

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E.- III (Information Technology)

Semester - VI

B.E.III (IT) 6 th Semester		Teaching Scheme			Examination Scheme						
					Theory Exam		Practical/Quiz/Viva/T.W. etc.				
Course	Course No.	L Hrs.	T Hrs.	P Hrs.	University Exam.		University Exam.		Tutori al	Cont. Evalu ation	Total Marks
					Durati on Hrs.	Marks	Durati on Hrs.	Marks			
Computer Architecture & Peripherals	IT 601 IT	3	1	0	3	100	0	0	25	0	25
Microprocessors	IT 602 IT	3	1	2	3	100	3	30	25	20	75
Automata & Formal Language	ECC 603 CO/IT	3	1	2	3	100	3	30	25	20	75
Language Processor	ECC 604 CO/IT	3	0	2	3	100	3	30	0	20	50
Simulation & Modelling	IT 605 IT	3	1	2	3	100	3	30	25	20	75
Elements of information Theory	IT 606 IT	3	0	0	3	100	0	0	0	0	0
TOTAL:		18	4	8	-	600	-	120	100	80	300
Total Contact Hours: 30					Total Marks: 900						

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BE – III (IT)

Semester - VI

COMPUTER ARCHITECTURE AND PERIPHERALS: IT 601 IT

	Lecture	Tutorial	Practical
Teaching Hours	3	1	0
Examination Scheme Marks	100	25	Cont. Evaluation : 00 Examination : 00

(A) THEORY

- (1) Principles of Computer Design: Software/Hardware interaction, Cost/Benefit, Concept of layers in architecture design
- (2) Basic computer organization and design : Instruction codes common bus system, Instructions, Instruction cycle, Memory reference instructions, Input-Output and interrupt, Design of basic computer, Design of accumulator logic
- (3) Computer Arithmetic : Binary arithmetic, Add, Subtract , Multiply, Divide, Algorithms and implementations, Carry look ahead and fast adders
- (4) CPU Design: Choice of Instruction set, Control structure- Hardwired and Microprogrammed control
- (5) RISC V/s CISC, Pipelining in CPU Design, Superscalar machines
- (6) Memory Hierarchy Design: Caches, Main Memory, Internal Memory, Virtual Memory, Architectural aids in implementing these.
- (7) I/O Modes and I/O Performance Measures: Programmed, Interrupt, DMA Channel, I/O Processor Buses Connecting I/O Devices to CPU/ Memory. Interaction with operating system, Serial/Parallel Interfaces
- (8) Multiprocessors
- (9) Parallel & Distributed Computers
- (10) Interfacing typical PC Peripherals: Interfacing Floppy disk, Hard disk Controllers: Read / Write Logic circuits, Commands & Programming. Data Storage formats. Printer Interfacing, PC - Keyboard Interfacing, CRT Terminals, CRT Controller – Intel 8275, Motorola 6845. Display Adapters - MDA, CGA, EGA and VGA, SVGA. Other Input & Output: OCR, MICR, Bar Code Reader, Voice Input & Output, Sound card & Sampling
- (11) Architecture of 80186, 80286, 80386, 80486, Pentium, Pentium Pro Typical Memory Management unit hardware & operations. Protected Virtual Mode

(12) Bus Standards: Study of the PC, PC - AT, ISA, EISA, IEEE -488 Bus, IDE, EIDE, SCSI, VESA, PCI, PC Card (PC MCIA) Bus.

(B) TUROTIAL ASSIGNMENTS:

Based upon the syllabus prescribed above.

(C) REFERENCE BOOKS

- (1) Computer system architecture by Morris Mano(PHI Edition)
- (2) IBM PC and clones by B Govindarajalu (TMH)
- (3) Computer architecture by Patterson Hennessy
- (4) Computer organization and design by pal Chaudhary
- (5) Perspective in computer architecture by P. Vs. Rad
- (6) Digital computer design Principles by M. R. Bhujade
- (7) Computer peripherals by Cook and White (Edward Arnold)
- (8) Berry B. Brey - The Intel Microprocessor 8086/88, 80186/188, 808286, 80386, 80486, Pentium and Pentium PRO Processor, PHI Edition

