





**Government Holkar (Model, Autonomous) Science  
College, Indore (M.P.)**


**Computer Science Department**

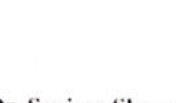
Part A - Introduction			
Programme – B.C.A. (Computer Applications - Major)		Class – B.C.A. I Semester	Year- 2024 Session- 2024-25
Course Type (Computer Applications) – Major			
1	Course Code	S1-BCAIT	
2	Course Title	Computer Fundamental, Organization and Architecture	
3	Pre – requisite (if any)	To study this course, a student must have basic knowledge of Computers.	
4	Course Learning Outcomes (CLO)	<p><b>After the completion of this course, a successful student will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Recall fundamental concepts of digital electronics, including data types, binary codes, and error detection codes.</li> <li>2. Explain the organization of basic computer components, such as registers, instructions, and memory, as well as logic gates and their applications.</li> <li>3. Apply Boolean algebra to simplify logic circuits and solve basic circuit design problems.</li> <li>4. Analyze computer architecture principles, including micro operations, control units, and pipelining, to identify data and control hazards.</li> <li>5. Synthesize knowledge of memory hierarchy, parallel computing concepts, and Indian contributions to computer science to assess their significance in the field.</li> </ol>	
5	Credit Value	4 Credits	
6	Total Marks	Formative Assessment (CCE) – 40 Marks Summative Assessment (End Semester Exam) – 60 Marks <b>Total 40+60= 100 Marks</b>	<b>Minimum Pass Marks – 35</b>


  
Mr. Mohit Gupta  
Student  
Clause 06

  
Mr. Manish Kumar  
Industrial Person  
Clause 05

  
Dr. Ugrasen Suman  
Subject Expert  
Clause 04

  
Dr. Sharad Gangele  
Subject Expert  
Clause 03

  
Dr. Sanjeev Sharma  
Subject Expert  
Clause 03

  
Dr. Pradeep Sharma  
Convener & HoD



Part A - Introduction			
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Course Code	S1-BCAIT		
Course Title	Computer Fundamental, Organization and Architecture		

Part – B Content of the Course		
Total no. of lectures – As per UGC rules (1 Credit = 15 Lectures)		
S. No.	Topics	No. of Lectures
I	<p>Fundamentals of computers: Definition, Characteristics, capabilities and limitations.</p> <p>Types of Computers: Analog, Digital, Micro, Mini, Mainframe &amp; SuperComputers, Work Station, Server computers.</p> <p>Generations of Computers.</p> <p>Smart Systems: definition, characteristics and applications</p> <p>Definition of Embedded system, GIS, GPS, Cloud Computing,</p> <p>Uses of computers in e-governance and various public domains and services.</p> <p>Block diagrams of computer and its functional units. Concept of hardware, software and firmware. Types of software.</p> <p>Input devices: keyboard, scanner, mouse, light pen, bar code reader, OMR, OCR, MICR, track ball, joystick, touch screen camera, mice etc.</p> <p>Output devices: monitors classification of monitors based on technology -CRT &amp; flat panel, LCD, LED monitors, speakers, printers: dot matrix printer, ink jet printer, laser printer, 3D Printers, Wi-Fi enabled printers, plots and their types, LCD/LED projectors.</p> <p>Computer memory and its types, Storage devices Magnetic tapes. Floppy Disks, Hard Disks, Compact Disc CD-ROM, CD-RW, VCD, DVD, DVD-RW, USB drives, Blue Ray Disc, SD/MMC Memory cards.</p>	18



Part A - Introduction			
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Course Title	Computer Fundamental, Organization and Architecture		

II	<p>Fundamentals of Digital Electronics: Data Types, Complements, Fixed-Point Representation. Floating-Point Representation, Binary and other Codes, Error Detection Codes.</p> <p>Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Sequential Circuits, simple combinational circuit design problems.</p> <p>Combinational Circuits- Adder, Subtractor, Multiplexer. De-multiplexer, Decoders, Encoders.</p> <p>Sequential Circuits-Flip-Flops, Registers, Counters.</p>	10
III	<p>Basic Computer Organization: Instruction codes, Computer Registers, Computer Instructions, Timing &amp; Control, Instruction Cycle, Memory Reference Instruction, and Input Output &amp; Interrupts.</p> <p>Instruction formats, Addressing modes, Instruction codes, Machine language, Assembly language.</p> <p>Register Transfer and Micro operations: Register Transfer Language Register Transfer, Bus &amp; Memory Transfer, Arithmetic Micro Operations, Logic Micro-operations. Shift Micro-operations.</p>	10
IV	<p>Processor and Control Unit: Hardwired vs. Micro programmed Control Unit, General Register Organization, Stack Organization, and Instruction Format. Data Transfer &amp; Manipulation, Program Control, Introductory concept of RISC, CISC, advantages and disadvantages of both.</p> <p>Pipelining: Concept of pipelining, introduction to Pipelined data path and control-Handling Data hazards &amp; Control hazards.</p>	10

