Microsoft Word Application
- Open Microsoft Word.
 - Type text (automatically).
 - Generate random file name.
 - Save file and close Microsoft Word.
09. Create GUI Objects.
10. Create any GUI Application e.g. Calculator.
11. Assignment for Web Testing (use any Web testing tools e.g. Selenium).
12. Assignment for any Bug Tracking Tool (e.g. Bugzilla, Bugit).
13. Assignment for any test management tool (e.g. Test Director).
- All above Practical may be performed on Windows or Linux Platform, using the tools mentioned below:

Sr. No	Testing Tools	Type of Tool
1	Auto IT	Free Ware
2	Ruby	Free Ware
3	Water	Free Ware
4	Sahi	Free Ware
5	Bugzilla	Licensed Software
6	Test Track	Licensed Software

Suggested list of Laboratory Experiments:

Sl. No. Laboratory Experiments

- Write different test cases for checking the login form.
- Write the different test cases and execute the test cases on login form
- Perform the load testing the university of Pune website.

Suggested list of Assignments / Tutorial:

Sl. No. Topic on which tutorial is to be conducted

- Different methodologies of software testing
- Develop a test plan for library management system.
- Implement the test plan from the above assignment.

Text/Reference Books:

Name of Authors	Title of the Book	Edition	Name of the Publisher
Ron Patton	Software Testing		SAMS Techmedia
SrinivasanDesikan Gopaldaswamy Ramesh	Software Testing : Principals and Practical		Pearson Education
Nick Jenkins	A Software Testing Primer		
Paul Ammann and Jeff Offutt	Introduction to Software Testing		
C. Kaner, J. Bach, and B. Pettichord	Lessons Learned in Software Testing		
W. Lewis	Software Testing and Continuous Quality Improvement		

Dorothy Graham , Erik van eenendaal , Isabel Evans , Rex Black.	Foundations of Software Testing		
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COMPILER DESIGN

Name of course: Compiler Design									
Subject code: CSWT/S6/TH/E-II(CD)		Semester : 6th							
Duration : 17 weeks		Maximum Marks : 100 Marks							
Teaching Scheme		Examination Scheme							
Theory : 03Hrs/week		Class Test: 20 Marks							
Tutorial: 00 Hrs./Week		Teachers Assessment(including attendance):10 Marks							
Practical: 00 hrs./week		End Semester Exam.: 70 Marks							
Credit: 3		Practical / Sessional :							
Objective: Student will be able to									
1	Learn Compiler design concepts, different phases of compiler.								
2	LearnThe Lexical analysis, parsing techniques and syntax-directed translation (Semantics analysis) and Intermediate code generation.								
3	Exploring the different problems faced in these stages and how to overcome those problems. Exploring the different algorithms for compiler stages.								
4	Implement and integrate different phases of a compiler. Students will construct a small compiler.								
Pre-Requisite:									
1	Basic knowledge of Set theory, graph, tree and relation is helpful.								
2	Formal Languages & Automata Theory.								
MODULAR DIVISION OF THE SYLLABUS									
GROUP	UNIT NO.	TOPIC	CONTACT PERIODS						
A	1,2	Introduction, Finite Automata and Regular Expressions, CFG & Syntax Analysis.	19						
B	3,4	Top-Down Parsing, Bottom-Up Parsing.	17						
C	5,6	Syntax-Directed Definitions and Translations, CODE OPTIMIZATION & CODE GENERATION	14						
EXAMINATION SCHEME									
GROUP	UNIT NO.	OBJECTIVE QUESTIONS		SUBJECTIVE QUESTIONS					
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1,2	10	ANY 20	ONE	20x1=20	04	FIVE, TAKING	10	10x5=50
B	3,4	08				04	AT LEAST ONE		
C	5,6	06				02	FROM EACH GROUP		
Unit No.	Contents(Theory)						Hrs./Unit	Marks	
Unit: 1	Introduction, Finite Automata & regular Expression: Compiler, Cross-Compiler, Compilation ,Finite Automata Definitions, Relation, Finite Automata, NFA, Transforming NFA to DFA,NFA with ϵ -moves.NFA with ϵ -moves to DFA,DFA minimization, Algorithm to detect unreachable and Dead states. Regular sets & Regular expression,						10		