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Semester - VI

MICROPROCESSOR TECHNIQUES: IT 602 IT

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Cont. Evaluation: 20 Examination : 30

(A) THEORY

- (1) **Brief overview of 8085 Microprocessor architecture and its operation:** Address, Data and control Buses, Pin functions, Demultiplexing of Buses, Introduction to Interfacing of Memory and Input/Output Devices.
- (2) **Instruction & timing:** generation of Control Signals, Instruction cycle, Machine Cycles, T-States, Instruction Classification and Format, Instruction timing and operation status, Introduction to 8085 instruction set; Data transfer instruction, Arithmetic and logical operations.
- (3) **Brief overview of assembly Language Programming:** Writing, Assembling & Executing a Program, Debugging the programs, Decision Making, Looping, Stack & Subroutines, Developing counters and Time Delay Routines, Code Conversion, BCD Arithmetic and 16-Bit data Operations
- (4) **Interrupt Management:** Intel 8085 Interrupts Different types of interrupts, Interrupt Service Routines, Enabling and disabling Interrupts, Interrupt Vectors, Typical Interrupt Acknowledgement and Response.
- (5) Interfacing Concepts, Ports, Interfacing of I/O Devices **General Purpose Programmable Peripheral Devices** : Basics in Programmable I/Os, Intel 8255 Programmable Peripheral Interface, Intel 8253 Programmable Interval Timer; Interfacing, Initialization. Programming typical Applications of all the Devices. **Special purpose Programmable Peripheral Devices** : Interfacing Intel 8279 Programmable Keyboard / Display; Intel 8259 Programmable Interrupt Controller, modes; Intel 8257 DMA Controller, modes; Interfacing, Initialization, Programming typical application of all the devices.
- (6) **Serial Data Communication:** Serial I/O, Software Controlled Asynchronous Serial I/O, Hardware Controlled Serial I/O; Synchronous Serial Communication; Intel 8250 UART & Intel 8251 USART interfacing, initialization, programming application.
- (7) **Introduction to 16-bit microprocessors:** Intel 8086 architecture, Internal Operation, Addressing Modes, Intel 8086/8088 Configurations-Minimum Mode and Maximum Mode

(8) Overview of Intel 8086 Family assembly Language Programming: Practice with Simple sequence Programs,. Writing & Using Procedures, Macros Use of DOS / BIOS interrupts.

(9) Intel 8086 maximum mode operations: memory banks, multiplexing of buses, clock generation, ready synchronization and reset synchronization using 8284, 8288, bus controller, interfacing of 8284 and 8288 with 8086

(10) Interrupts: Interrupt Vector Table, introduction to software and hardware interrupts.

(D) PRACTICAL WORK:

(1) 8085 instructions based assembly level programming in detail.

(2) Introduction of Assembler and other Development Tools like Loader, Compiler, Locator, debugger,

8086 Programming for simple problems, subroutines, macros and DOS and BIOS interrupts.

(E) TUTORIAL ASSIGNMENTS:

Based upon the syllabus

(F) REFERENCES:

(1) Microprocessor Architecture, Programming, and Application with the 8085 (4th Edition) by Ramesh

S. Gaonkar Pub: Penram international

(2) Douglas V Hall, Microprocessors and Interfacing, McGraw Hill, 2nd Edition, Reprint 1995.

(3) Yu Cheng Liu and Glenn A Gibson , Microcomputer systems - The 8086/8088 Family Architecture, Programming and Design , Prentice Hall of India , Reprint 1997.

(4) Govind Rajalu - IBM PC and its Clones, TMH Publication, 1994.

(5) IBM PC AT Technical Reference Manual.

(6) Berry B. Brey - The Intel Microprocessor 8086/88, 80186/188, 808286, 80386, 80486, Pentium and Pentium PRO Processor, PHI Edition

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BE – III (IT)

Semester - VI

AUTOMATA & FORMAL LANGUAGES : ECC 603 CO/IT

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Cont. Evaluation: 20 Examination: 30

(A) **THEORY:**

(1) **Introduction:** Basic : Mathematical objects : Sets, Logic, Functions, Relations, strings, Alphabets, Languages; Graphs & Trees; Mathematical Inductions : Inductive proofs, Principles; Recursive Definitions; Set Notation;

(2) **Finite Automata & Regular Expressions:** Finite State systems, Regular Languages & Regular Expressions, The Memory required to recognize a Language; Finite Automata; Nondeterministic Finite Automata, Kleen's Theorem; two-way Finite Automata, FA with output.

