Name of Institute: Institute of Sciences Humanities & Liberal Studies
Name of Faculty: Disha H. Parekh

Course code: IMSC0102 / MI830102
Course name: Computer Organization
Pre-requisites:
Credit points: 4
Offered Semester: 1st

Course coordinator
Full name: Prof. Disha H. Parekh
Department with sitting location: Department of Computer Science – Main Building Basement
Telephone: 9825709684
Email: dishadoshi.mca@indusuni.ac.in
Consultation times: After 2:30 pm / 5 days a week

Course lecturer
Full name: Prof. Disha H. Parekh
Department with sitting location: Department of Computer Science – Main Building Basement
Telephone: 9825709684
Email: dishadoshi.mca@indusuni.ac.in
Consultation times: After 2:30 pm / 5 days a week

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives

By participating in and understanding all facets of this course a student will:

1) Understand the operation of electronic logic elements
2) Understand the organization of a computer system in terms of its main components
3) Understand different processor architectures
4) Understand input/output mechanisms
5) Understand the various parts of a system memory hierarchy
6) Have practical experience of prototyping digital circuits
7) Be able to interface digital circuits to microprocessor systems

Course Outcomes (CO)

1. Student will learn the basic elements of Computer organization and architecture and various hardware operations of computer.

Course Outline

UNIT 1

[12 Hours]

(1). Basic Working of Peripheral devices

a) Block Diagram of a computer
b) Key board
c) Mouse
d) Display UNIT
e) Printer
f) Multimedia Projector
g) Scanner

(2). Number System

a) Decimal System
b) Counting in Binary System
c) Binary Addition and Subtraction
d) Binary Multiplication and Division
e) Conversions
f) Negative Numbers
g) Use of Complements to represent negative numbers
h) Complements in other number system
i) Binary Number Complements
j) Weighted Code
k) BCD Code
l) Octal and Hexadecimal Number System

UNIT II

[12 Hours]

(3). Boolean Algebra and Logic Gates

a) Fundamental Concepts of Boolean Algebra
b) Logic Gates
c) Logical Multiplication
d) AND Gate and OR Gate
e) Complementation and Inverts
f) Evaluation of logical Expression

g) Basic Laws of Boolean Algebra
h) Proof by Perfect Induction
i) Simplification of Expressions
j) De Morgan's Theorems
k) Basic Duality of Boolean Algebra
l) Derivation of a Boolean Algebra
m) Interconnecting Gates
n) Sum of Products And Product of Sums
o) Derivation of POS Expression
p) Derivation of 3 input variables expression
q) NAND Gates and NOR Gates
r) K-Map Method for Simplifying Boolean Expressions
s) Sub cubes and Covering
t) POS Expression and Don't Care
u) Design using NAND Gates and NOR Gates Only

(4). Sequential Logic
a) Flip Flops(RS, JK)
b) Shift Registers(Shift Left, Shift Right)
c) Binary Counter (Asynchronous) Counter

UNIT III

[12 Hours]

(5) Basic Concepts of Combinational Logic
a) Block Diagram of ALU
b) Binary Half & Full Adder(1 bit)
c) Positive and Negative Number
d) Addition in 1's Complement System
e) Addition in 2's Complement System
f) Encoder, Decoder
g) Multiplexer

(6). Introduction to Memory and Storage Devices
a) Memory Hierarchy
b) RAM
c) ROM

d) Virtual memory(overview)
e) Cache memory(overview)
f) Auxiliary memory (overview)

UNIT IV

[12 Hours]

(7). Introduction to Buses
   a. Interfacing Buses(Circuit Diagrams not necessary)
   b. Concepts of Address Bus, Data Bus and Control Bus

(8). Introduction to Control UNIT
   a) Construction of Instruction Word
   b) Instruction Cycle and Execution Cycle organization of Control Registers

(9). Basic Concepts of Computer Organization
   1. Instruction Word Formats
   2. Representation of Instruction and Data
   3. Addressing Techniques
   4. Direct Addressing
   5. Immediate Addressing
   6. Relative Addressing
   7. Indirect Addressing
   8. Indexed Addressing

Method of delivery

Lectures – Board Work
Power-point presentation
Chart Preparation
Quiz organization

Study time

Lectures: 4 hours / week
Lab Sessions: 4 hours / week
Extra @ home / self learning: 4 hours / week

CO-PO Mapping (PO: Program Outcomes)

Program Outcomes:

Computer Applications Graduates will be able to:

PO1 **Computer knowledge:** Apply the knowledge of mathematics, science, computer fundamentals and specialization to the solution of complex problems.

PO2 **Problem analysis:** Identify, formulate, review research literature, and analyze complex computer science problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and computer sciences.

PO3 **Design/development of solutions:** Design solutions for complex computer science problems and design system components or processes that meet the specified needs with appropriate consideration for cultural, social environment.

