Vision of the Department	To produce a blend of creativity & ethical engineering graduates and making them capable of facing the real-life challenges.
Mission of the Department	The mission elements of Computer Science & Engineering Department are: M-1. Inculcating the fundamentals of computer science & engineering and analysing the engineering problems along with the development of solutions keeping environmental aspects. M-2. To cultivate ability for modern tool usage on ethical grounds to widely solve real life issues. M-3. Building team spirit within the students, creating effecting communication for lifelong learning.

Programme Outcomes

1. To solve complex engineering problems by applying the knowledge of mathematics, algorithms, computing principles.
2. Identify and analyse complex engineering problems and define requirements appropriate for it.
3. To design and implement computer-based systems and programs to meet desired needs.
4. To provide valid conclusions by using research-based knowledge and research methods.
5. To use modern tools necessary for computing practice.
6. To understand the issues related to society by using reasoning.
7. To understand the issues related to environmental context for strengthening of engineering solutions.
8. An understanding of ethical responsibility.
9. To work effectively as team member for the accomplishment of goals.
10 To communicate effectively with community and society.
11. to design and develop various project economically with planning.
12. To engage in life-long learning.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO: 1 To provide quality computer education to inculcate modern technical skills among the students.

PEO: 2 To cultivate the ability to analyse the demand of software industry for carrying out hands on projects.

PEO: 3 Inculcate direction qualities to work mutually as a team member with effective briefing skills.

Bachelor of Technology (Computer Science & Engineering)

Scheme of Studies/Examination
Semester V

Bachelor of Technology (Computer Science & Engineering)										
Credit-Based Scheme of Studies/Examination										
Semester V (w.e.f. session 2020-2021)										
S. No.	Course Code	Subject	L:T:P	Hours/ Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	ES-301	Microprocessor & Interfacing	3:0:0	3	3	75	25	0	100	3
2	PC-CS-301	Database Management Systems	3:0:0	3	3	75	25	0	100	3
3	PC-CS-303	Formal Language & Automata Theory	3:0:0	3	3	75	25	0	100	3
4	PC-CS-305	Essential of Information Technology	3:0:0	3	3	75	25	0	100	3
5	PC-CS-307	Computer Organization & Architecture	2:0:0	2	2	75	25	0	100	3
6	PEC	Elective-I	3:0:0	3	3	75	25	0	100	3
7	PC-CS-309L	Database Management Systems Lab	0:0:4	4	2	0	40	60	100	3
8	PC-CS-311L	Essential of Information Technology Lab	0:0:4	4	2	0	40	60	100	3
Total				**25**	**21**	**450**	**230**	**120**	**800**	
9	MC-904	Energy Resources & Management	3:0:0	3	0	0	100	0	100	3
10	SIM-301*	Seminar on Summer Internship	2:0:0	2	0	0	50	0	50	

PEC Elective-I
Digital Data Communication: PE-CS-T301
Parallel and Distributed Computing: PE-CS-T303
Information Theory and Coding: PE-CS-T305
Advanced Algorithms: PE-CS-T307

***Note:** SIM-301* is a mandatory credit-less course in which the students will be evaluated for the Summer Internship undergone after 4th semester and students will be required to get passing marks to qualify.

ES-301	Microprocessor & Interfacing						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	3	75	25	100	**3 Hour**
Purpose	To learn the architecture and programming of Intel family microprocessors and its interfacing.						
Course Outcomes							
CO 1	To study the Architecture of 8086 microprocessors						
CO 2	To implement the interfacing of memories to 8086 Microprocessor						
CO 3	To learn and analyze the instruction set of 8086 Microprocessor and implementation of assembly language programming of 8086 Microprocessor.						
CO 4	To design and implement the interfacing of interrupts, basic I/O and DMA with 8086 Microprocessor						

Unit I

8086 CPU ARCHITECTURE: 8086 Block diagram; description of data registers, address registers; pointer and index registers, PSW, Queue, BIU and EU. 8086 Pin diagram descriptions. Generating 8086 CLK and reset signals using 8284. WAIT state generation. Microprocessor BUS types and buffering techniques, 8086 minimum mode and maximum mode CPU module.

UNIT-II

Main Memory System Design: Memory devices, 8086 CPU Read/Write timing diagrams in minimum mode and maximum mode. Address decoding techniques. Interfacing SRAMS; ROMS/PROMS. Interfacing and refreshing DRAMS.

UNIT-III

8086 Instruction Set: Instruction formats, addressing modes, Data transfer instructions, string instructions, logical instructions, arithmetic instructions, transfer of control instructions; process control instructions; Assembler directives.

8086 Programming Techniques: Writing assembly Language programs for logical processing, arithmetic processing, timing delays; loops, data conversions.

UNIT-IV

Basic I/O Interface: Parallel and Serial I/O Port design and address decoding. Memory mapped I/O Vs Isolated I/O Intel's 8255 and 8251- description and interfacing with 8086. ADCs and DACs, - types, operation and interfacing with 8086. Interfacing Keyboards, alphanumeric displays, multiplexed displays, and stepper motor, optical encoder with 8086.

Interrupts and DMA: 8086 Interrupt mechanism; interrupt types and interrupt vector table. Applications of interrupts, Intel's 8259. DMA operation. Intel's 8237.

