



**MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL**  
**NH-12 (Old NH-34), Simhat, Haringhata, Nadia -741249**  
**Department of Information Technology (In-house)**  
**B.Sc. in Information Technology (Cyber Security)**  
**(Effective from academic session 2019-20)**

**Semester-I**

<b>Name of the Course: B.Sc. in Information Technology (Cyber Security)</b>			
<b>Subject: Programming for Problem Solving &amp; Programming for Problem Solving Lab</b>			
<b>Course Code: BITCS101 and BITCS191</b>		<b>Semester: I</b>	
<b>Duration: 36 Hrs.</b>		<b>Maximum Marks: 100+100</b>	
<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Theory: 3 hrs./week</b>		<b>End Semester Exam: 70</b>	
<b>Tutorial: 0</b>		<b>Attendance : 5</b>	
<b>Practical: 4 hrs./week</b>		<b>Continuous Assessment: 25</b>	
<b>Credit: 3 + 2</b>		<b>Practical Sessional internal continuous evaluation: 40</b>	
		<b>Practical Sessional external examination: 60</b>	
<b>Aim:</b>			
<b>Sl. No.</b>			
1.	Implement your algorithms to build programs in the C programming language		
2.	Use data structures like arrays, linked lists, and stacks to solve various problems		
3.	Understand and use file handling in the C programming language		
<b>Objective:</b>			
<b>Sl. No.</b>			
1.	To write efficient algorithms to solve various problems		
2.	To understand and use various constructs of the programming language		
3.	To apply such as conditionals, iteration, and recursion in programming		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	Basic Knowledge of Computer System		
<b>Contents</b>			<b>3 Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	<b>Introduction to Computers</b> Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Software Development, Flow charts. Number Systems: Binary, Octal, Decimal, Hexadecimal Introduction to C Language - Background, C Programs, Identifiers, Data Types, Variables, Constants, Input / Output Statements Arithmetic Operators and Expressions: Evaluating Expressions, Precedence and Associativity of Operators, Type Conversions.	6	10
02	<b>Conditional Control Statements</b> Bitwise Operators, Relational and Logical Operators, If, If- Else, Switch-Statement and Examples. Loop Control Statements: For, While, DoWhile and Examples. Continue, Break and Goto statements Functions: Function Basics, User-defined Functions, Inter Function Communication, Standard Functions, Methods of Parameter Passing.	8	10



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	Recursion- Recursive Functions.. Storage Classes: Auto, Register, Static, Extern, Scope Rules, and Type Qualifiers.		
03	<b>Pre-processors and Arrays</b> Pre-processor Commands Arrays - Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two- Dimensional Arrays, Multidimensional Arrays, Linear and Binary Search, Selection and Bubble Sort.	8	16
04	<b>Pointers</b> Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, Lvalue and Rvalue, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions, Command Line Arguments. Strings - Concepts, C Strings, String Input/ Output Functions, Arrays of Strings, String Manipulation Functions.	8	16
05	<b>Structures and File</b> Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self-Referential Structures, Unions, Type Definition (typedef), Enumerated Types. Input and Output: Introduction to Files, Modes of Files, Streams, Standard Library Input/ Output Functions, Character Input/ Output Functions.	6	18
	<b>Sub Total:</b>	<b>36</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>40</b>	<b>100</b>

**Practical:**

**Skills to be developed:**

Intellectual skills:

1. The ability to learn concepts and apply them to other problems. ...
2. Basic mathematical skills.
3. A passion for problem solving.
4. Confidence around a computer programming Language.

