ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Course Structure and Syllabus
for the Second Semester B. Sc. (Computer Science) Programme

2nd SEMESTER
(JANUARY-JUNE)

Sl. No.	Sub Code	Subject	Hrs / Week			Credits
			L	T	P	C
Theory						
1	BCS161203	Operating System	3	2	0	4
2	MA161201	Mathematics-II	3	2	0	4
3	BCS161204	Programming in C++	3	2	0	4
4	BCS161205	DBMS	2	2	0	3
5	PH161202	Physics-II	3	2	0	4
Practical						
7	BCS161214	Computer Lab-III in C++	0	0	4	2
8	BCS161215	Computer Lab- IV in DBMS	0	0	4	2
9	PH161212	Lab in Physics- II	0	0	4	2
Total			14	10	12	25
Total Contact Hours= 36						
Total Credits = 25						

Subject Code: BCS161203
Subject: Operating System

L-T-P: 3-2-0 **Credit: 4**

Modules	Topics	Course Content	Hours
1	**Introduction**	Introduction to Operating System, Operating System functions, evolution of OS, different types of OS (batched, multi programmed, real time, time sharing, distributed, parallel) operating system structure(simple, layered, virtual machine), OS services	**6**
2	**Process**	Process concept, process states, thread, and design issues of thread, user space and kernel space thread, usage of thread, operation on processes (creation and termination).	**6**
3	**Process Synchronization**	Background, critical section problem, critical region, and synchronization hardware, classical problem of synchronization, semaphores, and message passing, classical problems: dinning philosopher, sleeping barber and readers and writers (bounded buffer).	**6**
4	**CPU Scheduling**	Scheduling criteria, preemptive and non-preemptive scheduling, scheduling algorithms, (FCFS, SJF, RR, Priority)	**6**
5	**Deadlocks**	System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Banker's algorithm.	**6**
6	**Memory Management**	Background, logical vs physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging, virtual memory, demand paging, page replacement algorithms, allocation of frames, trashing.	**6**
7	**I/O Management**	I/O hardware, interrupts, DMA, disk scheduling (FCFS, SCAN, C-SCAN), disk reliability, disk formatting.	**6**
8	**File System**	What is a file, file naming, file types (directory, regular, device), sequential access and random access files, file attributes, operation on file, hierarchical directory structure, path name(relative and absolute), operation on directories, disk layout, disk partition, file system layout, disk block allocation- contiguous allocation, linked list allocation, FAT, i-nodes, directories in UNIX, file system security.	**6**
		Total	**48**

Text Books/Reference Books:

1. Operating System Design & Implementation by Tanenbaum A.S., Practice Hall NJ.
2. Operating System: Concept & Design by Milenkovie M., McGraw Hill.
3. Operating System Concepts by Silbersehatz A. and Peterson J. L.,Wiley.

Subject Code: MA161201
Subject: Mathematics-II

L-T-P: 3-2-0 **Credit: 4**

Modules	Topics	Course Content	Hours
1	**Matrices**	Some special type of matrices like symmetric and skew symmetric- Hermitian and skew Hermitian Triangular and Echelonform, Inverse of the matrix, Theorems of inverse, Reduction of matrices to triangular form and normal form, Inverse by Partitioning, Rank of a matrix, Evaluation of rank, Theorem of rank.	**12**
2	**Discrete and Continuous Probability**	Discrete probability. Randomness, Finite probability space, Probability measure, Events, Conditional probability, Independence, Baye's theorem, Discrete random variables continuous probability, Continuous random variables, Joint distribution, Exponential and normal distribution, The central limit theorem and the implications.	**12**
3	**Linear Programming**	Formulation and graphical solutions, Convex sets and properties, Simplex methods, Duality assignment, Transportation problems, Duality, Big- M method, Integer programming.	**12**
4	**De Moivre's theorem and applications**	Find n^{th} roots of a complex number- Expansion of $\cos^n\theta$, $\sin^n\theta$, in power of cos θ, sin θ - Expansion of $\cos^n\theta$, $\sin^n\theta$ in multiple angles of θ - Series for $\cos^n\theta$, $\sin^n\theta$ in power of θ – Hyperbolic functions.	**12**
		Total	**48**

Text Books/Reference Books:

1. Linear Programming, R.K. Gupta.
2. Matrices, A.R. Vasistha.
3. Basis statistics, A.L. Nagar and R.K. Das
4. Probability, Random variables and Random processes, D.Tata, M.C.Graw-Hill
5. B.Sc Mathematics, Krishna Prakashan.