Suggested Books:

1. Barry B. Brey, "The Intel Microprocessor8086/8088, 80186", Pearson Education, Eighth Edition, 2009
2. D.V. Hall, Microprocessors and Interfacing, McGraw Hill 2nd ed.
3. Liu, Gibson, "Microcomputer Systems: The 8086/88 Family", 2nd Edition, PHI,2005
4. Kenneth Ayala, "The 8086 Microprocessor: Programming & Interfacing the PC", Cengage Learning,
5. Indian Edition, 2008
6. Kip Irvine, "Assembly language for IBM PC", PHI, 2nd Edition, 1993
7. Peter Abel, "Assembly language programming", Pearson Edu,5th Edition,2002
8. Uffenback, "The 8086 Family Design" PHI, 2nd Edition.
9. Walter A Triebel and Avtar Singh; The 8088 and 8086 Microprocessors

LECTURE PLAN

Lecture	Topic
L1	The 8085 processor: Introduction to microprocessor
L2	8085 microprocessor architecture
L3	Instruction set of 8085 microprocessor
L4	Interrupt structure of 8085 microprocessor
L5	Assembly language programming
L6	Memory Interfacing : semiconductor memory
L7	Types of semiconductor memory : static and dynamic RAM
L8	ROM and its types :-EPROM, EEPROM
L9	NOVRAM and Interfacing memory
L10	Interfacing SRAM , DRAM and EPROM etc.
L11	Timing of RAM and ROM signals
L12	Architecture of 8086 microprocessor
L13	Block Diagram of 8086
L14	Details of sub blocks such as EU , BIU
L15	Memory segmentation in 8086 microprocessor
L16	Physical address computation and program relocation
L17	Physical address computation and program counter
L18	Addressing modes and instruction formats
L19	Pin diagram and instruction of various signals
L20	Instruction set of 8086 : Instruction execution timing
L21	Assembler instruction format , data transfer instructions
L22	Arithmetic instructions , branch instructions , looping instructions
L23	NOP and HLT instructions, flag manipulation instructions
L24	Logical instructions , shift and rotate instructions
L25	Directive and operators , programming examples
L26	Directive and operators , programming examples
L27	Introduction to 8255 PPI chip
L28	Architecture of 8255 PPI chip
L29	8255 control words
L30	Modes of operation of 8255 PPI chip
L31	Examples of the 8255 PPI chip
L32	Introduction to D/A converters
L33	Introduction to A/D converters
L34	Interfacing A/D and D/A converters

L35	Introduction to DMA process
L36	DMA architecture
L37	8237 DMA controller
L38	Introduction to interrupt
L39	8259 programming interrupt Controller
L40	Programmable interval timer chip

TUTORIAL SHEET-1

Q.1 Draw the architecture of 8085 Microprocessor and specify the functions of address bus and the direction of information flow on the address bus?

Q.2 Explain the function of Flag register in 8085 MPU with necessary diagram?

Q.3 How many memory locations can be addressed by a microprocessor with 14 address lines and if a memory chip size is 1024 X 4 bits then how many memory chips are required to make up 2K bytes of memory?

Q.4 Give the classification of memory in detail with the help of diagram?

Q.5 Elaborate the functions of the following in context to 8085 MPU:

(i) Accumulator?

(ii) Program Counter?

(iii) Stack Pointer?

(iv) Address Bus?

(v) Data Bus?

(vi) Control Bus?

TUTORIAL SHEET-2

Q.1 Give the programming model of 8085 MPU?

Q.2 Explain following instruction of 8085 MPU with example:

(i) SUI

(ii) ADI

(iii) CMA

(iv) XRI

(v) OUT

Q.3 Write a program using the ADI instruction to add two hexadecimal numbers 3AH and 48H and to display the answer to an output port?

Q.4 How does the microprocessor differentiate between the positive numbers, a negative number and a bit pattern?

Q.5 Write a program to find the greatest number in a given set of numbers?

TUTORIAL SHEET-3

Q.1 Give the pin description, block diagram and CWR format for 8255 PPI chip?

Q.2 Explain following modes of 8255 PPI chip:

(i) I/O Mode?

(ii) BSR Mode?

Q.3 Interface ADC 0808 with 8086 using 8255 ports. Use port A of 8255 for transferring digital data output of ADC to the CPU and port C for control signals. Assume analog i/p is present at 2^{nd} i/p of ADC and a clock signal of suitable frequency is available. Draw schematic and write an ALP?

Q.4 Explain the functions of assembler directive in detail?

Q.5 Draw the timing diagram for MODE 2 of 8255 and elaborate it?

TUTORIAL SHEET-4

Q.1 Give the architecture block diagram of 8237?

Q.2 Give pin description of DMA controller?

Q.3 Explain the following transfer modes of 8237:

(i) Single Transfer mode?

(ii) Cascade Mode?

(iii) Memory to Memory Transfer Mode?

(iv) Demand Transfer Mode?

Q.4 Elaborate the DMA operation of 8237 in detail?

Q.5 What are different types of interrupt? Explain them.

Q.6 Explain 8259 programmable Interrupt controller.

Roll No. .....
Printed Pages : 2

34095

BT-4 / M-18

MICROPROCESSOR AND INTERFACING

Paper–CSE–208-N

Time allowed : 3 hours] *[Maximum marks : 75*

Note :- *Attempt five questions in all selecting at least one from each unit. All questions carry equal marks.*

Unit–I

1. Describe the evaluation of Microprocessor in detail. Give all the features of 8085 Microprocessor. Also draw the functional block diagram of 8085 internal architecture. 15

2. Draw the pin configuration of 8085 Microprocessor and explain the function of all the pins in detail. 15

Unit–II

3. (a) Explain the working of EU and BIU of 8086 Microprocessor. 7

(b) Explain with the help of diagram the working of static and dynamic RAM and ROM memories. 8

4. Draw and explain the block diagram and pin diagram of 8086 microprocessor and explain its PSW. 15

Unit–III

5. (a) Discuss the following assemble directives.

(i) ASSUME

(ii) SEGMENT 6

(b) Write a programme to compute factorial for a number N between 1 and 8. 9

6. Write 8086 ALP to generate 10 elements of Fibonacci series. 15

Unit–IV

7. (a) What is Intel's 8259 chip? Discuss its use and operation in a 8086 Microprocessor based systems. 9

(b) Describe the operation, characteristic and interfacing of D/A convertor with 8086 Microprocessor. 6

8. (a) Define an interrupt. Explain its various applications. 7

(b) Write short note on the following:

(i) Description and interfacing of 8251.