	Obtaining regular expression from FA, Lexical Analyzer Design, Properties of Regular Sets, Equivalence of two Automata		
Unit: 2	Context- free Grammar & Syntax Analysis: Syntax Analysis, Context-free grammar; Derivation, standard notation, parse tree, reduction of grammar, useless grammar symbols, _ε Productions and Null able non-terminals, Elimination _ε -Productions, Unit productions & Left Recursion. Regular grammar; Right Linear & Left Linear grammar.	09	
Unit: 3	Top-Down Parsing: Top-down parsing, Implementation, Predictive Top-down Parsing, Implementation of a table driven Predictive Parser.	07	
Unit: 4	Bottom-up parsing: A handle of a Right Sentential Form, Implementation.LR Parser; Augmented Grammar, construction of parsing SLR(1),LR(1),parser conflict, ambiguous grammar, Example.	10	
Unit: 5	Syntax –Directed Definitions & Translations: Specification of translations, Implementation of translation specified by syntax-directed definitions-attributed Definition, Syntax-directed translation scheme, Intermediate code generation, Representing three-address statements, syntax-directed translation scheme to specify the translation of various programming language construct.	09	
Unit: 6	Code Optimization & Code generation: Introduction to optimization, Eliminating Loop Invariant Computations, Loop Optimization, Loop Detection, Identification of Back Edges, Reducible Flow Graphs. Introduction to code generation, Problems that hinder good code generation, machine model, Straightforward code generation.	05	
Total:		50	

Reference Books:

Name of Authors	Title of the Book	Edition	Name of the Publisher
Aho, Sethi, Ullman	Principles, techniques and tools		
ALFRED AHO AND JEFFREY ULLMAN	Principles of Compiler Design		NAROSA PUBLISHING HOUSE
RAVI SETHI, D. JEFFREY ULLMAN, ALFRED V. AHO AND MONICA S. LAM'	COMPILERS PRINCIPLES, TECHNIQUES, AND TOOLS		PEARSON EDUCATION
DR. O. G. KAKDE	COMPILER DESIGN 4ED 4TH EDITION		FIREWALL

OPERATION RESEARCH

Name of course: OPERATION RESEARCH	
Subject code: CSWT/S6/TH/E-II(OR)	Semester : 6th

Duration : 17 weeks				Maximum Marks : 100 Marks					
Teaching Scheme				Marks Distribution					
Theory : 03Hrs/week				Class Test: 20 Marks					
Tutorial : 00 Hrs./Week				Teachers Assessment (including attendance): 10 Marks					
Practical: NA				End Semester Exam.: 70 Marks					
Credit: 3									
Objective: Student will be able to									
1	develop agricultural planning, biotechnology, data analysis, distribution of goods and resources, emergency and rescue operations, engineering systems design, environmental management, financial planning, health care management, inventory control.								
2	develop a research proposal using the general approach for Operations Research								
3	describe the need and importance of Operations Research for rationale decision making in health care delivery								
4	To discuss the basic Operations Research concepts and techniques for solving particular problem and identification of appropriate solution								
MODULAR DIVISION OF THE SYLLABUS									
GROUP	UNIT NO.	TOPIC						CONTACT PERIODS	
A	1	INTRODUCTION						2	
	2	LINEAR PROGRAMMING						25	
B	3	TRANSPORTATION PROBLEM						8	
	4	ASSIGNMENT PROBLEM						8	
	5	PROJECT MANAGEMENT						8	
EXAMINATION SCHEME									
GROUP	UNIT NO.	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1,2	12	ANY 20	ONE	20x1=20	FIVE	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	10	10x5=50
B	3,4,5	12				FOUR			
Unit No.		Contents(Theory)						Hrs./Unit	Marks
Unit: 1		INTRODUCTION: 1.1 Origin and Development of O R 1.2 Meaning of O R, Scope of O R, Characteristics of O R, Uses and limitation of O R.						2	
Unit: 2		LINEAR PROGRAMMING: 2.1. Introduction, Formulation of the L.P.P., Graphical solution method (only introduction), Canonical & Standard form of L.P.P. 2.2. Linear Programming Method: Basic solution, Degenerate solution, Basic Feasible solution, Associated Cost vector, Improved Basic Feasible solution, Optimum Basic Feasible solution. (Definitions only) 2.3. Simplex method, Artificial Variable technique up to optimality, (Big M method). 2.4. Duality in Linear Programming: Concept of duality, Primal problem, Dual problem (Definitions only), Writing Dual problem from Primal problem and vice versa.						25	

