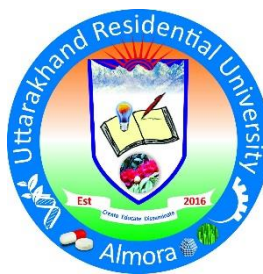


# **Study & Evaluation Scheme of Bachelor of Science (Internet of Things)**

**(Syllabus Applicable w.e.f. Academic Session 2017-18)**



**Uttarakhand Residential University  
Almora, Uttarakhand-263001**

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# Uttarakhand Residential University

## Almora, Uttarakhand-263001

### Study & Evaluation Scheme

#### SUMMARY

<b>Programme</b>	:	<b>B.Sc. (Cyber Security)</b>
<b>Duration</b>	:	<b>Three Years (Six Semesters)</b>
<b>Medium</b>	:	<b>English</b>
<b>Minimum Required Attendance</b>	:	<b>75%</b>
<b>Credit</b>	:	
<b>Maximum Credit</b>	:	
<b>Minimum Credit required for the degree</b>	:	
<b>Assessment</b>	:	

Internal	External	Total
25	75	100

#### **Evaluation of Practical/Dissertations & Project Reports**

External	Internal	Total
50		50

#### **Duration of Examination**

External	Internal
3 hrs	1 ½ hrs

To qualify the course a student is required to secure a minimum of 40 marks in aggregate including the semester end examination and teachers continuous evaluation (i.e. both internal & external). A candidate who secures less than 40% of marks in theory and practical papers separately in semester, shall be deemed to have failed in that semester.

#### **Question Paper Structure:**

*Semester where Class room teaching is taking place in University*

1. The question paper shall consist question one as compulsory of 15 marks. In addition there will be two questions from each unit of which one question will have to be answered by the student. Each question will carry equal weightage.

*Semester where Class room teaching is taking place in University*

1. The question paper shall consist question of Multiple choice Questions and the same would take place using computer software in a manner that the result would be known to the student at the end of the paper.

## **STUDY & EVALUATION SCHEME**

## **STUDY & EVALUATION SCHEME**

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**B.Sc. (Internet of Things) syllabus 2017-18 onwards**

**B.Sc. (Cyber Security) SESSION 2017-2018  
SEMESTER I**

S. N.	Subject Code	Subject	Periods			Credits	Evaluation Scheme		
			L	T	P		Internal	External	Total
1		Professional &Confident Communication	5	-	-	5	25	75	100
2		Computers Basics	5	-	-	5	25	75	100
3		Electrical Basics	5	-	-	5	25	75	100
4		Professional Communication Lab	-	-	4	2	25	75	100
5		Computer Lab	-	-	4	2		50	100
6		Electrical Lab	-	-	4	2		50	100
<b>Total</b>			<b>15</b>	<b>-</b>	<b>12</b>	<b>21</b>	<b>250</b>	<b>450</b>	<b>700</b>

**SEMESTER II**

S. N.	Subject Code	Subject	Periods			Credits	Evaluation Scheme		
			L	T	P		Internal	External	Total
1		Electronics Basics	5	-	-	5	25	75	100
2		Engineering Design Intro	5	-	-	5	25	75	100
3		Technical Diagram	5	-	-	5	25	75	100
4		Electronic Lab	-	-	4	2		50	100
5		Engineering Design Lab	-	-	4	2		50	100
6		Technical Diagram Lab	-	-	4	2		50	100
<b>Total</b>			<b>15</b>	<b>-</b>	<b>12</b>	<b>21</b>	<b>75</b>	<b>375</b>	<b>700</b>

### SEMESTER III

S. N.	Subject Code	Subject	Periods			Credits	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	301	Programming Concepts and Application	5	-	-	5	25	75	100
2	302	Database Management System	5	-	-	5	25	75	100
3	303	Introduction to Open Source Operating System, Networking and Virtualization	5	-	-	5	25	75	100
4	304	Cloud Computing, Open Source, IOT and Cyber Security	5	-	-	5	25	75	100
5	Practical	Open Source Linux/ Ubuntu Operating Systems, Web & Application Servers, Database Lab	-	-	2	2		50	50
<b>Total</b>			<b>20</b>	<b>-</b>	<b>2</b>	<b>22</b>	<b>100</b>	<b>350</b>	<b>450</b>