**List of Practical: Sl. No. 1 to 10 compulsory & at least three from the rest)**

1. Write a c program to display the word "welcome".
2. Write a c program to take a variable int and input the value from the user and display it.
3. Write a c program to add 2 numbers entered by the user and display the result.
4. Write a c program to calculate the area and perimeter of a circle.
5. Write a C program to find maximum between two numbers.
6. Write a C program to check whether a number is divisible by 5 and 11 or not.
7. Write a C program to input angles of a triangle and check whether triangle is valid or not.
8. Write a C program to check whether a year is leap year or not.
9. Write a C program to input basic salary of an employee and calculate its Gross salary according to



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following:

Basic Salary <= 10000 : HRA = 20%, DA = 80%

Basic Salary <= 20000 : HRA = 25%, DA = 90%

Basic Salary > 20000 : HRA = 30%, DA = 95%

10. Write a c program to print "welcome" 10 times.
11. Write a c program to print first n natural numbers using while loop.
12. Write a c program to print all the odd numbers in a given range.
13. Write a c program to add first n numbers using while loop.
14. Write a c program to print all numbers divisible by 3 or 5 in a given range.
15. Write a c program to add even numbers in a given range.
16. Write a c program to find the factorial of a given number.
17. Write a c program to find whether a number is prime or not.
18. Write a c program to print the reverse of a number.
19. Write a c program to add the digits of a number.
20. Write a c program to print the Fibonacci series in a given range using recursion.
21. Write a c program to check whether a number is an Armstrong number or not.
22. Write a c program to find g.c.d. and l.c.m. of two numbers using function.

**Assignments:**

1. Based on theory lectures.

**List of Books**

**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Yashavant Kanetkar,	Let us C	13 <sup>th</sup> Edition	BPB Publication
E. Balaguruswamy	Programming in ANSI C		Tata McGraw-Hill
Gary J. Bronson	A First Book of ANSI C	4th Edition	ACM

**Reference Books:**

Byron Gottfried	Schaum's Outline of Programming with C		McGraw-Hill
Kenneth A. Reek	Pointers on C		Pearson
Brian W. Kernighan and Dennis M. Ritchie	The C Programming Language		Prentice Hall of India

**List of equipment/apparatus for laboratory experiments:**

Sl. No.	
1.	Computer

**End Semester Examination Scheme.**

**Maximum Marks-70.**

**Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1,2,3,4,5	10	10				



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B	3, 4, 5			5	3	5	60
C	1,2,3,4,5			5	3	15	

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

**Examination Scheme for end semester examination:**

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

**Examination Scheme for Practical Sessional examination:**

**Practical Internal Sessional Continuous Evaluation**

**Internal Examination:**

Continuous evaluation			<b>40</b>
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**External Examination: Examiner-**

Signed Lab Assignments	<b>10</b>	
On Spot Experiment	<b>40</b>	
Viva voce	<b>10</b>	<b>60</b>



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<b>Name of the Course: B.Sc. in Information Technology (Cyber Security)</b>			
<b>Subject: Electrical and Electronics Engineering &amp; Electrical and Electronics Engineering Lab</b>			
<b>Course Code: BITCS102 and BITCS192</b>		<b>Semester: I</b>	
<b>Duration: 36 Hrs.</b>		<b>Maximum Marks: 100+100</b>	
<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Theory: 3 hrs./week</b>		<b>End Semester Exam: 70</b>	
<b>Tutorial: 0</b>		<b>Attendance : 5</b>	
<b>Practical: 4 hrs./week</b>		<b>Continuous Assessment: 25</b>	
<b>Credit: 3 + 2</b>		<b>Practical Sessional internal continuous evaluation: 40</b>	
		<b>Practical Sessional external examination: 60</b>	
<b>Aim:</b>			
<b>Sl. No.</b>			
1.	It aims to apply knowledge of science, mathematics, and engineering principles to solve electrical and electronics engineering problems.		
2.	It also edifies understanding the impact of electrical & electronics engineering solutions in a global, economic, environmental, and societal context.		
<b>Objective:</b>			
<b>Sl. No.</b>			
1.	To impart profound scientific & engineering knowledge to comprehend, analyze, design and create new thoughts and products for solving real life Engineering problems.		
2.	Ability to conduct experimental investigation, analyze, evaluate and interpret results in the field electrical & electronics circuits & measurements, electrical machines, power systems, control systems, power electronics & drives and microprocessor & microcontroller, electronics devices etc.		
<b>Contents</b>			<b>3 Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	<b>Electrical Circuits &amp; Measurements</b> Fundamental laws of electric circuits, Steady State Solution of DC Circuits – Introduction to AC Circuits -Sinusoidal steady state analysis, Power and Power factor - Single Phase and Three Phase Balanced Circuits. Classification of instruments - Operating Principles of indicating Instruments	6	14
02	<b>Electrical Machines</b> Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.	6	13
03	<b>Semiconductor Devices And Applications</b> Introduction - Characteristics of PN Junction Diode – Zener Effect - Zener Diode and its Characteristics - Half wave and Full wave Rectifiers - Voltage Regulation. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal Amplifier.	10	16
04	<b>Digital Electronics</b> Binary Number System – Boolean algebra theorems, Digital circuits -	8	13