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V	<p>Memory and I/O Systems: Peripheral Devices, I/O Interface, Data Transfer Schemes-Program Control, Interrupt, DMA Transfer, I/O Processor.</p> <p>Memory Hierarchy, Processor vs. Memory Speed, High Speed Memories, Main memory &amp; its types. Auxiliary memory, Cache Memory, Associative Memory, Interleaving, concept of Virtual Memory. Hardware support for Memory Management.</p> <p>Indian contribution to the field-Contributions of reputed scientists of Indian origin- like Dr. VinodDham Father of Intel Pentium Processor, Dr. Ajay Bhat-Co-Inventor of USB Technology, Dr. VinodKhosla-an-founder of Sun Microsystems, Dr. Vijay P Bhaskar- architect of India's national initiative in supercomputing, and many others,</p> <p>Parallel Computing projects of India PARAM, ANUPAM, FLO SOLVER CHIPPS etc. Other relevant contributors and contributions.</p>	12
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Course Title	Computer Fundamental, Organization and Architecture		

Part – C Learning Resources
Text Books, Reference Books, Other Resources
<p><b>Suggested Readings:</b></p> <p><b>Text Books:</b></p> <ol style="list-style-type: none"> <li>1. M. Morris Mano, Digital Design, 3.ed. Prentice Hall of India Pvt. Ltd.,</li> <li>2. Heuring Jordan, "Computer System Design &amp; Architecture" (A.W.L.)</li> <li>3. Books published by M.P. Hindi Granth Academy, Bhopal.</li> </ol> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. William Stalling, "Computer Organization &amp; Architecture", Pearson Education Asia.</li> <li>2. V. Carl Hamacher, "Computer Organization", TMH</li> <li>3. Tannenbaum, "Structured Computer Organization", PHI.</li> </ol> <p><b>Suggested Digital Platforms Web Links:</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://www.youtube.com/watch?v=4TzMyXmzL8M">https://www.youtube.com/watch?v=4TzMyXmzL8M</a></li> <li>2. <a href="https://nptel.ac.in/courses/106/106/106106166/">https://nptel.ac.in/courses/106/106/106106166/</a></li> <li>3. <a href="https://nptel.ac.in/courses/106/106/106106134/">https://nptel.ac.in/courses/106/106/106106134/</a></li> </ol> <p><b>Suggested Equivalent Online Courses:</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/106/105/106105163/">https://nptel.ac.in/courses/106/105/106105163/</a></li> </ol>



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Course Title	Computer Fundamental, Organization and Architecture		

Part – D Assessment and Evaluation				
<b>Internal Assessment: Continuous Comprehensive Evaluation (CCE)/ Formative Assessment: 40 Marks</b>  Formative Assessment shall be based on – Quiz, Seminar, Presentation, Written test, Case Study, Project, Assignment etc.  The division of marks is as follows:			<b>External Evaluation (Summative Assessment):</b> <b>End Semester Exam:60 Marks</b> Time: 03 hours	
Test I	20 Marks	Best two test Marks = (20 + 20)	<b>Section (A): 5</b> Objective Questions (1 mark each)	5 x 1 = 5
Test II	20 Marks		<b>Section (B): 5 Short</b> Questions out of eight questions (200 words each) (7 Marks each)	5 x 7 = 35
Test III	20 Marks		<b>Section (C): Two</b> long questions out of four questions ( 500 Words each) (10 Marks each)	2 x 10 = 20
Total Internal Assessment (CCE) Marks		<b>40 Marks</b>	Total External Evaluation (Theory) Marks (A+B+ C)	<b>60 Marks</b>
Note:	1.	For Major, Minor, Open Elective, Foundation and Vocational Courses, Part D will be as per the scheme of marks given.		
	2.	The student should secure 35% marks in Internal Assessment (CCE) and External Evaluation (theory) combined.		