	2.5. Dual Simplex Method 2.6. Revised Simplex Method: Introduction, standard form of Revised Simplex method, computational procedure, Revised Simplex method vs. Simplex method.		
Unit: 3	TRANSPORTATION PROBLEM: 3.1. Mathematical formulation, Initial basic feasible solution (North–West corner rule), row minima, column minima, matrix minima method, Vogel’s Approximation method (VAM). 3.2. Optimality test (U-V method), Unbalanced T.P (Definition only).	8	
Unit: 4	ASSIGNMENT PROBLEM: 4.1 Mathematical formulation; Optimality test; Unbalanced A.P. (Definition only)	8	
Unit: 5	PROJECT MANAGEMENT: 5.1 Introduction to network analysis 5.2 Definitions of project, job, events, networks 5.3 Construction of the arrow diagram (network) 5.4 Critical Path Method: Determination of critical paths & calculation of floats 5.5 Project Evaluation & Review Technique 5.6 Resource Allocation Technique: Project scheduling with constraints resources.	8	
Total:		51	
Reference Books:			
Name of Authors	Title of the Book	Edition	Name of the Publisher
Hamdy A. Taha,	Operations Research	Fifth	Macmillan Publishing Company, 1992.
V.K. Kapoor	Operations Research		
KantiSwaroop	Operations Research		
G. Hadley	Linear Programming		Narosa Publishers, 1987
F. Hiller F. and G.J. Leibermann	Operation Research		Holder Day Inc, 1974

NUMERICAL METHODS

Name of course: NUMERICAL METHODS

Subject code CSWT/S6/TH/E-II(NM)		Semester : 6th							
Duration : 17 weeks		Maximum Marks : 100 Marks							
Teaching Scheme				Marks Distribution					
Theory : 03Hrs/week				Class Test: 20 Marks					
Tutorial : 00 Hrs./Week				Teachers Assessment(including attendance): 10 Marks					
Practical: NA				End Semester Exam.: 70 Marks					
Credit: 3									
Objective: Student will be able to									
1	Knowledge about numerical side of mathematical analysis								
2	Teach methods and means for estimations the accuracy of numerical results								
MODULAR DIVISION OF THE SYLLABUS									
GROUP	UNIT NO.	TOPIC						CONTACT PERIODS	
A	1	ERROR HANDLING						6	
	2	POLYNOMIAL INTERPOLATION						10	
B	3	SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS						10	
	4	NUMERICAL DIFFERENTIATION & INTEGRATION						10	
C	5	NUMERICAL SOLUTION OF A SYSTEM OF LINEAR EQUATIONS						8	
	6	SOLUTION OF ORDINARY DIFFERENTIAL EQUATION						7	
EXAMINATION SCHEME									
GROUP	UNIT NO.	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTIONS			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1,2	8	ANY 20	ONE	20x1=20	THREE	FIVE, TAKING AT LEAST ONE FROM EACH GROUP	10	10x5=50
B	3,4	8				FOUR			
C	5,6	8				THREE			
Unit No.		Contents(Theory)						Hrs./Unit	Marks
Unit: 1		ERROR HANDLING: 1.1 Approximation in Numerical Computation 1.2 Significant Figures 1.3 Absolute, Relative and Percentage Errors 1.4 Truncation and Round-off Errors 1.5 Accumulation and Propagation of Errors						6	
Unit: 2		POLYNOMIAL INTERPOLATION: 2.1 Forward, Backward and Divided Difference Table Newton's Forward and Backward Interpolation Formula 2.2 Newton's General Interpolation Formula with the remainder term 2.3 Lagrange's Interpolation Formula 2.4 Inverse Interpolation						10	
Unit: 3		SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS: 3.1 Method of Tabulation 3.2 Bisection Method 3.3 Newton-Raphson Method, Convergence of Newton-Raphson Method						10	
Unit: 4		NUMERICAL DIFFERENTIATION AND INTEGRATION: 4.1 Differentiation of Forward and Backward Formula 4.2 Trapezoidal rule						10	