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	Introduction to sequential Circuits, Flip-Flops - Registers and Counters – A/D and D/A Conversion -digital processing architecture.		
05	<b>Fundamentals of Communication Engineering</b> Introduction - Elements of Communication Systems, Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Digital Communication - Communication Systems: Radio, Antenna, TV, Fax, ISDN, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).	6	14
	<b>Sub Total:</b>	<b>36</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>40</b>	<b>100</b>

**Practical:**

**Skills to be developed:**

Intellectual skills:

- 1.
- 2.
- 3.
- 4.
- 5.

**List of Practical: Sl. No. 1& 2 compulsory & at least three from the rest)**

1. Verification of Kirchoff's current and voltage laws.
2. Verification of network theorems.
3. Study of characteristics of DC motor
4. Open circuit and short circuit test on single phase transformer.
5. Familiarization of resistors using colour coded method and multimeter.
6. PN junction diode and zener diode characteristics
7. Transistor CE and CB characteristics.
8. Full wave and Half wave Characteristics
9. Study of CRO.

**Assignments:**

1. Based on theory

**List of Books**

**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
DP Kothari and I.J Nagarath	Electrical Machines "Basic Electrical and Electronics Engineering		McGraw Hill Education(India) Private Limited, Third Reprint,2016
S.K. Bhattacharya	Basic Electrical and Electronics Engineering		Pearson India, 2011

**Reference Books:**

Sedha R.S	Applied Electronics		S. Chand & Co., 2006
A.E.Fitzgerald, David E Higginbotham and Arvin Grabel	Basic Electrical Engineering		McGraw Hill Education(India) Private Limited, 2009



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<b>List of equipment/apparatus for laboratory experiments:</b>							
Sl. No.							
1.		CRO/DSO, Multimeter					
2.		Function Generator					
3.		Electrical Trainer Kit					
<b>End Semester Examination Scheme.</b>			<b>Maximum Marks-70.</b>		<b>Time allotted-3hrs.</b>		
Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1,2,3,4,5	10	10				
B	3, 4, 5			5	3	5	60
C	1,2,3,4,5			5	3	15	
<ul style="list-style-type: none"> <li>Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.</li> <li>Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.</li> </ul>							
<b>Examination Scheme for end semester examination:</b>							
Group	Chapter	Marks of each question	Question to be set	Question to be answered			
A	All	1	10	10			
B	All	5	5	3			
C	All	15	5	3			
<b>Examination Scheme for Practical Sessional examination:</b>							
<b>Practical Internal Sessional Continuous Evaluation</b>							
<b>Internal Examination:</b>							
Continuous evaluation						<b>40</b>	
<b>External Examination: Examiner-</b>							
Signed Lab Assignments					<b>10</b>		
On Spot Experiment					<b>40</b>		
Viva voce					<b>10</b>		<b>60</b>