## SEMESTER # 1

TITLE		Description of the course
01	Professional and confident communication	This course will help students to read, write, think and communicate critically. The goal is simply not to memorize terminology but to learn critically. It will enable students to know how to use concepts and relate the concepts to other subjects and other dimensions of life such as personal life, social life and professional life.
02	Computer basics	This course is the simplest and quickest way to be acquainted with basic IT skills and usages of the internet through simple fun filled programs. The programs shall equip students with basic IT skills thereby bridging the digital divide.
03	Electrical Basics	Electrical circuits are everywhere, from tiny ones in integrated circuits in mobile phones and music players, to giant ones that carry power to our homes. This course deals with analysis techniques that can be applied to all such circuits.
PRACTICAL		
01	Professional communication Lab	A hands-on lab during which participants apply practices, mechanisms, and technologies to solve a set of complex problems
02	Computer lab	A hands-on lab during which participants apply practices, mechanisms, and technologies to solve a set of complex problems
03	Electrical Lab	A hands-on lab during which participants apply practices, mechanisms, and technologies to solve a set of complex problems

## **CHAPTER # 01: PROFESSIONAL & CONFIDENT COMMUNICATION**

### **UNIT I: The Seven C's of the Effective Communication**

1. Completeness
2. Conciseness
3. Consideration
4. Concreteness
5. Clarity
6. Courtesy
7. Correctness

### **UNIT II: Communication: Its interpretation**

1. Basics
2. Nonverbal Communication
3. Barriers to Communication

### **UNIT III: Business Communication at Work Place**

1. Letter Components and Layouts
2. Planning a letter
3. Process of Letter writing
4. Email Communication
5. Memo and Memo Reports
6. Employment Communication
7. Notice Agenda and Minutes of Meeting
8. Brochures

### **UNIT IV: Report Writing**

1. Effective Writing
2. Types of Business Reports
3. Structure of Reports
4. Gathering Information
5. Organization of the Material
6. Writing Abstracts and Summaries
7. Writing Definitions
8. Visual Aids
9. User Instruction Manual

### **UNIT V: Required Skills**

1. Reading Skills
2. Note-making
3. Précis Writing
4. Audio Visual Aids
5. Oral Communication

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**B.Sc. (Internet of Things) syllabus 2017-18 onwards**

## **CHAPTER # 02: BASICS OF COMPUTERS:**

### **UNIT I: Introduction to computer**

1. What is computer?
2. Components of Computer System
3. Classifications of computers
4. Representation of data/Information concepts of data processing

### **UNIT II: Introduction to Windows**

1. What is an operating system and basics of Windows
2. The User Interface
3. Windows Setting
4. Advanced Windows

### **UNIT III: Basic DOS commands**

1. Comparison of DOS and Windows
2. Switching Between DOS and Windows
3. Basic DOS Commands
4. Formatting a floppy

### **UNIT IV: Elements of Word, Spreadsheet and Presentation**

1. Opening Documents and Closing documents
2. Moving Around in a Document
3. Using a Document/Help Wizard
4. Text Creation and Manipulation
5. Formatting the Text
6. Handling Multiple Documents
7. Table Manipulation
8. Printing
9. Slide Manipulation and Slide Show
10. Presentation of the Slides
11. Providing aesthetics
12. Preparation of Slides

### **UNIT V: Communication and Internet**

1. Basic of Computer networks
2. Internet
3. Service on Inter Net
4. Web Browsing software
5. Surfing the Internet
6. Basic of electronic mail
7. Using Emails
8. Document handling

## CHAPTER # 03: BASICS OF ELECTRICALS:

### UNIT I: General Concepts:

Concepts of emf., p.d. and current, resistance, effect of temperature on resistance. resistance temperature coefficient, insulation resistance. S.I. units of work, power and energy. Conversion of energy from one form to another in electrical, mechanical and thermal systems. batteries and cells, their types, primary cells and secondary cells, Lead Acid, Ni-Cd and Ni-MH batteries, current capacity and cell ratings. Charging, importance of initial charging and discharging of batteries. series and parallel battery connections, maintenance procedure.

### UNIT II: D.C. Circuits

Classification of electrical networks, Ohm's law, Kirchhoff's law and their applications for network solutions. Simplifications of networks using series and parallel combinations and star-delta conversions, Superposition theorem, Thevenin's theorem and maximum power transfer theorem.