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Computer Science Department

Part A- Introduction (Practical)			
Programme – B.C.A. (Computer Applications - Major)		Class – B.C.A. I Semester	Year- 2024 Session- 2024-25
Course Type (Computer Applications) – Major			
1.	Course Code	S1-BCA1TP	
2.	Course Title	Computer Fundamental and Digital Computer Lab	
3.	Pre-requisite (if any)	Open for All	
4.	Course Learning Outcomes (CLO)	<b>On completion of this course, learners will be able to:</b> <ol style="list-style-type: none"><li>1. Demonstrate the ability to recall and identify various computer components and CPU parts through physical examination.</li><li>2. Exhibit an understanding of I/O devices and the interpretation of truth tables for different logic gates.</li><li>3. Apply acquired knowledge to operate and verify the functions of various logic circuits, such as adders, subtractors, and gates.</li><li>4. Analyze and assess the practical applications of logic gates and flip-flops, including their functions and truth tables.</li><li>5. Create and construct logic circuits, such as multiplexers, demultiplexers, and conversion processes, using logical components.</li></ol>	
5.	Credit Value	2 Credits	
6	Total Marks	Formative Assessment (CCE) – 40 Marks Summative Assessment (End Semester Exam) – 60 Marks <b>Total 40+60= 100 Marks</b>	<b>Minimum Pass Marks – 35</b>

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Part B- Content of the Course	
Total no. of lectures – As per UGC rules	
Suggestive List of Practicals	
1.	Identify various parts of the computer by physical examination.
2.	Identify various parts inside the CPU like motherboard, SMPS, ports, buses, IC chips, Processor, HDD, and RAM etc.
3.	Identify various I/O devices available in the lab physically.
4.	Verification and interpretation of truth table for AND, OR, NOT gates
5.	Verification and interpretation of truth table for NAND, NOR gates
6.	Verification and interpretation of truth table for Ex-OR, Ex-NOR gates
7.	Study of half adder using XOR and NAND gates and verification of its operation.
8.	Study of full adder using XOR and NAND gates and verification of its operation.
9.	Study of half subtractor and verification of its operation.
10.	Study of full subtractor and verification of its operation
11.	Realization of logic functions with the help of NAND –Universal Gates.
12.	Realization of logic functions with the help of NOR
13.	Verify the truth table of RSflip
14.	Verify the truth table of JKflip
15.	Verify the truth table of T and D flip
16.	Implementation of 4x1 multiplexer using logic gates.
17.	Implementation of 1x4 demultiplexer using logic gates.
18.	Verify Gray to Binary conversion using NAND gates only.
19.	Verify Gray to Binary conversion using NAND gates only.



## Part – C Learning Resources

### Text Books, Reference Books, Other Resources

#### Suggested Readings:

##### Text Books:

1. M. Morris Mano, Digital Design, 3.ed. Prentice Hall of India Pvt. Ltd.,
2. Heuring Jordan, "Computer System Design & Architecture" (A.W.L.)
3. Books published by M.P. Hindi Granth Academy, Bhopal.

##### Reference Books:

1. William Stalling, "Computer Organization & Architecture", Pearson Education Asia.
2. V. Carl Hamacher, "Computer Organization", TMH
3. Tannenbaum, "Structured Computer Organization", PHI.

##### Suggested Digital Platforms Web Links:

1. <https://www.youtube.com/watch?v=4TzMyXmzL8M>
2. <https://nptel.ac.in/courses/106/106/106106166/>
3. <https://nptel.ac.in/courses/106/106/106106134/>

##### Suggested Equivalent Online Courses:

1. <https://nptel.ac.in/courses/106/105/106105163/>

Part D- Assessment and Evaluation	
<b>Suggested Continuous Evaluation methods:</b>	
<b>Internal Assessment/Formative Examination(A):</b>	<b>40 Marks</b>
Lab Record	15 Marks
Attendance in the Lab	05 Marks
Assignments (It can be in different modes)	20 Marks
<b>End Semester External Evaluation (B):</b>	<b>60 Marks</b>
Viva Voce on Practical	10 Marks
Practical Record File	10 Marks
Experiments	40 Marks
Total Marks (A+B)	<b>(40 + 60 =100 Marks)</b>