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<b>Name of the Course: B.Sc. in Information Technology (Cyber Security)</b>			
<b>Subject: Soft Skills &amp; Soft Skills Lab</b>			
<b>Course Code: BITCS103 and BITCS193</b>		<b>Semester: I</b>	
<b>Duration: 36 Hrs.</b>		<b>Maximum Marks: 100+100</b>	
<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Theory: 3 hrs./week</b>		<b>End Semester Exam: 70</b>	
<b>Tutorial: 0</b>		<b>Attendance: 5</b>	
<b>Practical: 2 hrs./week</b>		<b>Continuous Assessment: 25</b>	
<b>Credit: 3 +1</b>		<b>Practical Sessional internal continuous evaluation: 40</b>	
		<b>Practical Sessional external examination: 60</b>	
<b>Aim:</b>			
<b>Sl. No.</b>			
1.	Ability to read English with ability to read English with understanding and decipher paragraph patterns, writer techniques and conclusions		
2.	Skill to develop the ability to write English correctly and master the mechanics of writing the use of correct punctuation marks and capital letter		
3.	Ability to understand English when it is spoken in various contexts.		
<b>Objective:</b>			
<b>Sl. No.</b>			
1.	To enable the learner to communicate effectively and appropriately in real life situation		
2.	To use English effectively for study purpose across the curriculum		
3.	To use R,W,L,S and integrate the use of four language skills, Reading, writing , listening and speaking.		
4.	To revise and reinforce structures already learnt.		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	Basic knowledge of English Language.		
<b>Contents</b>			<b>3 Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	<b>Grammar</b> Correction of sentence, Vocabulary/word formation, Single word for a group of words, Fill in the blank, transformation of sentences, Structure of sentences – Active / Passive Voice – Direct / Indirect Narration.	6	15
02	<b>Essay Writing</b> Descriptive – Comparative – Argumentative – Thesis statement-Structure of opening / concluding paragraphs – Body of the essay.	5	5
03	<b>Reading Comprehension</b> Global – Contextual – Inferential – Select passages from recommended text.	5	10
04	<b>Business Correspondence</b> Letter Writing – Formal. Drafting. Bio data - Resume'- Curriculum Vitae.	5	8
05	<b>Report Writing</b> Structure, Types of report – Practice Writing.	5	5
06	<b>Communication skills</b>	5	15



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	Public Speaking skills, Features of effective speech, verbal-nonverbal.		
07	<b>Group discussion</b> Group discussion – principle – practice	5	12
	<b>Sub Total:</b>	36	70
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	4	30
	<b>Total:</b>	40	100

**Practical:**

**Skills to be developed:**

Intellectual skills:

1. Skill of Grammar
2. Various writing skills
3. Skill of reading English text
4. Skill of effective written communication

Motor Skills:

1. Skill of using Correct body language while giving a presentation
2. Various non-verbal communication skills
3. Skill of using correct gestures and expressions while speaking publicly
4. Essential approach and attitude in Group Discussion or Viva

**List of Practical:**

1. Honing 'Listening Skill' and its sub skills through Language Lab Audio device.
2. Honing 'Speaking Skill' and its sub skills.
3. Helping them master Linguistic/Paralinguistic features (Pronunciation/Phonetics/Voice modulation/ Stress/ Intonation/ Pitch & Accent) of connected speech.
4. Honing 'Conversation Skill' using Language Lab Audio –Visual input, Conversational Practice Sessions (Face to Face / via Telephone, Mobile phone & Role Play Mode).
5. Introducing 'Group Discussion' through audio –Visual input and acquainting them with key strategies for success.
6. GD Practice Sessions for helping them internalize basic Principles (turn- taking, creative intervention, by using correct body language, courtesies & other soft skills) of GD.
7. Honing 'Reading Skills' and its sub skills using Visual / Graphics/Diagrams /Chart Display/Technical/Non Technical Passages, Learning Global / Contextual / Inferential Comprehension.
8. Honing 'Writing Skill' and its sub skills by using Language Lab Audio –Visual input, Practice Sessions

**Assignments:**

Based on theory lectures.