(ii) Interfacing of 8×8 Keyboard. 8

PC-CS-301	Database Management Systems						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	3	75	25	100	**3 Hour**
Purpose	To familiarize the students with Data Base Management system						
Course Outcomes							
CO 1	To provide introduction to relational model and ER diagrams.						
CO 2	To realize about Query Processing and Transaction Processing.						
CO 3	To comprehend about the concept of functional dependencies.						
CO 4	To learn the concept of failure recovery and concurrency control.						

UNIT I

Introduction: Concept & Overview of DBMS, Data Models-, Network, Hierarchical and Relational Model, Levels of abstraction. Administrator, Database Users, Three Schema architecture of DBMS, Application. **Entity-Relationship Model:** : Entities, Attributes and Entity Sets, Relation and Relationships sets, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.

UNIT II

Relational Model: Structure of relational Databases, Relational Algebra and Relational Calculus, Operations on Relational Algebra, Operations on Relational Calculus, Tuple Relational Calculus, Domain Relational Calculus.

SQL and Integrity Constraints: Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, Introduction to views, Querying, Nested Sub queries, Database security application development using SQL, Stored procedures and triggers.

UNIT III

Relational Database Design:

Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF.

Internals of RDBMS: Physical data structures, Query optimization: join algorithm, statistics and cost base optimization. Transaction processing, Concurrency control and Recovery Management: transaction model properties, state serializability, lock base protocols, two phase locking.

UNIT IV

Recovery System: Types of Failures, Recovery Techniques, ARIES.

Concurrency Control: Serial and Serializable Schedules-Conflict Serializability –Enforcing Serializability by Locks-Locking Systems with Several Lock Modes-Concurrency Control by Timestamps, validation. **Transaction Management:** ACID Properties, Transaction states, Serializability and Recoverability-View, Serializability-Resolving Deadlocks-Distributed Databases: Commit and Lock

Suggested Books:

- Ramez Elmasri , Shamkant B. Navathe ,"Fundamentals of Database systems", Pearson
- Korth, Silberschatz, Sudarshan: database concepts, MGH,
- R. Ramakrishnan and J. Gehrks database management system; MGH, International edition,
- C. J. Date, data base systems: 7th edition, Addison Wesley, Pearson Education,
- Chakrabarti, Advance database management systems , Wiley Dreamtech

LESSON PLAN

Name: Dr. Gaurav Sharma, Dr. Shilpi Harnal

Discipline: Computer Science and Engineering

Semester: B.Tech 5th

Subject: DATA BASE MANAGEMENT SYSTEMS (**PC-CS-301)**

Lesson Plan Duration: 15 weeks

Work Load: Lectures-03 Practical -04

Week		**Theory**
	Lecture Day	**Topic**
UNIT-1		
1st	1st	Concept & Overview of DBMS
	2nd	Data Models
	3rd	Database Languages, Database Administrator
2nd	4th	Database Users
	5th	Three Schema architecture of DBMS
	6th	Basic concepts, Design Issues, Mapping Constraints of E-R model
3rd	7th	Keys, Entity-Relationship Diagram, Weak Entity Sets
	8th	Extended E-R features
	9th	**Revision of Unit-I**
UNIT-II		
4th	10th	Structure of relational Databases
	11th	Relational Algebra
	12th	Relational Calculus
5th	13th	introduction to Views, updates on views
	14th	Concept of DDL, DML, DCL
	15th	Basic Structure, Set operations
6th	16th	Aggregate Functions, Null Values, Domain Constraints

	17th	Referential Integrity Constraints, assertions, views
	18th	Nested Sub queries
7th	19th	Database security application development using SQL
	20th	Stored procedures and triggers
	21st	**Revision of Unit-II**
UNIT-III		
8th	22nd	Functional Dependencies
	23rd	Different anomalies in designing a Database
	24th	**-do-**
9th	25th	Normalization using functional dependencies,
	26th	**-do-**
	27th	Decomposition, Boyce-Codd Normal Form, 3NF
10th	28th	**-do-**
	29th	Normalization using multi-valued dependencies, 4NF, 5NF
	30th	**-do-**
11th	31st	Physical data structures, Query optimization: join algorithm
	32nd	statistics and cost base optimization
	33rd	Overview of Transaction processing, Concurrency control, Recovery Management
12th	34th	Transaction model properties, state serializability, lock base protocols, Two phase locking.
	35th	**Revision of Unit-III**
UNIT-IV		
13th	36th	Issues and Models for Resilient Operation -Undo/Redo Logging
	37th	Protecting against Media Failures
	38th	Serial and Serializable Schedules
	39th	Conflict Serializability
14th	40th	Enforcing Serializability by Locks
	41st	Locking Systems with Several Lock Modes-Concurrency Control by Timestamps, validation.

	42nd	Serializability and Recoverability-View
15th	43rd	Serializability-Resolving
	44th	Deadlocks-Distributed Databases: Commit and Lock
	45th	**Revision of Unit-IV**

Text Books;

1. Ramez Elmasri , Shamkant B. Navathe ,"Fundamentals of Database systems", Pearson
2. Korth, Silberschatz, Sudarshan: database concepts, MGH,

Reference Books:

1. R. Ramakrishnan and J. Gehrks database management system; MGH, International edition,
2. 2 C. J. Date, data base systems: 7th edition, Addison Wesley, Pearson Education
3. Rini Chakrabarti, Advance database management systems , Wiley Dreamtech

Tutorial Sheet-1

1. What is Data Base and Data Base System? Differentiate File processing system and data base system.
2. Explain three Schema architecture of DBMS
3. What do you mean by Data Independence?.
4. Explain network model and how insertion can take place in network.
5. How DBA can provide better service to the users?