### UNIT III: Electromagnetism

Magnetic effect of an electric current, cross and dot conventions, right hand thumb rule and cork screw rule, nature of magnetic field of long straight conductor, solenoid and toroid. concept of m.m.f., flux, flux density, reluctance, permeability and field strength, their units and relationships. simple series and parallel magnetic circuits, comparison of electrical and magnetic circuit, force on current carrying conductors placed in magnetic field, Fleming's left hand rule. Faradays laws of electromagnetic induction, statically and dynamically induced e.m.f., self and mutual inductance, coefficient of couplings. energy stored in magnetic field.

### UNIT IV: Electrostatics and AC fundamentals:

1. Electrostatics field, electric flux density, electric field strength, absolute permittivity, relative permittivity, capacitance and capacitor, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors and time constant.
2. Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of instantaneous, peak(maximum), average and r.m.s. values, frequency, cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. rectangular and polar representation of phasors.

### UNIT IV: Single phase A.C. Circuits:

1. Study of A.C. circuits consisting of pure resistance, pure inductance, pure capacitance and corresponding voltage-current phasor diagrams and waveforms. Development of concept of reactance, study of series R-L, R-C, R-L-C circuit and resonance, study of parallel R-L, R-C and R-L-C circuit, concept of impedance, admittance, conductance and susceptance in case of above combinations and relevant voltage-current phasor diagrams, concept of active, reactive and apparent power and power factor.
- Polyphase A.C. Circuits and Single Phase Transformers:
  1. Polyphase A.C. Circuits: Concept of three-phase supply and phase sequence. voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phasor diagrams.
  2. Single phase transformers: Construction, principle of working, e.m.f. equation, voltage and current ratios. losses, definition of regulation and efficiency, determination of these by direct loading method. descriptive treatment of autotransformers and dimmer-stats.



## SEMESTER # 2

<b>TITLE</b>		<b>Description of the course</b>
01	Electronics Basics	The fundamental concepts of electricity and electronics that involve direct current (dc), alternating current (ac), series and parallel resistive circuits, network analysis, magnetism, inductance, capacitance, transformers, motors, residential wiring, electronic components, and various types of test equipment found in industry.
02	Engineering Design Intro	Engineering drawing is an important tool for all Engineers and for many others professionals. It is the language of Engineers. Engineering Drawing communicates all needed information from the engineer who designed a part to the workers who will manufacture it. The aim of the subject is to equip students with the fundamentals of Computer Aided Engineering Drawing and to further the ability to communicate information by graphical means.
03	Technical Diagram	The syllabus is planned as an integration of knowledge and skills in Technical Drawing. It covers the following areas; plane geometry, solid geometry, graphical resolution of forces, Building and Engineering Drawings.
<b>PRACTICAL</b>		
01	Electronic Lab	A hands-on lab during which participants apply practices, mechanisms, and technologies to solve a set of complex problems
02	Engineering Design Lab	A hands-on lab during which participants apply practices, mechanisms, and technologies to solve a set of complex problems
03	Technical Diagram Lab	A hands-on lab during which participants apply practices, mechanisms, and technologies to solve a set of complex problems

## CHAPTER # 01: BASICS OF ELECTRONICS

### UNIT I: Semiconductor Diodes and Applications

P-N junction diode, Characteristics and Parameters, Diode approximations, DC load line analysis, Half-wave rectifier, Two-diode Full-wave rectifier, Bridge rectifier, Capacitor filter circuit (only qualitative approach), Zener diode voltage regulators: Regulator circuit with no load, Loaded Regulator. Numerical examples as applicable.

- Bipolar Junction Transistors  
BJT operation, BJT Voltages and Currents, BJT amplification, Common Base, Common Emitter and Common Collector Characteristics, Numerical examples as applicable

### UNIT II: BJT Biasing

DC Load line and Bias Point, Base Bias, Voltage divider Bias, Numerical examples as applicable.

- Introduction to Operational Amplifiers  
Ideal OPAMP, Inverting and Non-Inverting OPAMP circuits, OPAMP applications: voltage follower, addition, subtraction, integration, differentiation; Numerical examples as applicable.