Subject Code: BCS161204
Subject: Programming in C++

L-T-P: 3-2-0 **Credit: 4**

Modules	Topics	Course Content	Hours
1	**Introduction**	History, Structure of a C++ program, tokens, keywords, identifiers, data types, expressions, control structures, declaration and initialization of variables, operators, expressions and implicit conversions. Functions in C++.	**9**
2	**Object Oriented Programming**	Introduction to OOP, Need of OOP, Development, Concepts, and Benefits of OOP.	**9**
3	**OOP in C++**	Classes and objects, member functions, constructors and destructors, operator overloading and type conversions, Inheritance, virtual functions and polymorphism.	**10**
4	**Managing console I/O operations**	C++ streams, C++ Stream classes, formatted and unformatted I/O operations. File handling in C++: classes for file stream operations, Opening, closing, and updating files, file pointers and their manipulations. Templates and exception handling: class and function templates	**10**
5	**Fundamentals of Object Oriented design in UML**	Static and dynamic models, why modeling, UML diagrams: Class diagram, interaction diagram: collaboration diagram, sequence diagram, state chart diagram, activity diagram, implementation diagram, UML extensibility- model constraints and comments, Note, Stereotype.	**10**
		Total	**48**

Text Books/Reference Books:

1. Object Oriented Programming and C++ by Rajaraman, New Age International.
2. Object Oriented System Development by Ali Bahrami, McGraw Hill.
3. Object Oriented Programming using C++by E. Balaguruswamy,

Subject Code: BCS161205
Subject: DBMS

L-T-P: 2-2-0 **Credit: 3**

Modules	Topics	Course Content	Hours
1	**Introduction**	Database, Traditional file approach (File management system) vs Database management system. Characteristics of DBMS Advantages & disadvantages of DBMS, DBMS users, DBMS Architecture& data independence. Data model, Schemas & Instances .Three level architectural schema & Data - independence. Relational model, RDBMS & its terminologies .Concept of keys (primary key, alternate key, candidate key, composite key, superkey and foreign key). Fundamental integrity constraints (entity integrity, domain integrity & referential integrity).	**8**
2	**Relational Algebra**	Relational algebra (Set theoretic operations & select , project,join (equi join, theta join , natural join, aggregate functions & grouping).	**6**
3	**ANSI SQL -92 Standard:**	DDL, DML,SQL constructs (select ..from ... where ...Group by .. having ...order by), insert, delete, update. Definition & use of nested queries, constraints considers (NOT NULL, UNIQUE , CHECK , FOREIGN KEY).	**12**
4	**Database design**	Phases of database design,Entities & attributes , Entity type , Entity sets Relationship type, relationship sets & instances. Relationship degree, roles & recursive relationship. Constraints on relationship types (cardinality ratios for binary relationship, participation constraints). Dependency diagram and ER diagram, naming conventions & design issues .Conversion of ER diagram into relational table. Normalization: Informal design guidelines for relational schema, Functional dependencies, normal forms based on primary keys (1NF,2NF,3NF & BCNF). Functional dependency diagram and design of relational database from it.	**10**
		Total	**36**

Text books/Reference Books:

1. Database System Concepts by Henry F. Korth and Silberschatz Abraham, McGraw Hill.
2. Fundamentals of Database Systemsby Elmasri Ramez and Navathe Shamkant, Benjamin Cummings Publishing Company.
3. Introduction to Database Management by Date C. J.,8th Edition.
4. Database Management System by Ramakrishnan, McGraw-Hill.

Subject code: PH161202

Subject: Physics-II

L-T-P: 3-2-0 **Credit: 4**

Modules	Topics	Course Content	Hours
1	**Laser**	Induced absorption, Spontaneous and Stimulated emission, Einstein's coefficients, Population inversion, Pumping, Principles of Laser, Characteristics of a laser beam, Ruby laser, He-Ne laser.	**5**
2	**Fiber Optics**	Optical Fiber-Principles and structure, Propagation of light in optical fibers, Numerical aperture and acceptance angle, classification of optical fibers-single and multimode, step Index and graded index fibers, Losses in fibers, optical fiber communication system.	**7**
3	**Waves and Oscillations**	Simple harmonic motion, differential equation of S.H.M., total energy of a particle executing S.H.M., oscillation of loaded spring. Free, damped and forced vibrations, resonance, sharpness of resonance, equation of wave motion, principle of superposition of waves, beats, stationary wave and Doppler's effect. Velocity of sound in a homogeneous medium, effect of temperature and pressure on velocity of sound in air, intensity level of sound and its unit (bel and decibel). Ultrasonic waves – production of ultrasonic waves, application of ultrasonic waves.	**8**
4	**Heat and thermodynamics**	Kinetic theory of gases, degree of freedom, law of equipartition of energy, mean free path, Brownian motion, equation of state, Joule-Thomson effect, Clausius–Clayperon equation, triple point. Radiation: Kirchhoff's law and its applications, Black body radiation. Zeroth law of thermodynamics and concept of temperature, First law of thermodynamics and concept of internal energy, Thermodynamics 2nd law and Third law basics	**8**
5	**Solid state Physics**	Crystalline and amorphous state of substances, single crystal and polycrystalline substances, basis, crystal lattice, unit cell, primitive unit cell, translation vectors, lattice parameters, directions, lattice planes, Miller indices, inter-planar spacing. Crystallographic axes, Crystal systems and Bravais lattice. Different types of bonding in solids, ionic, covalent, metallic and hydrogen bonding. Classical free electron theory of metals. P-N junction diode, Hall effect.	**9**
6	**Superconductors**	Superconductors, Meissner effect, Critical magnetic field, persistent current, Magnetic levitation, Type I and II superconductors, BCS theory (qualitative only)	**5**
7	**Quantum Physics**	Failure of Classical Physics, Postulates of quantum Physics, De –Broglie hypothesis, group velocity and phase velocity	**6**

