

<i>Part A Introduction</i>			
<b>Program :</b> <i>Certificate</i>	<b>Class :</b> <i>BCA I Semester</i>	<b>Year :</b> <i>2022</i>	<b>Session :</b> <i>2022-23</i>
1	<b>Course Code</b>	<b>S1-BCAA1T</b>	
2	<b>Course Title</b>	Computer Fundamentals, Organization & Architecture	
3	<b>Course Type (Core Course/Elective/Generic Elective/Vocational)</b>	Major – Paper I	
4	<b>Pre-Requisite (if any)</b>	To Study This Course, a student must have basic knowledge of computers.	
5	<b>Course Learning outcomes (CLO)</b>	After the completion of this course, a successful student will be able to: <ul style="list-style-type: none"> <li>• Understand the basic structure, operation and characteristics of digital computer.</li> <li>• Design simple combinational digital circuits based on given parameters.</li> <li>• Understand the working of arithmetic and logic unit.</li> <li>• Know about hierarchical memory system including cache memories and virtual memory.</li> <li>• Know the contributions of Indians in the field of computer architecture and related technologies.</li> </ul>	
6	<b>Credit Value</b>	<b>Theory – 4 Credits Practical – 2 Credits</b>	
7	<b>Total Marks</b>	Max. Marks : 100	Min. Marks : 40
<b>Part B – Content of the Course</b>			
<b>No. of Lectures (in hours per week) : 2 Hours per week</b>			
<b>Total no. of Lectures: 60 Hrs.</b>			
Unit	Topics		No. of Lectures
1	<b>Fundamentals of Computers:</b> Definition, Characteristics, Capabilities and limitations. Types of computers: Analog, Digital, Micro, Mini, Mainframe & super computers, Work station, server computers, generations of computers.  Smart systems: definition, characteristics and applications. Definition embedded system, GIS, GPS, Cloud computing. Uses of computers in E-Governance and various public domains and services.		<b>8</b>
2	Block diagram of computer and its functional units. Concept of hardware, software and firmware. Types of software.		<b>10</b>

	<p><b>Input devices</b> – keyboard, scanner, mouse, light pen, bar code reader, OMR, OCR, MICR, Trach ball, joystick, touch screen camera, mic etc.</p> <p><b>Output devices – Monitors</b> – 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, plotters 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>	
3	<p><b>Fundamentals of digital electronics:</b> Data types, complements, fixed-point representation, floating-point representation, Binary and other codes, Error detection codes.</p> <p><b>Logic Gates,</b> Boolean Algebra, map simplification, Combinational Circuits, Sequential circuits, simple combinational circuit design problems.</p> <p><b>Combinational Circuits</b> – Adder – sub tractor, multiplexer, Demultiplexer, Decoders, Encoders.</p> <p><b>Sequential Circuits</b> – Flip-Flops, Registers, counters.</p>	10
4	<p><b>Basic Computer Organization:</b> Instruction codes, computer registers, computer instructions, timing &amp; control, instruction cycles, memory reference instruction, input-output &amp; interrupts.</p> <p>Instruction formats, addressing modes, instruction codes, machine language, and assembly language.</p> <p><b>Register Transfer and Micro operations:</b> Register transfer language, register transfer, Bus &amp; memory transfer, arithmetic Micro-operation, logic micro-operations, shift Micro-operations.</p>	10
5	<p><b>Processor and control unit:</b> Hardwired vs. micro programmed control unit, general register organization, stack organization, instruction format, data transfer &amp; manipulation, program control, introductory concept of RISC, CISC, advantages and disadvantages of both.</p> <p><b>Pipelining</b> – Concept of pipelining, introduction to pipelined data path and control – handling data hazards &amp; control hazards.</p>	10
6	<p><b>Memory and I/O systems</b> – Peripheral devices, I/O interface.</p> <p><b>Data transfer schemes-</b> Program control, Interrupt, DMA transfer, I/O Processor.</p> <p><b>Memory Hierarchy,</b> 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>	10
7	<p><b>Indian contribution to the field</b> –Contributions of reputed scientists of Indian origin like – Dr. Vinod Dham – Father on Intel Pentium Processor, Dr. Ajay Bhat – Co-inventor of USB technology, Dr. Vinod Khosla Co-Founder of Sun Microsystems, Dr. Vijay P Bhatkar – Architect of India’s national initiative in supercomputing, and many others.</p>	2

<b>Parallel Computing projects of India</b> - PARMA, ANUPAM, FLOSOLVER, CHIPPS etc. other relevant contributors and contributions.	
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<b>Part C- Learning Resources</b> <b>Text Books, Reference Books, Other resources</b>
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**Text Books:**

- M. Morris Mano, "Computer System Architecture", PHI.
- Heuring Jordan, "Computer system Design & Architecture" (A.W.L.)
- मध्य प्रदेश हिंदी ग्रंथ अकादमी से प्रकाशित विषय से संबंधित पुस्तकें

**Reference Books:**

- William Stalling, "Computer Organization & Architecture", Pearson Education Asia.
- V. Carl Hamacher, "Computer Organization", TMH
- Tannenbaum, "Structured Computer Organization", PHI.
- Er. Rajiv Chopra, "Computer Architecture", Revised 3<sup>rd</sup> Edition, S. Chand & company Pvt. Ltd.