**List of Books**

**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
R.C. Sharma and K.Mohan	Business Correspondence and Report Writing		Tata McGraw Hill , New Delhi , 1994
.Gartside	Model Business Letters		Pitman , London , 1992



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<b>Reference Books:</b>			
Mark MaCormack	Communication		
John Metchell	How to write reports		
S R Inthira& V Saraswathi	Enrich your English – a) Communication skills b) Academic skills		CIEFL & OUP
Longman	Longman Dictionary of Contemporary English/Oxford Advanced Learner’s Dictionary of Current English		OUP , 1998
Maxwell Nurnberg and Rosenblum Morris	All About Words		General Book Depot, New Delhi , 1995
	A Text Book for English for Engineers & Technologists		

<b>List of equipment/apparatus for laboratory experiments:</b>	
Sl. No.	
1.	Computer
2.	Audio Devices
3.	Visual Devices
4.	Language lab Devices and the dedicated software

<b>End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.</b>							
Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1,2,3,4,5,6	10	10				
B	3, 4, 5, 6			5	3	5	60
C	1,2,3,4,5, 6			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

<b>Examination Scheme for end semester examination:</b>				
Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3



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C	All	15	5	3
<b>Examination Scheme for Practical Sessional examination:</b>				
<b>Practical Internal Sessional Continuous Evaluation</b>				
<b>Internal Examination:</b>				
Continuous evaluation				<b>40</b>
<b>External Examination: Examiner-</b>				
Signed Lab Assignments			<b>10</b>	
On Spot Experiment			<b>40</b>	
Viva voce			<b>10</b>	<b>60</b>



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<b>Name of the Course: B.Sc. in Information Technology (Cyber Security)</b>			
<b>Subject: Mathematics for Computer Science</b>			
<b>Course Code: BITCS104</b>		<b>Semester: 1</b>	
<b>Duration: 36 Hrs.</b>		<b>Maximum Marks: 100</b>	
<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Theory: 3 hrs./week</b>		End Semester Exam: 70	
<b>Tutorial:1 hrs./week</b>		Attendance: 5	
<b>Practical: 0</b>		Continuous Assessment: 25	
<b>Credit:4</b>		Practical Sessional internal continuous evaluation: NA	
		Practical Sessional external examination: NA	
<b>Aim:</b>			
<b>Sl. No.</b>			
1.	To develop formal reasoning.		
2.	Create habit of raising questions		
3.	Knowledge regarding the use of Mathematics in Computer Science		
4.	Ability to communicate knowledge, capabilities and skills related to the computer engineer profession		
<b>Objective:</b>			
<b>Throughout the course, students will be expected to demonstrate their understanding of Mathematics by being able to do each of the following</b>			
<b>Sl. No.</b>			
1.	To understand and solve mathematical problems		
2.	To impart knowledge regarding relevant topics.		
3.	To familiarize students with linear Algebra, differential and integral calculus, numerical methods and statistics.		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	<b>Knowledge of basic algebra, trigonometry and calculus.</b>		
<b>Contents</b>			<b>4 Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	<b>Modern algebra</b> Set, Relation, Mapping, Binary Operation, Addition Modulo n, Multiplication modulo n, semi group, properties of groups, subgroup.	3	7
02	<b>Trigonometry</b> Radian or circular Measure, Trigonometric Functions, Trigonometric ratios of angle $\theta$ when $\theta$ is acute, trigonometric ratios of certain standard angles, allied angles, compound angles, multiple and sub-multiple angles.	3	5
03	<b>Limits and Continuity</b> The real number system, The concept of limit, concept of continuity.	2	5
04	<b>Differentiation</b>	4	10



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	Differentiation of powers of $x$ , Differentiation of $e^x$ and $\log x$ , differentiation of trigonometric functions, Rules for finding derivatives, Different types of differentiation, logarithmic differentiation, differentiation by substitution, differentiation of implicit functions, differentiation from parametric equation. Differentiation from first principles.		
05	<b>Integrations</b> Integration of standard Functions, rules of Integration, More formulas in integration, Definite integrals.	4	10
06	<b>Differential equations</b> First order differential equations, practical approach to Differential equations, first order and first degree differential equations, homogeneous equations. Linear equations, Bernoulli's equation, Exact Differential Equations.	4	6
07	<b>Complex Numbers</b> Complex Numbers, Conjugate of a complex number, modulus of a complex Number, geometrical representation of complex number, De Moivre's theorem, $n^{\text{th}}$ roots of a complex number.	3	5
08	<b>Matrices and Determinants</b> Definition of a matrix, Operations on matrices, Square Matrix and its inverse, determinants, properties of determinants, the inverse of a matrix, solution of equations using matrices and determinants, solving equations using determinants.	4	7
09	<b>Infinite Series</b> Convergence and divergence, series of positive terms, binomial series, exponential series, logarithmic series.	3	5
10	<b>Probability</b> Concept of probability, sample space and events, three approaches of probability, kolmogorov's axiomatic approach to probability, conditional probability and independence of events, bay's theorem.	3	5
11	<b>Introduction to Statistics</b> Measures of central Tendency, Standard Deviation, Discrete series. Methods, Deviation taken from assumed mean, continuous series, combined standard deviation, coefficient of variation, variance.	3	5
	<b>Sub Total:</b>	<b>36</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>40</b>	<b>100</b>