### UNIT III: Digital Electronics

Introduction, Switching and Logic Levels, Digital Waveform. Number Systems: Decimal Number System, Binary Number System, Converting Decimal to Binary, Hexadecimal Number System: Converting Binary to Hexadecimal, Hexadecimal to Binary, Converting Hexadecimal to Decimal, Converting Decimal to Hexadecimal, Octal Numbers: Binary to Octal Conversion. Complement of Binary Numbers. Boolean Algebra Theorems, De Morgan's theorem. Digital Circuits: Logic gates, NOT Gate, AND Gate, OR Gate, XOR Gate, NAND Gate, NOR Gate, X-NOR Gate. Algebraic Simplification, NAND and NOR Implementation: NAND Implementation, NOR Implementation. Half adder, Full adder.

### UNIT IV: Flip-Flops

Introduction to Flip-Flops, NAND Gate Latch/ NOR Gate Latch, RS Flip-Flop, Gated Flip-Flops: Clocked RS Flip-Flop

- Microcontrollers  
Introduction to Microcontrollers, 8051 Microcontroller Architecture and an example of Microcontroller based stepper motor control system (only Block Diagram approach)

### UNIT V: Communication Systems

Introduction, Elements of Communication Systems, Modulation: Amplitude Modulation, Spectrum Power, AM Detection (Demodulation), Frequency and Phase Modulation. Amplitude and Frequency Modulation: A comparison.

- Transducers  
Introduction, Passive Electrical Transducers, Resistive Transducers, Resistance Thermometers, Thermistor. Linear Variable Differential Transformer (LVDT). Active Electrical Transducers, Piezoelectric Transducer, Photoelectric Transducer

## **CHAPTER # 02: INTRODUCTION TO ENGINEERING DESIGN**

### **UNIT I: INTRODUCTION TO COMPUTER GRAPHICS FUNDAMENTALS**

Output primitives (points, lines, curves etc.), 2-D & 3-D transformation (Translation, scaling, rotators) windowing - view ports - clipping transformation.

### **UNIT II: CURVES AND SURFACES MODELLING**

Introduction to curves - Analytical curves: line, circle and conics - synthetic curves: Hermite cubic spline- Bezier curve and B-Spline curve - curve manipulations.

Introduction to surfaces - Analytical surfaces: Plane surface, ruled surface, surface of revolution and tabulated cylinder - synthetic surfaces: Hermite bicubic surface- Bezier surface and B-Spline surface- surface manipulations.

### **UNIT III: NURBS AND SOLID MODELING**

NURBS- Basics - curves, lines, arcs, circle and bi linear surface. Regularized Boolean set operations - primitive instancing - sweep representations - boundary representations - constructive solid Geometry - comparison of representations - user interface for solid modeling.

### **UNIT IV: VISUAL REALISM**

Hidden - Line - Surface - solid removal algorithms shading - coloring. Introduction to parametric and variational geometry based software's and their principles creation of prismatic and lofted parts using these packages.

### **UNIT V: ASSEMBLY OF PARTS AND PRODUCT DATA EXCHANGE**

Assembly modeling - interferences of positions and orientation - tolerances analysis - mass property calculations - mechanism simulation. Graphics and computing standards - Open GL Data Exchange standards - IGES, STEP etc., - Communication standards.

## **CHAPTER # 03: INTRODUCTION TO TECHNICAL DIAGRAM**

### **UNIT I: Plane and solid geometry**

1. Instruments, lettering, lines, dimensions, scales
2. Geometric constructions
3. Construction of polygons
4. Circles, arcs, curves and tangents
5. Equivalent areas; reducing and enlarging plane figures
6. Loci
7. Pictorial drawings
8. Orthographic projection
9. Auxiliary projections
10. Surface developments
11. Helical curves

### **UNIT II: Building drawing**

1. Building codes and materials
2. Site work
3. Foundations
4. Floor plans and elevations
5. Floors
6. Internal and external walls and finishing
7. Roofs
8. Doors and windows
9. Stairways
10. Sections

### **UNIT III: Mechanical engineering drawing**

1. Preparation of drawing sheet
2. Orthographic projection
3. Engineering conventions
4. Sections
5. Engineering fasteners
6. Assembly drawings
7. Sketching