		concepts, Uncertainty principle, Schrodinger wave equation (time independent and time dependent)	
		Total	**48**

Text books/ Reference Books

1. A treatise on Heat - Saha and Srivastava
2. A Text Book of Sound - N. Subramanyam and Brij Lal
3. Concept of Modern Physics – A. Beiser
4. College Physics – K. N. Sharma &Neerja
5. Teach yourself Physics series – (Bharati Bhaban P&D)

Subject Code: BCS161214
Subject: Computer Lab – III in C++

L-T-P: 0-0-4 **Credit: 2**

Modules	Topics	Course Content	Hours
1	**Arrays**	1. C++ program to find sum of elements in a given array. 2. C++ program to find largest elements in an array. 3. C++ program for search an element in a sorted array. 4. C++ program for merge an array of size n into another array of size m+n. 5. C++ program to reverse an array. 6. C++ program to add, multiply two matrices	**8**
2	**Searching and Sorting**	1. C++ program for binary search. 2. C++ program for bubble sort.	**4**
3	**Class and Object**	1. C++ program to implement the concept of Class and objects. 2. C++ program to implement the concept of constructor and destructor. 3. Implement different OOP concepts	**6**
4	**Inheritance and Polymorphism**	1. C++ program to implement different types of inheritance. 2. C++ program to implement polymorphism. 3. C++ program to implement operator overloading.	**6**
		Total	**24**

Text Books/Reference Books:

1. Object Oriented Programming and C++ by Rajaraman, New Age International.
2. Object Oriented System Development by Ali Bahrami, McGraw Hill.
3. Object Oriented Programming using C++by E. Balaguruswamy,

Subject Code: BCS161215
Subject: Computer Lab – IV in DBMS

L-T-P: 0-0-4 **Credit: 2**

Modules	Topics	Course Content	Hours
1	**Creating Database**	Creating a Database Creating a Table Specifying Relational Data Types Specifying Constraints Creating Indexes	**4**
2	**Table and Record Handling**	INSERT statement Using SELECT and INSERT together DELETE, UPDATE, TRUNCATE statements DROP, ALTER statements	**6**
3	**Retrieving Data from a Database**	The SELECT statement Using the WHERE clause Using Logical Operators in the WHERE clause Using IN, BETWEEN, LIKE , ORDER BY, GROUP BY and HAVING clause Using Aggregate Functions Combining Tables Using JOINS Subqueries	**8**
4	**Database Management**	Creating Views Creating Column Aliases Creating Database Users Using GRANT and REVOKE Cursors in Oracle PL / SQL Writing Oracle PL / SQL Stored Procedures	**6**
		Total	**24**

Text books/ Reference Books:

1. Database System Concepts by Henry F. Korth and Silberschatz Abraham, McGraw Hill.
2. Fundamentals of Database Systems by Elmasri Ramez and Navathe Shamkant, Benjamin Cummings Publishing Company.
3. Introduction to Database Management by Date C. J.,8th Edition.
4. Database Management System by Ramakrishnan, McGraw-Hill.

Subject code: PH161212

Subject: Physics Lab II

L-T-P: 0-0-4 **Credit 2**

Unit	Experiments	Hours
1.	Determination of mechanical equivalent of heat by Joul's calorimeter	**3**
2.	Determination of specific heat of a given liquid by cooling method	**3**
3.	To adjust and focus the given spectrometer using Schuster's method and then Determine the refractive index of the material of the prism and compare with the value from I-D curve.	**3**
4.	To measure current flowing through an external circuit with the help of potentiometer	**3**
5.	Determination of grating element and number of lines per unit length of the grating by spectrometer	**3**
6.	Determination of value of low resistance by potential drop method	**3**
7	Determination of internal resistance of a cell with the help of potentiometer	**3**
8	To draw the characteristic curves of PN junction diode	**3**
	Total	**24**

Text books/Reference Books :

1. Practical Physics, by K.G.Mazumdar and B. Ghosh, Sreedhar Publishers.
2. Laboratory Manual Physics, by R.S Mittal, S.Singal and Poonam Singh.
3. Practical Physics by Dr. Samir Kumar Ghosh.

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