**Assignments:**

Based on the curriculum as covered by subject teacher.

**List of Books**



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<b>Text Books:</b>							
<b>Name of Author</b>		<b>Title of the Book</b>		<b>Edition/ISSN/ISBN</b>		<b>Name of the Publisher</b>	
S. K. Mapa		Higher Algebra				Levant Books	
Chakravorty and Ghosh		Advanced Higher Algebra				U N DharPvt. Ltd	
<b>Reference Books:</b>							
Das and Mukherjee		Integral Calculus				U N DharPvt. Ltd	
Das and Mukherjee		Differential Calculus				U N DharPvt. Ltd	
<b>End Semester Examination Scheme.</b>				<b>Maximum Marks-70.</b>		<b>Time allotted-3hrs.</b>	
<b>Group</b>	<b>Unit</b>	<b>Objective Questions</b> (MCQ only with the correct answer)		<b>Subjective Questions</b>			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
<b>A</b>	<b>1 to 11</b>	<b>10</b>	<b>10</b>				
<b>B</b>	<b>1 to 11</b>			<b>5</b>	<b>3</b>	<b>5</b>	<b>60</b>
<b>C</b>	<b>1 to 11</b>			<b>5</b>	<b>3</b>	<b>15</b>	
<ul style="list-style-type: none"> <li>Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.</li> <li>Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.</li> </ul>							
<b>Examination Scheme for end semester examination:</b>							
<b>Group</b>	<b>Chapter</b>	<b>Marks of each question</b>	<b>Question to be set</b>	<b>Question to be answered</b>			
<b>A</b>	<b>All</b>	<b>1</b>	<b>10</b>	<b>10</b>			
<b>B</b>	<b>All</b>	<b>5</b>	<b>5</b>	<b>3</b>			
<b>C</b>	<b>All</b>	<b>15</b>	<b>5</b>	<b>3</b>			



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<b>Name of the Course: B.Sc. in Information Technology (Cyber Security)</b>			
<b>Subject: Introduction to AI and Machine Learning</b>			
<b>Course Code: BITCS105</b>		<b>Semester: I</b>	
<b>Duration: 36 Hrs.</b>		<b>Maximum Marks: 100</b>	
<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Theory: 3 hrs./week</b>		<b>End Semester Exam: 70</b>	
<b>Tutorial: 1 hr./week</b>		<b>Attendance : 5</b>	
<b>Practical: 0</b>		<b>Continuous Assessment: 25</b>	
<b>Credit: 4</b>		<b>Practical Sessional internal continuous evaluation: NA</b>	
		<b>Practical Sessional external examination: NA</b>	
<b>Aim:</b>			
<b>Sl. No.</b>			
1.	Define Artificial Intelligence (AI) and understand its relationship with data		
2.	Understand Machine Learning approach and its relationship with data science		
3.	Identify the application		
4.	Define Machine Learning (ML) and understand its relationship with Artificial Intelligence		
<b>Objective:</b>			
<b>Sl. No.</b>			
1.	Gain a historical perspective of AI and its foundations		
2.	Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.		
3.	Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.		
4.	Experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.		
5.	Experiment with a machine learning model for simulation and analysis.		
6.	Explore the current scope, potential, limitations, and implications of intelligent systems		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	<b>Basic Statistical and Computational knowledge</b>		
<b>Contents</b>			<b>4 Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	<b>Artificial intelligence fundamentals</b> A.I. systems integrating approaches and methods.- Advanced search-Constraint satisfaction problems - Knowledge representation and reasoning - Non-standard logics - Uncertain and probabilistic reasoning (Bayesian networks, fuzzy sets).- Foundations of semantic web: semantic networks and description logics. - Rules systems: use and efficient implementation.- Planning systems	7	14
02	<b>Machine learning</b>	7	14