	4.3 Simpson's 1/3 rule		
Unit: 5	NUMERICAL SOLUTION OF A SYSTEM OF LINEAR EQUATIONS: 5.1 Gauss-Elimination Method 5.2 Matrix Inversion Method 5.3 Gauss-Jacobi Method 5.4 Gauss-Siedal Method	8	
Unit: 6	SOLUTION OF ORDINARY DIFFERENTIAL EQUATION: 6.1 Solution of first order Differential Equation by Euler's Method 6.2 Modified Euler's Method and Runge-Kutta Method.	7	
Total:		51	
Name of Authors	Title of the Book	Edition	Name of the Publisher
E.V. Krishnamurthy & S.K. Sen	Numerical Algorithms	1986, 2nd ed	New Dehli : Affiliated East-West Press
J. B. Scarborough	Numerical Mathematics Analysis		Oxford & IBH Publishing Co. Pvt. Ltd.
Dutta & Jana	Introductory Numerical Analysis		SreedharPrakashani, Kolkata
Balagurusamy	Numerical Methods		Tata McGraw-Hill

Image Processing

Name of course: Image Processing			
Subject code CSWT/S6/TH/E-II(IP)		Semester : 6th	
Duration : 17 weeks		Maximum Marks : 100 Marks	
Teaching Scheme		Examination Scheme	
Theory : 03Hrs/week		Class Test: 20 Marks	
Tutorial: 00 Hrs./Week		Teachers Assessment(including attendance):10 Marks	
Practical: NA		End Semester Exam.: 70 Marks	
Credit: 3		Practical /Sessional : NA	
Question Paper Setting Tips:			
End Semester Examination: Objective Type: 20 marks (answered in one or two sentences). Subjective type: 50 marks, To be set at least 8 questions and to be answered 5 questions each carrying 10 marks.			
Objective: Student will be able to			
<ol style="list-style-type: none"> 1. Understanding of digital image fundamentals. 2. Understanding of image digitization. 3. Understanding of image display hardware and software. 4. Ability to understand and apply image enhancement and restoration techniques. 5. Understanding of image encoding techniques. 6. Ability to apply compression techniques. 			
Pre-Requisite:			
Fundamental knowledge of digital Image, color and graphics, mathematical preliminaries etc.			
Unit No.	Contents(Theory)	Hrs./Unit	Marks
Unit:1	Introduction: Background, Digital Image Representation, Fundamental steps in Image Processing, Elements of Digital Image Processing - Image Acquisition, Storage, Processing, Communication, Display.	6	
Unit:2	Digital Image Formation: A Simple Image Model, Geometric Model- Basic Transformation	7	