**Suggested digital platform web links:**

<https://www.youtube.com/watch?v+=4TzMyXmzL8M>

<https://nptel.ac.in/courses/106/106/106106166>

<https://nptel.ac.in/courses/106/106/106106134>

**Suggested equivalent online courses:**

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

<b>Part D- Assessment and Evaluation</b>
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<b>Internal Assessment:</b> <b>Continuous Comprehensive Evaluation (CCE) :</b> Shall be based on allotted assignments and class tests. The marks shall be as follows:	<b>External assessment: University exam (UE):</b> <b>marks</b> <b>Time: 02.00 Hours</b>
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<b>Assessment and presentation of assignment</b>			
Class Test I  <b>(Objective Questions)</b>			
Class Test I  <b>(Descriptive Questions)</b>			
<b>Total</b>		<b>Total</b>	100 Marks

Any remarks / suggestions: Theoretical exposition should be accompanied by Discussions, Case-studies preferably with Indian Context, Presentations and Industry Based Assignments.

<i>Part A Introduction</i>			
<b>Program :</b> <i>Certificate</i>	<b>Class :</b> BCA I SEM	<b>Year :</b> 2022	<b>Session :</b> 2022-23
1	<b>Course Code</b>	<b>S1-BCAA1P</b>	
2	<b>Course Title</b>	Computer Fundamentals, and Digital lab	
3	<b>Course Type (Core Course/Elective/Generic Elective/Vocational)</b>	Major – Paper I	
4	<b>Pre-Requisite (if any)</b>	Open for All	
5	<b>Course Learning outcomes (CLO)</b>	After the completion of this course, a successful student will be able to: <ul style="list-style-type: none"> <li>• Familiarity with parts of the computer and peripheral devices used with computer.</li> <li>• Realization of the basic logic and universal gates.</li> <li>• Verify the behavior of logic gates using truth tables.</li> <li>• Implement Binary-to-Gray, Gray-to-Binary code conversions.</li> <li>• Design half and full adder circuit using basic gates.</li> <li>• Design and construct flip flops and verify the excitation tables.</li> </ul>	
6	<b>Credit Value</b>	<b>Practical – 2 Credits</b>	
7	<b>Total Marks</b>	Max. Marks : 100	Min. Marks : 40
<b>Part B – Content of the Course</b>			
<b>No. of Lectures (in hours per week) : 1 Hours per week</b>			
<b>Total no. of Lectures: 30 Hrs.</b>			
<b>Unit</b>	<b>Topics</b>	<b>No. of Lectures</b>	
	I. Computer Fundamentals <ol style="list-style-type: none"> <li>a. Identify various parts of the computer by physical examination.</li> <li>b. Identify various parts inside the CPU like motherboard, SMPS, ports buses, IC chips, Processor, HDD, and RAM etc.</li> <li>c. Identify various I/O devices available in the lab physically.</li> </ol> II. Digital Electronics <ol style="list-style-type: none"> <li>a. Verification and interpretation of truth table for AND, OR, NOT gates.</li> <li>b. Verification and interpretation of truth table for NAND, NOR gates.</li> <li>c. Verification and interpretation of truth table for Ex-OR, Ex-</li> </ol>	<b>30 Hrs.</b>	

	<p>NOR gates.</p> <ol style="list-style-type: none"> <li>d. Study of half adder using XOR and NAND gates and verification of its operation.</li> <li>e. Study of full adder using XOR and NAND gates and verification of its operation.</li> <li>f. Study of half subtractor and verification of its operation.</li> <li>g. Study of full subtractor and verification of its operation.</li> <li>h. Realization of logic functions with the help of NAND-Universal gates.</li> <li>i. Realization of logic functions with the help of NOR-Universal gates.</li> <li>j. Verify the truth table of RS flip-flops using NAND and NOR gates.</li> <li>k. Verify the truth table of JK flip-flops using NAND and NOR gates.</li> <li>l. Verify the truth table of T and D flip-flops using NAND and NOR gates.</li> <li>m. Implementation of 4xl multiplexer using logic gates.</li> <li>n. Implementation of 1x4 demultiplexer using logic gates.</li> <li>o. Verify Gray to Binary conversion using NAND gates only.</li> <li>p. Verify Gray to Binary conversion using NAND gates only.</li> </ol>	
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### Part C- Learning Resources

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

**Suggested digital platform web links:**

<https://de-iitr.vlabs.ac.in/>

**Suggested equivalent online courses:**

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

### Part D- Assessment and Evaluation

<b>Internal Assessment:</b>	<b>External assessment: University exam (UE):</b>		
<b>Continuous Comprehensive Evaluation (CCE) :</b>	<b>Time: 02.00 Hours</b>		
Shall be based on allotted assignments and class tests. The marks shall be as follows:			
<b>Hand-on Lab practice</b>			
Viva			
Lab Test from Practical			
Assignments (Chats /			

model) / Technology Dissemination / Excursion / lab visit / industrial training			
Total Excursion / lab visit / Industrial Training is compulsory		<b>Total</b>	100 Marks

