

**Bodoland University**  
**Curriculum Structures for UG syllabus For Information Technology (Honours)),**

<b>SEM-I</b>						
<b>Paper Code</b>	<b>Course</b>	<b>L+T+P</b>	<b>Credit</b>	<b>End Sem</b>	<b>Int.</b>	<b>Total</b>
IT-101H	C-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20 20	100
IT-102H	C-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
Phy-GE-103H	GE-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20 20	100
COMM-104HR	AECC-1:English/ Hindi/MIL (Communication)	2	2	50(L)		50
<b>Total-</b>			<b>20</b>	<b>290</b>	<b>60</b>	<b>350</b>

<b>SEM-II</b>						
<b>Paper Code</b>	<b>Course</b>	<b>L+T+P</b>	<b>Credit</b>	<b>End Sem</b>	<b>Int</b>	<b>Total</b>
IT -201H	C-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT-202H	C-4	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
Phy-GE-203H	GE-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
ENV -204HR	AECC-2: Environmental Science	2	2	50(L)		50
<b>Total-</b>			<b>20</b>	<b>290</b>	<b>60</b>	<b>350</b>

<b>SEM-III</b>						
<b>Paper Code</b>	<b>Course</b>	<b>L+T+P</b>	<b>Credit</b>	<b>End Sem</b>	<b>Int</b>	<b>Total</b>
IT -301H	C-5	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -302H	C-6	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -303H	C-7	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -SEC1- 304HR	SEC-1	2	2	50(L)		50
Math -GE- 305H	GE-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
<b>Total-</b>			<b>26</b>	<b>370</b>	<b>80</b>	<b>450</b>

<b>SEM-IV</b>						
<b>Paper Code</b>	<b>Course</b>	<b>L+T+P</b>	<b>Credit</b>	<b>End Sem</b>	<b>Int</b>	<b>Total</b>
IT -401H	C-8	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -402H	C-9	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -403H	C-10	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -SEC2- 404HR	SEC-2	2	2	50(L)		50
Math-GE-405H	GE-4	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
<b>Total-</b>			<b>26</b>	<b>370</b>	<b>80</b>	<b>450</b>

<b>SEM-V</b>						
<b>Paper Code</b>	<b>Course</b>	<b>L+T+P</b>	<b>Credit</b>	<b>End Sem</b>	<b>Int</b>	<b>Total</b>
IT -501H	C-11	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -502H	C-12	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -DSE1- 503H	DSE-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -DSE2- 504H	DSE-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
<b>Total-</b>			<b>24</b>	<b>320</b>	<b>80</b>	<b>400</b>

<b>SEM-VI</b>						
<b>Paper Code</b>	<b>Course</b>	<b>L+T+P</b>	<b>Credit</b>	<b>End Sem</b>	<b>Int</b>	<b>Total</b>
IT -601H	C-13	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -602H	C-14	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -DSE3- 603H	DSE-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
IT -DSE4- 604H	DSE-4 (Project/Diss ertation)	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
<b>Total-</b>			<b>24</b>	<b>320</b>	<b>80</b>	<b>400</b>

1. Where there is a practical there will be no tutorial or vice-versa.
2. Institute should evolve a system/policy about ECA/ General Interest/Hobby/Sports/NCC/NSS/related courses on its own.
3. **Skill Enhancement Courses (SEC):** These courses are to be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge and should contain both theory and lab/hands-on/training/field work. The main purpose of these courses is to provide students life-skills in hands-on mode so as to increase their employability. The list provided under this category are suggestive in nature and each Institution/College has complete freedom to suggest their own papers under this category based on their expertise, specialization, requirements, scope and need. However, in this case approval of Academic section of the University is mandatory.

## 1<sup>st</sup> SEMESTER

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### **IT-101 C-1: COMPUTER FUNDAMENTALS AND PROGRAMMING IN C** **Theory: 60 Lectures**

#### **Unit 1: Fundamentals** (15 Lectures)

Major components of a Digital Computer, Representation of numbers (only a brief introduction to be given) and characters in computer, Interpreter, Assembler, Linker and Loader. Definition and concepts of algorithm and its different implementations-pseudo code, flowchart and Computer programs.

**Number System:** Binary, Hexadecimal, Octal, BCD, and conversions of number systems. Representation of signed integers, Sign and magnitude, 1's complement and 2's complement representation, conditions for overflow/underflow and its detection.

#### **Unit 2: Introduction to C** (25 Lectures)

Elementary data types , variables, constants and identifiers, Reserved word. Expression in C, precedence and associativity of C operators, C operators, L-value and R-value. Side effects of operators. Conditional Statement. Iterative Statement. Other Statement –break , continue, goto, return, null Statement, block Statement.

Function: function declaration. Calling a function. Parameters –Call by value, Call by reference

Recursion and how it works. Cast and sizeof operator.