(3) **Properties of Regular sets:** The Pumping Lemma for Regular sets, closure properties, Decision algorithms, The myhill-nerode Theorem,

(4) **Context Free Grammers:** Definition, Derivation trees & Ambiguity, Motivation & Introduction, Simplification of CFg, Chomsky Normal form, Inherently ambiguous Cfls; The Chomsky Hierarchy : Regular grammars, Unrestricted grammars, Context-sensitive languages, relations between classes of languages.

(5) **Pushdown Automata:** definitions , Deterministic PDA, PDA and CFLs

(6) **Properties of CFLs :** The Pumping Lemma, Closure properties, Decision algorithms.

(7) **Turing Machines:** The TM Model , Church Turing thesis , Computable languages and functions, Techniques for TM construction , Modifications of TM , Tms enumerators , Restricted Tms.

(8) Introduction to Recursive Function theory

(9) **Deterministic Context-Free Languages:** Normal forms, Closure of DCFLs, Predicting machines, Additional Closure properties of DCFLs, Decision Properties, LR (0) grammars.

(10) **Closure properties of Families of languages:** Trios & Full trios, Generalized Sequential Machine mappings, Abstract families of languages, Independence of the AFL operations.

(11) **Highlights of Other Important Languages Classes:** Auxiliary Pushdown Automata, Stack automata, Indexed languages, Developmental systems.

(B) **PRACTICALS:**

Based up on the syllabus prescribed above.

(C) **TUTORIAL ASSIGNMENTS:**

Based up on the syllabus prescribed above.

(D) **REFERENCES:**

- (1) J E Hopcroft & J D Ullman - Introduction to Automata Theory, Languages & Computations, 1987 ed, 1995 reprint, Addison - Wesley Pub, narosa reprint.
- (2) John C Martin - Introduction to languages & the theory, languages & Computation, McGraw-Hill International ed, 1997.
- (3) Deniel A Cohen- Introduction to Computer Theory, John-Willey & Sons, 1990 Ed, Reprint 1994.

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Semester - VI

LANGUAGE PROCESSORS: ECC 604 CO/IT

	Lecture	Tutorial	Practical
Teaching Hours	3	0	2
Examination Scheme Marks	100	00	Cont. Evaluation : 20 Examination : 30

(A) **THEORY:**

(1) Introduction to System software, utility Software, systems programming.

(2) **Assemblers:** Introduction, Cross assembler , Micro Assembler , Meta Assemble, Single pass Assemblers , Two Pass Assembler , Design of Operation code table , Symbol table , Literal table.

(3) **Macro processor:** Introduction of Macros , macro processor design , Forward reference , Backward reference , positional parameters , keyword parameters , conditional assembly , Macro calls within Macros , Implementation of macros within Assembler . Designing Macro name table , Macro Definition table , Kew word parameter table , Actual parameter table , Expansion time variable storage etc.

(4) **Compilers:** Introduction , Analysis of the programmed, Lexical Analysis , syntax analysis , phase of a compiler , Scanning , Parsing , Type checking and conversion , Storage organization and allocation strategies , Symbol tables , parameter passing , local and nonlocal variables , Intermediate code generation of declaration , Assignment statement. Boolean Expression, Conditional Statement etc ., Code generation , Code optimization , Compiler writing tools e.g. (Lex , Yacc) , Incremental Compiler , Interpreter.

(5) **Loader and Linkage Editor:** Absolute Loader, Relocation - Relocating loader, Dynamic loader, Bootstrap loader, Linking loader, Program relocatibility, design of Absolute Loader, Design of direct - linking editor, other loader scheme e.g. (Binders , Linking Loaders , Overlays , Dynamic Binders etc.)

(B) **PRACTICALS:**

Based up on the syllabus prescribed above.