Tutorial Sheet-2

1. Explain DDC, DCC, DML ,SDL.
2. Differentiate
   a) Weak and strong entity
   b) Derived and Stored attribute
   c) Total and partial participation
3. Explain quantifiers and explain operation in relational algebra.
4. How equi join is different from natural join
5. Describe following
   a) Primary key
   b) Foreign key
   c) Unique key

Tutorial Sheet-3

1. Why do we call relational calculus a known procedural language?
2. Differentiate tuple and domain relational calculus.
3. Explain Functional dependencies and normalization in detail.
4. Define lossless join property.
5. Explain Query optimization: join algorithm

Tutorial Sheet-4

1. What is PL/SQL? How is it different from SQL?
2. Explain various transaction states?
3. Explain database recovery techniques.
4. Explain the Concurrency control mechanism?
5. What do you mean by transaction? Explain ACID property.

Tutorial Sheet-5

1. What is deadlock and Explain serializability of schedule
2. Define the following
   a) Locking
   b) Starvation
   c) Time stamp
   d) Serialization
3. Explain protecting against media failures.
4. Explain Serial and Serializable Schedules
5. Explain the concept of Deadlocks.
6. Locking Systems with Several Lock Modes

Roll No. .....

Total Pages : 02

BT-3/D-19

33001

DATABASE MANAGEMENT SYSTEM

CSE-201E

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. What are properties of Relational Model ? Explain integrity constraints in details.

2. Explain the following in detail :
   (a) Mapping Cardinalities in E-R Model.
   (b) Total and Partial Participation
   (c) Composite and Derived Attribute.

Unit II

3. What are Hierarchical and Network Database Models ? Discuss applications of database models to database design.

4. Explain the following by examples :
   (a) Index Sequential Files
   (b) Hashing
   (c) B-Tree Index Files
   (d) Direct Files.

Unit III

5. (a) Define Normalization and its various forms. How does BCNF differ from 3 NF.
   (b) What are prime and non-prime attribute in a relation ? Discuss their significance in Normalization process.

6. What is Relational Algebra ? Discuss Query Language-SQL and QBE ?

Unit IV

7. (a) Discuss the Atomicity, Durability and Consistency Preservation Properties of a database transaction.
   (b) Describe the basic techniques to implement database recovery in a DBMS.

8. Explain the following :
   (a) Time Stamping
   (b) 2PL Protocol.

Roll No. ..... Total Pages : 02

BT-3/D-19 33001

DATABASE MANAGEMENT SYSTEM

CSE-201E

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

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   (b) 2PL Protocol.

CSE-301N	Automata Theory					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**75**	**25**	**100**	**3 Hrs.**
Purpose	To understand the challenges for Theoretical Computer Science and its contribution to other sciences					
Course Outcomes(CO)						
CO1	Identify real life applications of automata theory in terms of abstract machines.					
CO2	To study concept of FA, NFA, Regular expressions, conversion of Regular Expressions to FA and state minimization.					
CO3	Analysis of Normal forms, Chomsky Hierarchy, Pumping Lemma etc.					
CO4	To study mealy and Moore machines, PDA, equivalence of PDA & CFG, Kleene's Theorem and Parikh theorem.					
CO5	To analyze TM, PGP, Rice Theorem & decidability.					
CO6	Identify different formal language classes and their relationships					

Unit - I

Introduction to Automata: Study and Central Concepts of Automata Theory, Applications of Finite Automata, An Introduction of Deterministic Finite Automata(DFA) and Non-Deterministic Finite Automata(NFA), Finite Automata with Epsilon (€) Transitions.

Regular Expression and Languages:-Regular Expressions (RE), Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws of Regular Expressions. Closure Properties of Regular Languages, RE to NFA, DFA Conversion and DFA to RE, Equivalence and Minimization of NFA and DFA automata.

Unit-2

Context free Grammars and Languages: Parse Trees, Context Sensitive Grammar, Applications of Context Free Grammars, Regular Grammar, Ambiguity in Grammars and Languages. Normal forms of context free grammars, Subfamilies of Context Free Languages (CFL), Closure Properties of CFL, Chomsky Theorem, Chomsky Hierarchy, Chomsky Normal Form, Greibach Normal Form.

Pumping Lemma:-Introduction to Pumping Lemma, pumping lemma for context free languages, Applications of Pumping Lemma, Minimization of Finite Automata, and Recursive Language.

Unit-3

Mealey and Moore Machines:- Definitions, Representation, Equivalence of Moore and Mealey Machines and its Designing.

Push Down Automata: Introduction of Push Down Automata (PDA), Language of PDA, Equivalence of PDA's and CFG's, Deterministic Push Down Automata, Designing of PDA, Applications of PDA. Parikh Theorem and Parikh Mapping, Kleene's Theorem.

Unit-4

Introduction to Turing Machine: The Turing Machine, Programming Techniques for Turing Machine, Extensions of Turing Machine, Restricted Turing Machines, Universal Turing Machines and Designing of Turing Machines, Time and Tape Complexity Measures of Turing machines

Decidability: Post's Correspondence Problem (PCP), Rice's Theorem, Decidability of Membership, Emptiness and Equivalence Problems of Languages.

Textbooks

1. J.E.Hopcroft, R.Motwani and J.D.Ullman , "Introduction to Automata Theory Languages and computation", Pearson Education Asia , 2001.
2. K.Krithivasan and R.Rama; Introduction to Formal Languages, Automata Theory and Computation; Pearson Education, 2009.

References

1. Peter Linz, "An Introduction to Formal Language and Automata", 4th Edition, Narosa Publishing house , 2006.
2. M.Sipser; Introduction to the Theory of Computation; Singapore: Brooks/Cole, Thomson Learning, 1997.
3. John.C.martin, "Introduction to the Languages and the Theory of Computation",Third edition, Tata McGrawHill, 2003.