#### **Unit 3: Arrays and pointers** (15 Lectures)

Storage classes. Scope and lifetime of variables. Arrays and pointers and corresponding operators. Pointer arithmetic. Programs using arrays and pointers like sum, average, minimum, maximum of an array of numbers. Add and delete an element of an array. Merge two sorted arrays. String manipulation programs like string concatenation, palindrome, reverse, copy etc. Matrix manipulation like Sum of rows, columns, and diagonal elements of a matrix, transpose of a matrix.

#### **Searching and Sorting**

Linear search, binary search. Selection sort and bubble sort.

#### **Unit 4: Structures and Files** (5 Lectures)

Structure – declaration and use. Structure member resolution and structure pointer member resolution operators. Programs to show the use of structure. Standard C library.

Files in C—opening, closing, reading and writing of files. Seeking forward and backward. Simple examples of file handling programs.

## REFERNCE BOOKS

1. Programming with C, B.S. Gottfried, Tata Mc-Graw Hill.
2. Programming in ANSI C, E.Balagurusamy, Tata McGraw – Hill
3. The C Programming Language, B.W. Kernighan and D.M.Ritchie, PHI
4. Computer Fundamentals, Anita Goel, Pearson, 2010.

## IT LAB-101 (C-I): COMPUTER FUNDAMENTALS AND PROGRAMMING IN C Lab Practical: 60 Lectures

**At least 20 programming assignments have to be done by each student from the following list. The assignments should be selected in such a way that all the features of C language are included.**

1. Write a program to convert a given temperature value from Fahrenheit scale to Centigrade scale and vice versa.
2. Write a program to display ASCII value of a character.
3. Write a program to check whether a number is perfect or not.
4. Write a program to find out the biggest of three numbers using nested if.
5. A company insures its drivers if either of the following conditions are satisfied
  - Driver is married.
  - Driver is an unmarried, male and above 30 years of age.
  - Driver is unmarried, female and above 25 years of age.

Write a program to decide if a driver is to be insured using logical operators.

6. Write a program to read a list of positive integers terminated by -1 and display the odd and even numbers separately and also their respective counts.
7. Write a program to read values of n and x and print the value of y using switch case where
  - a.  $y=n+x$  when  $n=1$
  - b.  $y=1+x/n$  when  $n=2$
  - c.  $y= n+3x$  when  $n=3$
  - d.  $y=1+nx$  when  $n>3$  or  $n<1$ .
8. Write a program to n values of sales and then calculate the commission on sales amount where the commission is calculated as follows:
  - a. If sales  $\leq$  Rs.500, commission is 5%.
  - b. If sales  $> 500$  but  $\leq 2000$ , commission is Rs 35 plus 10% above Rs 500.
  - c. If sales  $> 2000$  but  $\leq 5000$ ,commission is Rs 185 plus 12% above Rs.2000.
  - d. If sales  $> 5000$  ,commission is 12.5%.

9. Write a program to find out minimum, maximum, sum and average of n numbers without using array.
10. Program to find mean and standard deviation (SD) for a set of n numbers without using array.
11. Write a program to find out the roots of a quadratic equation. Use proper testing to find checks for real and complex roots.
12. Write a program to print the digits of a number in words. ( eg. if a number 841 is entered through the keyboard your program should print —Eight Four One.)
13. Write a program to print the PASCAL Triangle up to the n-th row where n is an input to the program.
14. Write a function to return the HCF of two positive integers. Write a main function to read two positive integers and print their HCF and LCM by using the above function.
15. Write a program to convert a decimal number into binary number using function.
16. Write a program to display the result of sine series using function.
17. Write a program to find the sum of the following series  
 $1+x-x^3/3!+x^5/5!-x^7/7!+\dots$  corrected up to the 3 decimal place.
18. Write a program to read n numbers in a sorted array and insert a given element in a particular position
19. Write functions to compute the factorial of a number using both recursive and non-recursive procedure.
20. Write a program to print the values of ncr and npr for given positive integers n r > 0. Use a function fact(n) to return the factorial of a non-negative integer.n.  
 $ncr=n!/r!(n-r)!$   $npr=n!/(n-r)!$
21. Write a program to display the first n Fibonacci numbers using function.
22. Write a program to display the prime numbers within a given range. Write a function to check whether a given integer is prime or not and use it.
23. Write a program to Multiply two matrices using function
22. Write a program to display the prime numbers within a given range. Write a function to check whether a given integer is prime or not and use it.
23. Write a program to Multiply two matrices using function
24. Write a program to display the upper Triangle and lower Triangle of a given square matrix using function.
25. Write a function to check if a given square matrix is symmetric or not. Write a main function to implement it.
26. Write a program to read a m X n matrix and calculate the Row sum and Column Sum of the matrix
27. Write a function to read in an integer and print the representation of the number using the sign and magnitude representation scheme using 8 bits. The program should check for overflow/under flow conditions. The left most bit is to be used as the sign bit.
28. Write a program to merge two sorted arrays.