(C) **REFERENCES :**

- (1) D.M. Dhamdhare : systems Programming & Operating System, TMH Edition, 2nd edition , 1996.
- (2) John J . Donovan : Systems Programming, McGraw-Hill International Edition, 1993 Reprint.
- (3) Houlb : Compiler Design in C , PHI , EEE , 1995.

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SIMULATION AND MODELLING: IT 605 IT

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Cont. Evaluation: 20 Examination : 30

(A) THEORY

(1) **Introduction:** Objective of modeling, System Theory: State Variables, System and its model, Theory of models, basic nature of simulation, motivation, examples.

Analytic Simulation, Measurement. Analytic Modeling Probability Theory, Random Variables, Poisson process, Markov

Simulation Modeling, Continuous and Discrete Event Simulation, Monte Carlo Simulation, Pseudo Random Number Generation, Non-Uniform Random Number generation.

(2) **Simulation of queuing systems:** Basic of queuing theory; single-server, two-server and more general queues, Little's law, M/M/I, M/M/C queuing models, M/G/I (Impact variation in service times)

Petrinets and Stochastic Petrinets(spn), Gpss, Gasp Iv, Csim Estimation of simulation, Output Matrix Confidence Intervals, Regenerative Simulation, Method of Banch Means

(3) **Simulation of PERT network:** Network model of a project; analysis of activity duration, example, resource allocation and cost considerations.

(4) **Inventory control & forecasting:** Basic concepts, simulation of Possion and Erlang and cost considerations.

(5) Case Studies, Application to operating systems, databases, network architecture.

(6) Further Reading: G/G/I , G/G/C Correlation Queues, Queuing Networks, Mean Value Analysis, Gtpn, Espn.

(B) PRACTICAL AND TERM WORK:

Practicals and Term Work will be based on the topics covered in the syllabus. Minimum 10 experiments should be carried out.

(C) TUTORIAL ASSIGNMENTS:

Based upon the syllabus prescribed above

(D) REFERENCE BOOKS:

- (1) Narsingh Deo; System simulation with digital computer; Prentice Hall International.
- (2) R L Woods & K L Lawrence, Modeling & simulation of Dynamic Systems, Prentice Hall
- (3) A M Law & W D Kelton, Simulation Modelling & Analysis, McGraw-hill International Edition
- (4) M.K.Molloy, Fundamentals of Performance Modelling, McMillan, 1984
- (5) R.K.Nelson, Probability, Stochastic Processing, Queuing Theory, Springer-Verlag
- (6) K.S.Trivedi, Probability and Statistics , Reliability Queueing and Computer Science Applications PHI.
- (7) P.A. Fishwick, Getting Started with Simulation Programming in C and C++

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ELEMENTS OF INFORMATION THEORY: IT 606 IT

	Lecture	Tutorial	Practical
Teaching Hours	3	0	0
Examination Scheme Marks	100	00	Cont. Evaluation: 00 Examination : 00

(A) THEORY

(1) **Review of spectral analysis:** Fourier series; response of a linear system; normalized power and power spectral density; effect of transfer function on power spectral density. The Fourier transforms. Convolution.

(2) **Random process and noise:** Review of probability concepts; a communications examples, signal determination with noise described by distribution function, random processes, autocorrelation and power spectral density, power spectral density of digital data. Sources of external and internal noise.

(3) **Analog to digital conversation:** Noisy communication channels. The sampling theorem, its effect on low-pass signal

(4) **The concept of information:** Discrete messages; qualification of the concepts of the information. Average information, entropy, information rate, Coding to increase average information per bit. Shannon's theorem, channels capacity; capacity of Gaussian channel, bandwidth-S/N tradeoff.

(5) **Nature of multimedia information:** Audio signals, video signals-analog and digital, data compression, entropy encoding, source encoding, the JPEG and MPEG standards.

(6) **Security of Information:** Cryptography, basis issue, substitution and transposition ciphers, onetime pads, secret-key and public-key algorithms, authentication, digital signatures, steganography

(B) REFERENCE BOOK:

- (1) H Taub & D L Schilling, Principal of Communication Systems, McGraw-Hill International Edition
- (2) A S Tanenbaum, Computer Networks, Prentice Hall International
- (3) B. P. Lathi, Modern Communication Systems, Addison Wesley.