Lesson Plan

Week	Theory	
	Lecture Day	**Topic**
1	1st	Automata and its Applications. Basics of Finite Automata
	2nd	Basic of Deterministic finite Automata (DFA) and examples
	3rd	DFA's Limitations and examples
2	4th	Basic of Non-Deterministic finite Automata (NFA) and examples.
	5th	Equivalence of DFA and NDFA and examples
	6th	Finite Automata with E-Moves
3	7th	Regular Expression's Basics
	8th	Equivalence of finite Automata and expression
	9th	Regular expression conversion and vice versa
4	10th	Introduction to Machines : Concept of basic machines
	11th	Moore and Mealy Machines
	12th	Properties and limitations of FSM
5	13th	Conversion of NFA and DFA by Arden's method
	14th	Properties of Regular sets
	15th	The Pumping Lemma for regular sets
6	16th	Application of the pumping Lemma Closure Properties of regular sets
	17th	Myhill-Nerode. Theorem and minimization of Finite Automata
	18th	Minimization Algorithm
7	19th	Grammars : Definition
	20th	Context free Grammar
	21st	Context sensitive Grammar
8	22nd	Grammar ambiguity
	23rd	Regular grammar
	24th	Reduced Form
9	25th	Removal of useless symbols
	26th	Unit production
	27th	Chomsky Normal Form (CNF)
10	28th	Griebach Normal Form (GNF)
	29th	Pushdown Automata : Introduction to push-down machines
	30th	Application of push down machines
11	31st	Turing Machines
	32nd	Deterministic Turing Machines
	33rd	Non-Deterministic Turing Machines
12	34th	Design of T.M
	35th	Halting Problem of T.M
	36th	Universal T.M

13	37th	PCP Problem
	38th	Chomsky Hierarchy of grammars
	39th	unrestricted grammar
14	40th	Context sensitive Language
	41st	Relation between languages of classes
	42nd	Basic Concepts Computability
15	43rd	Primitive Recursive functions
	44th	Rice Theorem
	45th	Parikh Theorem

TUTORIAL SHEET

UNIT-I

1: Concepts of Automata Theory, Applications of Finite Automata

2: An Introduction of Deterministic Finite Automata (DFA) and Non-Deterministic Finite Automata (NFA)

3: Regular Expression and Languages: -Regular Expressions (RE)

4: Algebraic Laws of Regular Expressions.

5: RE to NFA, DFA Conversion and DFA to RE,

6: Equivalence and Minimization of NFA and DFA automata.

UNIT-II

1: Parse Trees, Context Sensitive Grammar, Applications of Context Free Grammars

2: Ambiguity in Grammars and Languages. Normal forms of context free grammars

3: Subfamilies of Context Free Languages (CFL), Closure Properties of CFL

4: Chomsky Theorem, Chomsky Hierarchy, Chomsky Normal Form

5: Introduction to Pumping Lemma, pumping lemma for context free languages,

6: Minimization of Finite Automata

UNIT-III

1: Definitions, Representation, Equivalence of Moore and Mealey Machines and its Designing.

2: Introduction of Push Down Automata (PDA), Language of PDA, Equivalence of PDA's

3: CFG's, Deterministic Push Down Automata, Designing of PDA

4: Parikh Theorem and Parikh Mapping, Kleene's Theorem.

UNIT-IV

1: The Turing Machine, Programming Techniques for Turing Machine, Extensions of Turing Machine

2: Restricted Turing Machines, Universal Turing Machines and Designing of Turing Machines

3: Time and Tape Complexity Measures of Turing machines

4: Post's Correspondence Problem (PCP)

5: Rice's Theorem, Decidability of Membership

6: Emptiness and Equivalence Problems of Languages.

Roll No. ..... Total Pages : 03

BT-5/D-18 **35113**

AUTOMATA THEORY

CSE-301-N

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *two* questions from each Unit.

Unit I

1. (a) What is a finite automation ? Design finite automata illustrating a string containing even number of *a*'s and odd number of *b*'s over the alphabet $\{a, b\}$. **7.5**

   (b) How can you minimize the number of states of a DFA ? Explain using suitable example. **7.5**

2. (a) Define regular language. Discuss the closure properties of regular language. **7.5**

   (b) For every language $L \subseteq \Sigma^*$ accepted by an NFA $M = (Q, \Sigma, q_0, A, \delta)$, prove that there is an FA $M_1 = (Q_1, \Sigma, q_1, A_1, \delta_1)$ that also accepts L. **7.5**

Unit II

3. Consider the CFG with productions :

$S \rightarrow S_1\$ \quad S1 \rightarrow S_1 + T \mid T \quad T \rightarrow T * F \mid F$

$F \rightarrow [S_1] \mid a$

(a) Write the CFG obtained from this one by eliminating left recursion.

(b) Find whether the given grammar is ambiguous or not ? **15**

4. (a) What do you mean by GNF and CNF ? How these can be used to simplify CFL ? Explain using suitable examples. **7.5**

(b) State and prove pumping lemma. **7.5**

Unit III

5. What is Moore Machine ? Design a Moore Machine for 2's complement and then convert it into Mealy Machine. **15**

6. Differentiate between PDA and DPDA. Design a PDA for equal number of a's and equal number of b's over the alphabet {a, b}. **15**

Unit IV

7. Design a turing machine accepting $XX = \{xx \mid x \in \{a, b\}^*\}$. Differentiate between single tape and multi-tape turing machine. **15**

8. Write short notes on the following :

(i) TCP

(ii) Decidability *vs.* Undedidability. **15**

PC-CS-305	Essential of Information Technology						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hrs.**
Purpose	**To introduce the concepts of Advanced Java Programming**						
Course Outcomes (CO)							
CO1	Study fundamental concepts of Java.						
CO2	Design of user interfaces using Java applets.						
CO3	To study and implement JDBC and Jbeans.						
CO4	To study concepts of servlets and its applications.						

UNIT-I

Introduction: Importance and features of Java, Concepts of Java Virtual machine (JVM), Keywords, Constants, Variables and data types, operators and expressions, Control statements, Conditional statements, loops and iterations. Class definition, adding variables and methods, creating objects, constructors, defining methods, calling methods, method overloading. Creating an array, one and two dimensional array, string array and methods String and String Buffer classes, Wrapper classes. Packages and Interfaces, exception handling.

UNIT-II

Design of User Interfaces: Swing, Applet, Icons and Labels, Text Fields, Buttons, button Class, Check Box, Radio Buttons, The Container, Panel, Windows, and Frame Classes, Combo Box, Tabbed Panes, Scroll Panes, Trees, Tables.