## SEMESTER # 3

<b>TITLE</b>		<b>Features of the course</b>
01	Programming Concepts and Application Architecture	Programming Concepts, Introduction to High Availability, Application & Web Servers and Database, Application Architecture, Introduction to Compute (Servers, Storage, CPU, Cores, RAM etc), Data Center & Disaster Recover
02	Database Management System	Introduction to Databases, RDBMS, Relational Model, Relational Database design and Normalization, Introduction to SQL, Working with relations of RDBMS, Concept of Transaction, Database Administrators and Database Users, Basics of Data Warehousing, Concepts of Functions, Triggers and Procedures
03	Introduction to Open Source Operating System, Networking and Virtualization	Introduction to Operating System (Linux) & Commands, Basics of Communication & Networking, Introduction to Virtualization
04	Cloud Computing, Open Source, IOT and Cyber Security	Introduction to Cloud Computing (Amazon, MS Azure), Introduction to Open Source Concept & Technologies, Introduction to IoT and Cyber Security
<b>PRACTICAL</b>		
01	Practical	Installation of Virtualization Software, Installation of Open Source Linux/Ubuntu Operating Systems, Web & Application Servers (Apache, Tomcat, Jboss etc), Configuration & Performance Tunings, Installation & Configuration of Database (Oracle, MySQL, Postgre SQL, Maria DB etc.)

## **Paper I : \_Programming Concepts and Application Architecture**

- Programming Concepts
  - What is a program
  - Program Structure
  - Variable Declaration
  - Operators
  - Conditional Statements (IF. THEN.ELSE)
  - Iterative Constructs (Loops)
  - OOPS Concepts
- Introduction to High Availability
  - Load Balancing
  - Clustering
  - Failover
- Introduction to Application & Web Servers and Database
- Application Architecture
- Introduction to Compute (Servers, Storage, CPU, Cores, RAM etc)
- Introduction to Data Center & Disaster Recover

## **Paper II: Database Management System**

- Introduction to Databases
  - What is Database Management System
  - Purpose of database system
  - Advantages and Disadvantages of Database System
  - Database architecture
- Introduction to RDBMS
- The Relational Model
- Relational Database design and Normalization
- Introduction to SQL
  - DDL, DML, DCL and TCL
  - Queries and Sub queries
  - Data Types
  - Operators
  - Aggregate functions
- Working with relations of RDBMS
- Concept of Transaction
- Database Administrators and Database Users
- Basics of Data Warehousing
- Concepts of Functions, Triggers and Procedures

## **Paper III : Introduction to Open Source Operating System, Networking and Virtualization**

- Introduction to Operating System (Linux) & Commands
  - Introduction to Linux operating system
  - Introduction to Bash Shell
  - Basic Commands
  - Text editor (vi)
  - Working with packages
  - User Administration
  - File system concepts & security
  - Processes and jobs
  - Introduction to Shell Scrip
  
- Basics of Communication & Networking
  - An Introduction to Networking
  - Networking Types and Structures
  - Intranet and Internet
  - The OSI Model Layers
  - Networking Levels and Layers and Protocols
  - Network Hubs, Switches and Routers
  - An introduction to DNS
  
- Introduction to Virtualization
  - An introduction to Virtualization
  - Virtualization Architecture
  - Types of virtualization
  - Advantage & Disadvantage
  - Virtualization Software

## **Paper IV :**

### **Open Source**

- Introduction to Open Source Concept & Technologies
  - An introduction to Open Source
  - Open Source and Proprietary Software
  - Advantages and disadvantages of the open source software
  - Roles of Open Source & Proprietary Software in Government and Private Sector
  - Indian Government Policy About Open Source

### **Internet of Things (IOT)**

- Introduction to IoT
  - What exactly is the Internet of Things?
  - How does IoT work?
  - Internet of Things (IOT) Sectors
  - IoT Components, Network, Apps and Services

## LAB

- Installation of Virtualization Software
- Installation of Open Source Linux/Ubuntu Operating Systems
  - Working with Linux/Ubuntu
- Installation of Web & Application Servers (Apache, Tomcat, Jboss etc)
  - Working with Web & Application Server
- Integration Between Web & Application Servers
- Configuration & Performance Tunings
- Installation & Configuration of Database (Oracle, MySQL, Postgre SQL, Maria DB etc.)
- Working with Database

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