PO4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to complex activities with an understanding of the limitations.

PO6 **The digital youth and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional skill-set.

PO7 **Environment and sustainability:** Understand the impact of the professional computer science solutions in social and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the computer science practice.

PO9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping of CO with PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1						1	1	1	3	4	
CO2	1	2	2	3	2	1	2	2			2	
CO3	2	3		2	3					2		3
CO4	1	4								4	3	2

Blooms Taxonomy and Knowledge retention(For reference)

(Blooms taxonomy has been given for reference)

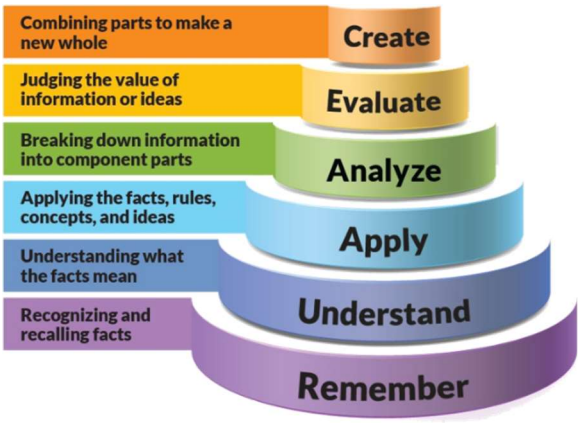

Figure 1: Blooms Taxonomy

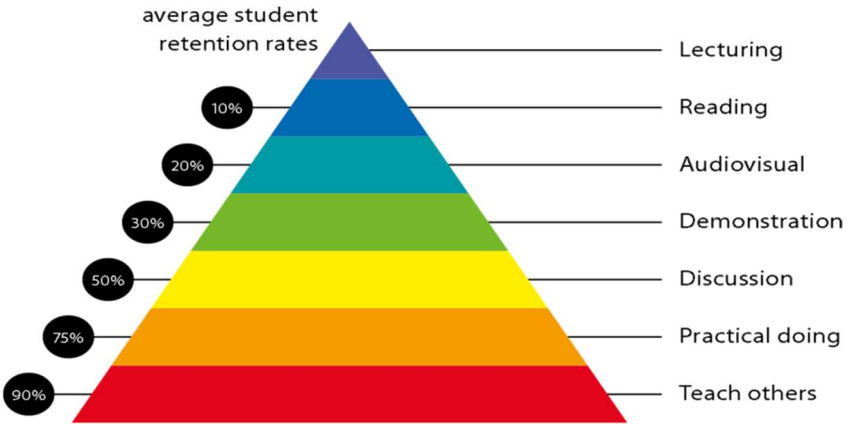

Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection.	**2 Information literacy, gathering & processing**

Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

None

Lecture/tutorial times

Yet to be finalized, hence it is pending

Example:

Lecture	Tuesday	8.30 – 10.30 am	Room LH 30
Lecture/Tutorial	Wednesday	8.30 – 10.30 am	Room LH 30
Practicals	Friday		

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Details of referencing system to be used in written work

Text books

1. A. Anadkumar, "*Fundamentals of Digital Circuits",* Publication: PHI

Additional Materials

1. Thomas C. Bartee, "*Digital Computer Fundamentals*", TataMcGraw-Hill
2. M.Morris Mano, "*Digital Logic and Computer Design*", PHI

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Internal Assessment 1	20 Marks (Unit -1 and Unit – 2)	Objectives (1-2)	**60% in Total**
Internal Assessment 2	20 Marks (Unit -3 and Unit – 4)	Objective (3-4)	
CIE – Assignment Evaluation	16 marks (4 marks / unit)	Objectives (1-4)	
CIE – MOOC / Workshop / Seminars	4 marks	Objectives (1-4)	
Final exam (*closed book*)	40 marks	Objectives (1-5) – **40%**	

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of 50% of the maximum mark per unit.

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

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Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Unit – 1		Board work + PPT
	Weeks 2	Unit – 1		Board work + PPT + Practical Implementation
	Week 3	Unit – 1 *Quiz*		Board work + PPT *Quiz*
	Week 4	Unit – 2		Board work + PPT
	Week 5	Unit – 2		Board work + PPT + Self Learning
	Week 6	Unit – 2 *Chart Preparation*		Board work + PPT *Charts*
	Week 7	Unit – 3		Board work + PPT
	Week 8	Unit – 3		Board work + PPT
	Week 9	Unit – 3		Board work + PPT
	Week 10	Unit – 4 *Debate on Technical topic*		Board work + PPT *Debate*
	Week 11	Unit – 4		Board work + PPT
	Week 12	Unit – 4 *Lecture Book Submission and Group Presentations*		Board work + PPT *Submissions and Presentations*