UNIT-III

Servlets: Introduction to Servlets, Life cycle of Servlets, Creating, Compiling and running servlet, Reading the servlet Parameters, Reading Initialization parameter, Packages- javax.servlet Package, Handling HTTP Request and Response (GET / POST Request), Cookies and Session Tracking.

UNIT-IV

Advance Java: Collection, list, Map, Tree, Hashing.

JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, working with statements, Creating and Executing SQL statements, working with Result Set Object & Result Set Meta Data.

Suggested Books:

1. Gary Cornell and Horstmann Cay S., Core Java, Vol I and Vol II, Sun Microsystems Press.
2. Herbert Schildt, Java: The Complete Reference, McGraw-Hill.
3. Philip Hanna, JSP: The Complete Reference, McGraw-Hill.
4. Deital and Deital, Java How to Program, Prentice Hall (2007).

Lesson Plan

Week	Theory	
	Lecture Day	**Topic**
1	1st	Importance and features of Java, Concepts of Java Virtual machine (JVM)
	2nd	Keywords, Constants, Variables and data types
	3rd	operators and expressions, Control statements, Conditional statements, loops and iterations
2	4th	Class definition, adding variables and methods, creating objects
	5th	constructors, defining methods, calling methods, method overloading
	6th	Creating an array, one and two dimensional array
3	7th	string array and methods
	8th	String Buffer classes
	9th	Wrapper classes
4	10th	Packages and Interfaces
	11th	Exception handling
	12th	Swing, Applet
5	13th	Icons and Labels
	14th	Text Fields, Buttons, button Class
	15th	Check Box, Radio Buttons
6	16th	The Container, Panel
	17th	Windows, and Frame Classes
	18th	Combo Box
7	19th	Tabbed Panes, Scroll Panes
	20th	Trees, Tables
	21st	Introduction to Servlets, Life cycle of Servlets
8	22nd	Creating, Compiling and running servlet
	23rd	Creating, Compiling and running servlet
	24th	Reading the servlet Parameters, Reading Initialization parameter
9	25th	Reading the servlet Parameters, Reading Initialization parameter
	26th	javax.servlet Package
	27th	Handling HTTP Request and Response (GET / POST Request)
10	28th	Cookies
	29th	Session Tracking
	30th	Collection
11	31st	List
	32nd	Map
	33rd	Tree
12	34th	Hashing
	35th	JDBC Fundamentals
	36th	Establishing Connectivity and working with connection interface

13	37th	working with statements
	38th	Creating and Executing SQL statements
	39th	working with Result Set Object
14	40th	working with Result Set Object
	41st	Result Set Meta Data.
	42nd	Result Set Meta Data.

Tutorial sheet 1

1. What is difference between C++ and JAVA?
2. What are the important features of JAVA?
3. What is JVM? Differentiate JDK, JRE and JVM.
4. Differentiate Constructors and Methods.
5. What is difference between Overloading and Overriding?

Tutorial Sheet 2

1. What is Exception Handling? Explain hierarchy of Exception Classes. What are checked and unchecked Exceptions?
2. Differentiate throw and throws.
3. Differentiate String and String Buffers. Differentiate String Buffer and String Builders.
4. Explain Wrapper classes.

Tutorial Sheet 3

1. What is Applet? How it is created and destroyed?
2. What are JAVA Beans and what is purpose of using Beans. What is Bean persistent property?
3. What is difference between Abstract Class and Interface.
4. What are Packages and its advantages? How to create Packages?

Tutorial Sheet 4

1. Explain Frame Classes.
2. Explain Tabbed Panes
3. Explain Scroll Panes.
4. Explain Text Fields, Buttons, Checkbox, Radio Button.

Tutorial Sheet 5

1. Explain Life cycle of Servlets.
2. Explain Cookies & Session Tracking.
3. Explain javax.servlet Package.
4. How you will compile and run Servlet.

Tutorial Sheet 6

1. Explain Collections.
2. Write about Establishing Connectivity and working with Connection Interface in JDBC.
3. How to with Statements and Result Set in JDBC.
4. How to create & execute SQL statements in JDBC.

Roll No. ..... Total Pages : 03

BT-5/D-18 35160

JAVA PROGRAMMING

IT-305N

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Explain briefly the following object oriented concepts :
   (i) Abstraction
   (ii) Polymorphism.
   (b) Define class and method. How objects are assigned as reference variable ?
   (c) Write a Java program to interchange the row and columns of a given matrix. **5+5+5=15**

2. Explain the following with example :
   (a) String handling using string buffer class
   (b) The universal super class-objected class. **8+7=15**

Unit II

3. (a) What do you mean by checked and unchecked exceptions ? Discuss with example.

   (b) Wite a Java program to find the area and perimeter of square and circle using interface. **8+7=15**

4. (a) Explain the following with necessary code snippets :
   (i) Creating thread
   (ii) Stopping and Blocking a Thread.

   (b) How do you store and retrieve objectives from file ? Discuss. **8+7=15**

Unit III

5. (a) Write Applets programs to accomplish the following tasks :
   (i) Drawing polygons
   (ii) Drawing a line graph.

   (b) Can applet class have a constructor ? Justify your answer with proper explanation and example. **8+7=15**

6. (a) Explain any *two* AWT controls in Java with suitable examples.

   (b) What is JDBC API ? How connection is established with database. Briefly explain transactions. **8+7=15**

Unit IV

7. Write notes on the following :
   (a) Event classes and event listeners
   (b) Servlet chaining. 8+7=15

8. (a) What do you mean by synchronization ? Discuss.
   (b) Explain init and destory with suitable examples.
   8+7=15

CSE-307N	Computer Organization and Architecture					
Lecture	**Tutorial**	**Practical**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**1**	**-**	**75**	**25**	**100**	**3 Hrs.**
Purpose	Student will be able to understand the basic concepts of computer architecture and organization, and understand the key skills of constructing cost-effective computer systems.					
Course Outcomes (CO)						
CO1	Be familiar with the internal organization and operations of a computer					
CO2	Be familiar with the design trade-offs in designing and constructing a computer processor.					
CO3	Be aware with the CPU design including the RISC/CISC architectures					
CO4	Be acquainted with the basic knowledge of I/O devices and Select the appropriate interfacing standards for I/O devices.					
CO5	How to analyze the system performance.					