	(Translation, Scaling, Rotation), Perspective Projection, Sampling & Quantization - Uniform & Non uniform		
Unit:3	Mathematical Preliminaries Neighbour of pixels, Connectivity, Relations, Equivalence & Transitive Closure; Distance Measures, Arithmetic/Logic Operations, Fourier Transformation, Properties of The Two Dimensional Fourier Transform, Discrete Fourier Transform, Discrete Cosine & Sine Transform.	8	
Unit: 4	Image Enhancement Spatial Domain Method, Frequency Domain Method, Contrast Enhancement -Linear & Nonlinear Stretching, Histogram Processing; Smoothing - Image Averaging, Mean Filter, Low-pass Filtering; Image Sharpening. High-pass Filtering, High-boost Filtering, Derivative Filtering, Homomorphic Filtering; Enhancement in the frequency domain -Low pass filtering, High pass filtering.	8	
Unit: 5	Image Restoration Degradation Model, Discrete Formulation, Algebraic Approach to Restoration - Unconstrained & Constrained; Constrained Least Square Restoration, Restoration by Homomorphic Filtering, Geometric Transformation – Spatial Transformation, Gray Level Interpolation	8	
Unit: 6	Image Segmentation Point Detection, Line Detection, Edge detection, Combined detection, Edge Linking & Boundary Detection – Local Processing, Global Processing via The Hough Transform; Thresholding - Foundation, Simple Global Thresholding, Optimal Thresholding; Region Oriented Segmentation - Basic Formulation, Region Growing by Pixel Aggregation, Region Splitting & Merging.	8	
Total:		45	
Reference Books:			
Name of Authors	Title of the Book	Edition	Name of the Publisher
Gonzalez	Digital Image Processing		Pearson
Jahne	Digital Image Processing		Springer India
Chanda&Majumder	Digital Image Processing & Analysis		PHI
Jain	Fundamentals of Digital Image Processing		PHI

Project Work

OBJECTIVE

Project Work is intended to provide opportunity for students to develop understanding of the interrelationship between different courses learnt in the entire diploma programme and to apply the knowledge gained in a way that enables them to develop & demonstrate higher order skills. The basic objective of a project class would be to ignite the potential of students' creative ability by enabling them to develop something which has social relevance, aging, it should provide a taste of real life problem that a diploma-holder may encounter as a professional. It will be appreciated if the polytechnics develop interaction with local industry and local developmental agencies viz. different *Panchayet* bodies, the municipalities etc. for choosing topics of projects and / or for case study. The course further includes preparation of a Project Report which, among other things, consists of technical description of the

project. The Report should be submitted in two copies, one to be retained in the library of the institute. The Report needs to be prepared in computer using Word and CADD software wherever necessary.

GENERAL GUIDELINE

Project Work is conceived as a group work through which the spirit of team building is expected to be developed. Students will be required to carry out their Project Works in groups under supervision of a lecturer of their core discipline who will work as a Project Guide. It is expected that most of the lecturers of the core discipline will act as project guide and each should supervise the work of at least two groups. Number of students per group will vary with the number of lecturers acting as Project Guide and student strength of that particular class.

EXAMINATION SCHEDULE

SUBJECT CODE	NAME OF THE COURSES	COURSES OFFERED IN	COURSE DURATION	CONTACT PERIODS	MARKS ALLOTTED
CSWT/S6 /PR/PRJL	Project Phase-I	FIFTH SEMESTER	15 Weeks	45 contact periods @ 3 sessional contact periods per week	Continuous Internal Assessment of 100 marks is to be carried out by the teachers throughout the two semesters. Distribution of marks: Project Work – 50, Project Report – 25, Viva-voce – 25.
	Project Phase-II	SIXTH SEMESTER	First 12½ Weeks	75 contact periods @ 6 sessional contact periods per week	External assessment of 100 marks shall be held at the end of the Part – III Second Semester on the entire syllabi of CSWT Project Work. The external examiner is to be from Industry / Engineering College / University / Government Organisation. Distribution of marks: Project Work - 25, Project Report – 25, Viva-voce – 50.

Advanced Web Technology (Professional Practice-IV)

Name of course: Advanced Web Technology (Professional Practice-IV)	
Subject code: CSWT/S6/PR/AWTL	Semester : 6th
Duration : 17 weeks	Maximum Marks : 50 Marks
Teaching Scheme	Examination Scheme
Theory : NA	Class Test: NA
Tutorial: NA	Teachers Assessment (including attendance):
Practical: 04 hrs./week	End Semester Exam.:
Credit: 2	Practical / Sessional : 50 (Internal)
	Continues internal assessment of 50 marks is to be carried out by teachers throughout 6 th Semester.