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	Computational learning tasks for predictions, learning as function approximation, generalization concept. - Linear models and Nearest-Neighbors (learning algorithms and properties, regularization). - Neural Networks (MLP and deep models, SOM). - Probabilistic graphical models. - Principles of learning processes: elements of statistical learning theory, model validation. - Support Vector Machines and kernel-based models. - Introduction to applications and advanced models. Applicative project: implementation and use of ML/NN models with emphasis to the rigorous application of validation techniques		
03	<p><b>Human language technologies</b></p> <p>Formal and statistical approaches to NLP. Statistical methods: Language Model, Hidden Markov Model, Viterbi Algorithm, Generative vs Discriminative Models Linguistic essentials (tokenization, morphology, PoS, collocations, etc.). Parsing (constituency and dependency parsing). Processing Pipelines. Lexical semantics: corpora, thesauri, gazetteers. Distributional Semantics: Word embeddings, Character embeddings. Deep Learning for natural language.</p> <p><b>Applications:</b> Entity recognition, Entity linking, classification, summarization.</p> <p>Opinion mining, Sentiment Analysis. Question answering, Language inference, Dialogic interfaces. Statistical Machine Translation. NLP libraries: NLTK, Theano, Tensorflow</p>	7	14
04	<p><b>Intelligent Systems for Pattern Recognition</b></p> <p>Particular focus will be given to pattern recognition problems and models dealing with sequential and time-series data-Signal processing and time-series analysis-Image processing, filters and visual feature detectors-Bayesian learning and deep learning for machine vision and signal processing-Neural network models for pattern recognition on non-vectorial data (physiological data, sensor streams, etc)-Kernel and adaptive methods for relational data-Pattern recognition applications: machine vision, bio informatics, robotics, medical imaging, etc.-ML and deep learning libraries overview: e.g. scikit-learn, Keras, Theano</p>	7	14
05	<p><b>Smart applications and Robotics</b></p> <p>Common designs for smart applications examples: fuzzy logic in control systems or cloud analysis of field sensors data streams Make or buy: selecting appropriate procurement strategies example: writing your own RNN architecture vs. using cloud services</p> <p>Development platforms for smart objects examples: Brillo (IoT devices) or Android TV (Smart TVs)</p> <p>Development platforms for smart architectures examples: TensorFlow (server-side RNNs), or the Face Recognition API (mobile) Cloud services for smart applications examples: Google Cloud Machine Learning API, Google Cloud Vision API, Google Cloud Speech API, or Deploying Deep Neural Networks on Microsoft Azure GPU VMs</p> <p>Deployment and operations examples: cloud hosting vs. device hosting, or harnessing user feedback to drive improvement</p> <p>Measuring success: methods and metrics examples: defining user</p>	8	14



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	engagement and satisfaction metrics, or assessing the naturalness of smart interactions <b>Introduction to robotics:</b> main definitions, illustration of application domains-Mechanics and kinematics of the robot-Sensors for robotics-Robot Control-Architectures for controlling behaviour in robots-Robotic Navigation-Tactile Perception in humans and robots-Vision in humans and robots-Analysis of case studies of robotic systems-Project laboratory: student work in the lab with robotic systems		
	<b>Sub Total:</b>	<b>36</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>40</b>	<b>100</b>

**List of Books**

**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Stuart Russell and Peter Norvig	Artificial Intelligence: A Modern Approach		
Nils J Nilsson	Artificial Intelligence: A New Sythesis		

**Reference Books:**

Negnevitsky	Artificial Intelligence		
AkerkarRajendr	Intro. to artificial intelligence		
AnandHareendran S and Vinod Chandra S S	Artificial Intelligence and Machine Learning		