Unit- I

Data representation and Computer arithmetic: Introduction to Computer Systems, Organization and architecture, Von Neumann Architecture, evolution and computer generations; Fixed point representation of numbers, digital arithmetic algorithms for Addition, Subtraction, Multiplication using Booth's algorithm and Division using restoring and non-restoring algorithms. Floating point representation with IEEE standards and its arithmetic operations. Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Unit-II

Basic Computer organization and Design: Instruction codes, stored program organization, computer registers and common bus system, computer instructions, timing and control, instruction cycle: Fetch and Decode, Register reference instructions; Memory reference instructions. Input, output and Interrupt: configuration, instructions, Program interrupt, Interrupt cycle, Micro programmed Control s organization, Control Memory, address sequencing, Micro program Example, micro instruction format, Horizontal Vs Vertical micro-programming, design of control Unit, microprogram sequencer, Hardwired v/s Micro-Programmed Control Unit.

Unit-III

Central Processing Unit: General register organization, stack organization, instruction formats (Zero, One, Two and Three Address Instruction), addressing modes, Data transfer and manipulation, Program control. CISC and RISC: features and comparison. Pipeline and vector Processing, Parallel Processing, Flynn's taxonomy, Pipelining, Instruction Pipeline, Basics of vector processing and Array Processors.

Unit-IV

Input-output organization: I/O interface. I/O Bus and interface modules, I/O versus Memory Bus. Asynchronous data transfer: Strobe control, Handshaking, Asynchronous serial transfer. Modes of Transfer: Programmed I/O, Interrupt driven I/O, Priority interrupt; Daisy chaining, Parallel Priority interrupt. Direct memory Access, DMA controller and transfer. Input output Processor, CPU-IOP communication, Serial communication.

Suggested Books:

- William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003.
- Morris Mano, M., "Computer System Architecture," 3/e, Pearson Education, 2005.
- John P. Hayes, "Computer Architecture and Organization," 3/e, TMH, 1998.
- David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Third Edition, Elsevier, 2005.
- V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.
- Carl Hamacher, ZvonkoVranesic and SafwatZaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002

Week		Theory
	Lecture Day	Topic
1st	1st	Data representation and Computer arithmetic: Introduction to Computer Systems, Organization and architecture, Von Neumann Architecture
	2nd	evolution and computer generations; Fixed point representation of numbers
	3rd	Fixed point representation of numbers
2nd	4th	digital arithmetic algorithms for Addition, Subtraction,
	5th	Multiplication using Booth's algorithm
	6th	Division using restoring
3rd	7th	and non-restoring algorithms.
	8th	Floating point representation with IEEE standards and its arithmetic operations.
	9th	Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory,
4th	10th	Associative Memory
	11th	Cache Memory,
	12th	Virtual Memory
5th	13th	Basic Computer organization and Design: Instruction codes, stored program organization
	14th	computer registers and common bus system, computer instructions
	15th	timing and control, instruction cycle: Fetch and Decode
6th	16th	Register reference instructions; Memory reference instructions
	17th	Input, output and Interrupt: configuration
	18th	Instructions, Program interrupt, Interrupt cycle
7th	19th	Micro programmed Control s organization,
	20th	Control Memory, address sequencing, Micro program Example
	21st	micro instruction format, Horizontal Vs Vertical micro-programming
8th	22nd	design of control Unit,
	23rd	microprogram sequencer, Hardwired v/s Micro-Programmed Control Unit.
	24th	Central Processing Unit: General register organization, stack organization,
9th	25th	instruction formats (Zero, One, Two and Three Address Instruction),
	26th	Addressing modes

	27th	Data transfer and manipulation, Program control
10th	28th	CISC and RISC: features and comparison
	29th	Pipeline and vector Processing , Parallel Processing
	30th	Flynn's taxonomy, Pipelining, Instruction Pipeline,
11th	31st	Basics of vector processing and Array Processors.
	32nd	Input-output organization: I/O interface. I/O Bus and interface modules
	33rd	I/O versus Memory Bus.
12th	34th	Asynchronous data transfer: Strobe control, Handshaking
	35th	Asynchronous serial transfer.
	36th	Modes of Transfer: Programmed I/O,
13th	37th	Interrupt driven I/O
	38th	Priority interrupt
	39th	Daisy chaining, Parallel Priority interrupt
14th	40th	Direct memory Access,
	41st	DMA controller and transfer.
	42nd	Input output Processor ,
15th	43rd	CPU-IOP communication,
	44th	Serial communication
	45th	**Revision**

TUTORIAL SHEET

UNIT-I

1: Introduction to Computer Systems, Organization and architecture

2: Fixed point representation of numbers,

3: digital arithmetic algorithms for Addition, Subtraction

4: Multiplication using Booth's algorithm

5: Division using restoring and non-restoring algorithms

6: Floating point representation with IEEE standards and its arithmetic operations.

UNIT-II

1: Instruction codes, stored program organization

2: Computer registers and common bus system, computer instructions, timing and control

3: Instruction cycle: Fetch and Decode

4: Input, output and Interrupt: configuration, instructions, Program interrupt, Interrupt cycle

5: Micro programmed Control organization,

6: Micro program sequencer.

UNIT-III

1: General register organization,

2: stack organization, instruction formats, addressing modes

3: Data transfer and manipulation, Program control.

4: CISC and RISC: features and comparison.

5: Pipeline and vector Processing

6: Basics of vector processing and Array Processors.