29. Write a program to implement selection sort using function.
30. Write a program to count the number of vowels in a string.
31. Write a program to concatenate two strings using function (without using library function).
32. Write a program to convert a string from upper case to lower case and vice versa.
33. Write a program to swap two numbers using function (pass the pointers).
34. Write a program to sort n number of strings in ascending order using pointer.
35. Write a program using pointers to copy a string to another string variable (without using library function).
36. Declare a structure of a student with details like roll number, student name and total marks. Using this, declare an array with 50 elements. Write a program to read details of n students and print the list of students who have scored 75 marks and above.
37. Create a structure to store the following information of employees.
  - a. Employee's number, name, pay and date of joining.It has been decided to increase the pay as per the following rules:  
Pay  $\leq$  Rs.3000 : 20% increase  
Pay  $\leq$  Rs.6000 but  $>$  Rs.3000 :15% increase  
Pay  $>$  Rs.6000 : no increase  
Write a program to implement the above structure.
38. Write a program to read a text file and count the number of vowels in the text file.
39. Write a program to copy a text file to another file.

## **IT-102 (C-2): DISCRETE STRUCTURE**

### **Theory: 60 Lectures**

#### **Unit 1: Introduction:** (15 Lectures)

Sets - finite and Infinite sets, functions, relations, Properties of Binary Relations, Closure, Partial Ordering Relations; counting - Pigeonhole Principle, Permutation and Combination; Mathematical Induction, Principle of Inclusion and Exclusion.

#### **Unit 2: Growth of Functions:** (8 Lectures)

Asymptotic Notations, Summation formulas and properties, Bounding Summations, approximation by Integrals

#### **Unit 3: Recurrences** (10 Lectures)

Recurrence Relations, generating functions, Linear Recurrence Relations with constant coefficients and their solution, Substitution Method

#### **Unit 4: Graph Theory** (15 Lectures)

Basic Terminology, Models and Types, multigraphs and weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees

#### **5. Propositional Logic** (12 Lectures)

Logical Connectives, Well-formed Formulas, Tautologies, Equivalences, Inference Theory

#### **Recommended Books:**

1. C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2<sup>nd</sup> Edition , Tata McGraw Hill, 1985,
2. Kenneth Rosen, Discrete Mathematics and Its Applications, Sixth Edition ,McGraw Hill 2006
3. T.H. Cormen, C.E. Leiserson, R. L. Rivest, Introduction to algorithms, 3rd edition Prentice Hall on India, 2009
4. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988
5. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009
6. D.J. Hunter, Essentials of Discrete Mathematics, Jones and Bartlett Publishers, 2008

## **IT LAB-102 (C 2): DISCRETE STRUCTURES**

### **Lab Practical: 15 Lectures**

1. C programs to implement the Kruskal's algorithm to generate a minimum cost spanning tree.
2. C programs to implement the Prim's algorithm to generate a minimum cost spanning tree.
3. C program to implement Euler Circuit problem.
4. C program to implement Hamiltonian Cycle.
5. C Program to Evaluate Truth Value of Conjunction.
6. C program to Evaluate Truth Value of Disjunction.
7. Write a c program to print the union of two sets.
8. Write a c program to print the intersection of two sets.
9. Write a c program to print the Permutation of character string of two sets.
10. Write a c program to print the combination of a number of two sets.
11. Write a c program to find and print all the elements in the Cartesian product of two sets.
12. Write a c program to print the subtraction of two sets.
13. Write a c program to print the power of two sets.
14. Write a c program to print the proper subset of sets.
15. Write a c program to print the symmetric difference of two sets.

**GE 1 : Information Communication Technologies Hardware**  
**Computer Fundamentals**  
**Theory: 60 lectures**

<b>Introduction:</b> Introduction to computer system, uses	<b>6L</b>
<b>Data Representation:</b> Number systems and character representation, binary arithmetic	<b>12L</b>
<b>Human Computer Interface:</b> Types of software, Operating system as user interface,	<b>6L</b>
<b>Devices:</b> Input and output devices	<b>10L</b>
<b>Memory:</b> Primary, secondary, auxiliary memory	<b>6L</b>
<b>Computer Organisation and Architecture:</b> C.P.U., registers, system bus, main memory unit, cache memory, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors.	<b>12L</b>
<b>Overview of Emerging Technologies:</b> cloud computing, big data, data mining, mobile computing and embedded systems.	<b>8L</b>

**Reference Books:**

1. A. Goel, Computer Fundamentals, Pearson Education, 2010.
2. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006
3. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007