**End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1,2,3,4,5	10	10				
B	3, 4, 5			5	3	5	60
C	1,2,3,4,5			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

**Examination Scheme for end semester examination:**

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3



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<b>Name of the Course: B.Sc. in Information Security Technology (Cyber Security)</b>			
<b>Subject: Introduction to Information Security</b>			
<b>Course Code: BITCS106</b>		<b>Semester: I</b>	
<b>Duration: 36 Hrs.</b>		<b>Maximum Marks: 100</b>	
<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Theory: 3 hrs./week</b>		<b>End Semester Exam: 70</b>	
<b>Tutorial: 1 hr./week</b>		<b>Attendance : 5</b>	
<b>Practical: 0</b>		<b>Continuous Assessment: 25</b>	
<b>Credit: 4</b>		<b>Practical Sessional internal continuous evaluation: NA</b>	
		<b>Practical Sessional external examination: NA</b>	
<b>Aim:</b>			
<b>Sl. No.</b>			
1.	This introductory course is aimed at giving basic understanding about system security.		
2.	This entry-level course covers a broad spectrum of security topics and is based on real-life examples to create system security interest in the students		
3.	A balanced mix of technical and managerial issues makes this course appealing to attendees who need to understand the salient facets of information security basics and the basics of risk management.		
<b>Objective:</b>			
<b>Sl. No.</b>			
1.	Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.		
2.	Gain familiarity with prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath.		
3.	Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.		
4.	Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges		
<b>Pre-Requisite:</b>			
<b>Sl. No.</b>			
1.	Not Required		
<b>Contents</b>			<b>4 Hrs./week</b>
<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
01	<b>Information and Network Security fundamentals</b> Overview of Networking Concepts Basics of Communication Systems, Transmission Media, Topology and Types of Networks, TCP/IP Protocol, Wireless Networks, The Internet Information Security Concepts Information Security Overview: Background and Current Scenario, Types of Attacks, Goals for Security, E-commerce Security Security Threats and Vulnerabilities Overview of Security threats, Weak / Strong Passwords and Password Cracking, Insecure Network connections, Malicious Code Cybercrime and Cyber terrorism Cryptography	16	20



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	Introduction to Cryptography, Digital Signatures, Public Key infrastructure, Applications of Cryptography, Tools and techniques of Cryptography		
02	<b>Security Management</b> Security Management Practices Overview of Security Management, Security Policy, Risk Management, Ethics and Best Practices Security Laws and Standards Security Assurance, Security Laws, International Standards, Security Audit	8	10
03	<b>Information and Network Security</b> Server Management and Firewalls User Management, Overview of Firewalls, Types of Firewalls, DMZ and firewall features Security for VPN and Next Generation Technologies VPN Security, Security in Multimedia Networks, Various Computing Platforms: HPC, Cluster and Computing Grids, Virtualization and Cloud Technology and Security	6	20
04	<b>System and Application Security</b> Security Architectures and Models Designing Secure Operating Systems, Controls to enforce security services, Information Security Models System Security Desktop Security, Email security, Database Security	6	20
	<b>Sub Total:</b>	<b>36</b>	<b>70</b>
	<b>Internal Assessment Examination &amp; Preparation of Semester Examination</b>	<b>4</b>	<b>30</b>
	<b>Total:</b>	<b>40</b>	<b>100</b>

**List of Books**

**Text Books:**

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
B. A. Forouzan	Data Communications and Networking	3rd Ed	TMH
A. S. Tanenbaum	Computer Networks	4th Ed	Pearson Education/PHI

**Reference Books:**

W. Stallings	Data and Computer Communications	5th Ed	PHI/ Pearson Education
AtulKahate	Cryptography & Network Security		TMH

**End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks



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A	1,2,3,4,5	10	10				
B	3, 4, 5			5	3	5	60
C	1,2,3,4,5			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

**Examination Scheme for end semester examination:**

<b>Group</b>	<b>Chapter</b>	<b>Marks of each question</b>	<b>Question to be set</b>	<b>Question to be answered</b>
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3