UNIT-IV

1: I/O interface. I/O Bus and interface modules

2: I/O versus Memory Bus

3: Asynchronous data transfer:

4: Modes of Transfer: Programmed I/O, Interrupt driven I/O, Priority interrupt

5: Direct memory Access, DMA controller and transfer

6: Input output Processor , CPU-IOP communication, I/O channel.

Roll No. ..... Total Pages : 02

BT-5/D-18. 35116

COMPUTER ORGANIZATION AND ARCHITECTURE

CSE-307N

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Explain the Digital arithmetic algorithm for addition with example. 8

   (b) Discuss division using non-restoring algorithm with help of flowchart. 7

2. (a) Explain the organization and architecture of a computer system. 8

   (b) Describe Flynn's Classification of computer architecture. 7

Unit II

3. Discuss the following : 15
   (a) Micro programmed control.
   (b) Register reference instructions.

4. What is the difference between an immediate, a direct and an indirect address instructions ? How many references are needed for each type of instructions to bring an operand into a processor register ? 15

Unit III

5. (a) What do you mean by speed up factor in pipelining ? State Amdahl's Law. 8
   (b) What are the characteristics of RISC architecture ? How it is different from CISC architecture ? 7

6. What are the different addressing modes ? Explain with examples. Also list their advantages and disadvantages. 15

Unit IV

7. (a) Write short note on DMA controller and transfer. 8
   (b) What do you mean by input out processor ? Explain. 7

8. Write short notes on the following :
   (a) Asynchronous Serial Transfer 9
   (b) Daising Chaining. 6

PC-CS-309L	Database Management Systems Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**4**	**2**	**40**	**60**	**100**	**3 Hours**
Purpose	**To familiarize the students with the basics of Data base management system.**						
Course Outcomes							
CO1	To understand basic DDL commands						
CO 2	To learn about DML and DCL commands						
CO 3	To understand the SQL queries using SQL operators						
CO 4	To understand the concept of relational algebra						
CO5	To learn various queries using date and group functions						
CO6	To understand the nested queries						
CO7	To learn view, cursors and triggers.						

1. Write the queries for Data Definition Language (DDL) in RDBMS.
2. Write the queries for Data Manipulation Language (DML) in RDBMS.
3. Write the queries for Data Control Language (DCL) in RDBMS.
4. To perform various integrity constraints on relational database.
5. Create a database and perform the following operations:-
   a. Arithmetic and Relational operations
   b. Group by & having clauses
   c. Like predicate for pattern matching in database
6. Write SQL queries for relational algebra
7. Write SQL queries for extracting data from more than one table
8. Write SQL queries for sub queries, nested queries
9. Concepts for ROLL BACK, COMMIT & CHECK POINTS
10. Using two tables create a view, which shall perform natural join, equi join, outer joins.
11. Write a procedure for computing income tax of employee on the basic of following conditions:-
    a. if gross pay<=40,000 then I.T rate is 0%.
    b. if gross pay>40,000 but <60000 then I.T rate is 10%.
    c. if gross pay>60,000 but <1,00,0000 then I.T rate is 20%.
    d. if gross pay>1,00,0000 then I.T rate is 30%.

    For this purpose create a table with name, ssn, gross salary and income tax of the employee.
12. Write trigger for before and after insertion, deletion and updation process.

		Practical
Week	**Practical day**	**Topic**
1	1	• Write the queries for Data Definition Language (DDL) in RDBMS. • Write the queries for Data Manipulation Language (DML) in RDBMS
2	2	• Write the queries for Data Control Language (DCL) in RDBMS • To perform various integrity constraints on relational database
3	3	• Create a database and perform the following operations:- a. Arithmetic and Relational operations b. Group by & having clauses c. Like predicate for pattern matching in database

4	4	• Write SQL query using character, number, date functions
5	5	• Write SQL queries for relational algebra
6	6	• Write SQL queries for extracting data from more than one table
7	7	• Write SQL queries for sub queries, nested queries
8	8	• Write SQL Queries to implement ROLL BACK, COMMIT & CHECK POINTS
9	9	• Create VIEWS, CURSORS and TR • Using two tables create a view, which shall perform natural join, equi join, outer joins.
10	10	• Write a procedure for computing income tax of employee on the basic of following conditions:- a.if gross pay<=40,000 then I.T rate is 0%. b.if gross pay>40,000 but <60000 then I.T rate is 10%. c.if gross pay>60,000 but <1,00,0000 then I.T rate is 20%. d.if gross pay>1,00,0000 then I.T rate is 30%. For this purpose create a table with name, ssn, gross salary and income tax of the employee.
11	11	• Write trigger for before and after insertion, deletion and updation process
12	12	• High level language extension with Cursors
13	13	• High level language extension with Triggers. • To study the concept of Functions
14	14	• To study the concept of Procedures • Create a program to find area of a circle using a procedure and insert the values into a table
15	15	• Revision
		• Viva

PC-CS-311L	Essential of Information Technology Lab						
Lecture	**Tutorial**	**Practical**	**Credit**	**Minor Test**	**Practical**	**Total**	**Time**
0	**0**	**4**	**2**	**40**	**60**	**100**	**3 Hrs.**
Purpose	To introduce the concepts of Advanced Java Programming						
Course Outcomes (CO)							
CO1	Study fundamental concepts of Java.						
CO2	Design of user interfaces using Java applets.						
CO3	To study and implement JDBC and Jbeans.						
CO4	To study concepts of servlets and its applications.						

1. Write a Java Package with Stack and queue classes.
2. Design a class for Complex numbers in Java. In addition to methods for basic operations on complex numbers, provide a method to return the number of active objects created.
3. Develop with suitable hierarchy, class for point, shape rectangle, square, circle, ellipse, triangle, polygenetic.
4. Design a simple test application to demonstrate dynamic polymorphism.
5. Design a java interface for ADT Stack.
6. Develop two different classes that implement this interface. One using array and other using linked list.
7. Develop a simple paint like program that can draw basic graphical primitives
8. Develop a scientific calculator using event driven programming.
9. Develop a template for linked list class along with its members in Java.
10. Write a program to insert and view data using Servlets