	Performance of Job – 35, Notebook – 15.	
Objective:		
Student will be able to understand the web architecture, Static Web pages, Dynamic Web pages , Active Web pages, Client side scripting language, Different web page development technologies including . Net technology and Java Technology.		
Pre-Requisite:		
Basic concept of web, internet, web page design, core java, dbms		
Unit No.	Contents(Practical / Sessional)	Remarks
Unit:1	Introduction The World Wide Web, WWW Architecture, Web server, Web client, Web Search Engines, Web crawling, Web indexing, Web Searching.	
Unit:2	Static , Dynamic and Active Web Pages HTML- different tags, sections, image & pictures, listings, tables, frame, frameset, form. An overview of DHTML, cascading style sheet (css). An overview of active web pages: working with applet, java applet life cycle.	
Unit:3	Java Script Data types, variables, operators, conditional statements, array object, date object, string object, HTML form validation.	
Unit: 4	Introduction toJava Technologies for web development Servlets Servlet environment and role, HTML support, Servlet API, The servlet life cycle, Cookies and Sessions. JSP JSP architecture, JSP servers, JSP tags, understanding the layout in JSP, Declaring variables, methods in JSP, inserting, java expression in JSP, processing request from user and generating dynamic response for the user, introduction to JDBC, database connectivity.	
Unit: 7	Introduction to .NET framework Evolution of .NET, Comparison of Java and .NET, Architecture of .NET framework i. Common Language Runtime ii. Common Type System iii. Metadata iv. Assemblies v. Application Domains vi. CFL · Features of .NET · Advantages and Application	
Unit: 8	C# Basic principles of object oriented programming, Basic Data Types, Building Blocks- Control Structures, operators, expressions, variables, Reference Data Types- Strings , Data time objects, Arrays, Classes and object, Exception Handling, Generics, File Handling, Inheritance and Polymorphism, Database programming	

Unit: 9	Web Applications in ASP.NET ASP.Net Coding Modules, ASP.NET Page Directives, Page events and Page Life Cycle,PostBack and CrossPage Posting, ASP.Net Application Compilation models, ASP.NET server Controls, HTML Controls, Validation Controls, Building Databases	

Seminar Work

OBJECTIVE

Seminar on Project Work is intended to provide opportunity for students to present the Project Work in front of a technical gathering with the help of different oral, aural and visual communication aids which they learnt through different courses in the Parts – I & II of the diploma course. In the Seminar, students are not only expected to present their Project Work, but also to defend the same while answering questions arising out of their presentation.

GENERAL GUIDELINE

In '**Seminar**' classes all the teachers who are involved with imparting knowledge and skill to the students in their "Project" classes should be present along with all the students.

The students are expected to incorporate any positive suggestion that they receive, and, to correct any mistake that are pointed out during the Seminar before the External Assessment of the Project Work, which shall take place at the end of the Part – III Second Semester.

EXAMINATION SCHEDULE

SUBJECT CODE	NAME OF THE COURSES	COURSES OFFERED IN	COURSE DURATIO N	CONTACT PERIODS	MARKS ALLOTTED

CSWT/S6 /PR/SMN R	Seminar Work	SIXTH SEMESTE R	2 Last 2½ Weeks	40 contact periods @ 2 for first 12½ weeks and 6 for last 2½ weeks sessional contact periods per week	Continuous Internal Assessment of 25 marks for a particular group is to be awarded by their concerned Project Guide. External Assessment of 25 marks is to be awarded by all the other Project Guides present in the Seminar.
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GENERAL VIVA-VOCE

EXAMINATION SCHEDULE

SUBJECT CODE	NAME OF THE COURSES	COURSES OFFERED IN	COURSE DURATI ON	CONTACT PERIODS	MARKS ALLOTTED
CSWT/S6 /GVV	General Viva Voce	SIXTH SEMESTE R			The Final Viva-Voce Examination shall take place at the end of the 6 th Semester. It is to be taken by one External and one Internal Examiner. The External Examiner is to be from industry / engineering college / university / government organisation and he / she should give credit out of 25 marks ; whereas, the Internal Examiner should normally be the Head of the Department and he / she should give credit of 25 marks . In the absence of the Head of the Department, the senior most lecturer will act as the Internal Examiner.