

**Proposed Syllabus and Scheme of  
Examination**

**for**

**B. SC. PHYSICAL SCIENCE  
(PHYSICS, MATHEMATICS,  
COMPUTER SCIENCE)**

**Under**

**Choice Based Credit System**

**Department of Computer Science  
Himachal Pradesh University  
Shimla**

## Details of Courses Under Undergraduate Program B.Sc. (Physical Science)

Course	*Credits	
=====		
	Theory+ Practical	Theory + Tutorials
<b><u>I. Core Course</u></b>	12X4= 48	12X5=60
<b>(12 Papers)</b>		
04 Courses from each of the		
03 disciplines of choice		
<b>Core Course Practical / Tutorial*</b>	12X2=24	12X1=12
<b>(12 Practical/ Tutorials*)</b>		
04 Courses from each of the		
03 Disciplines of choice		
<b><u>II. Elective Course</u></b>	6x4=24	6X5=30
<b>(6 Papers)</b>		
Two papers from each discipline of choice		
including paper of interdisciplinary nature.		
<b>Elective Course Practical / Tutorials*</b>	6 X 2=12	6X1=6
<b>(6 Practical / Tutorials*)</b>		
Two Papers from each discipline of choice		
including paper of interdisciplinary nature		

### **III. Ability Enhancement Courses**

1. **Ability Enhancement Compulsory**      4 X 2=8      4X2=8

**(2 Papers of 4 credits each)**

**Environmental Science**

**English/MIL Communication**

2. **Skill Enhancement Course**      4 X 4=16      4 X 2=16

**(Skill Based)**

**(4 Papers of 4 credits each)**

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**Total credit= 132**

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**Total credit= 132**

**\*wherever there is practical there will be no tutorials and vice -versa**

**PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN**

**B. Sc. Physical Science**

<b>Semest-er</b>	<b>Core Course (DSC)=12</b> *Credits(DSC) Theory + Practical/Tutorial= 6 each	<b>Ability Enhancement Course (AESCC) =2</b> *Credits (AECC)= 4 each	<b>Skill Enhancement Course (SEC) = 4</b> *Credits(SEC) Theory + Practical/ Tutorial = 4 each	<b>Elective: Discipline Specific (DSE)=6</b> *Credits(DSE) Theory + Practical/ Tutorial = 6 each	<b>Total No. of courses per Semester</b>	<b>Total Credits earned per Semester</b>
<b>I</b>	<b>Core Course-I.</b> Mechanics (4+4 Lab) <b>Core Course-II.</b> Differential Calculus (5+ 1 Tutorial) <b>Core Course-III.</b> <i>Object Oriented Programming in C++</i> (4+4 Lab)	<b>English/MIL communications / Environmental Science</b>			DSC=3 AECC=1 <hr/> 3	DSC=3*6=18 AECC=1*4=4 <hr/> 22  Credits Earned by Computer Subjects=6
<b>II</b>	<b>Core Course-IV.</b> Electricity, Magnetism and EMT (4+4 Lab) <b>Core Course-V.</b> <b>Differential Equations</b> (5+ 1 Tutorial) <b>Core Course-VI.</b> <i>Data Structures and File Processing</i> (5+ 1 Tutorial)	<b>English/MIL communications / Environmental Science</b>			DSC=3 AECC=1 <hr/> 3	DSC=3*6=18 AECC=1*4=4 <hr/> 22  Credits Earned by Computer Subjects=6
<b>III</b>	<b>Core Course-VII.</b> Thermal Physics and Statistical (4+4 Lab) <b>Core Course-VIII.</b> Real Analysis (5+ 1 Tutorial) <b>Core Course-IX.</b> <i>Numerical Computing</i> (5+ 1 Tutorial)		<b>SEC -1</b> [ 3/4 Theory +2 Lab/ 1 Tutorial]		DSC=3 SEC=1 <hr/> 4	DSC=3*6=18 SEC=1*4=4 <hr/> 22  Credits Earned by Computer Subjects=6
<b>IV</b>	<b>Core Course-X.</b> Waves and Optics (4+4 Lab) <b>Core Course-XI.</b> Algebra (5+ 1 Tutorial) <b>Core Course-XII.</b> <i>Database Management Systems</i> (4+4 Lab)		<b>SEC -2</b> [ 3/4 Theory +2 Lab/ 1 Tutorial]		DSC=3 SEC=1 <hr/> 4	DSC=3*6=18 SEC=1*4=4 <hr/> 22  Credits Earned by Computer Subjects=6
<b>V</b>			<b>SEC -3</b> <i>PHP Programming OR E-Commerce</i>  [ 3/4 Theory +2 Lab/ 1 Tutorial]	<b>DSE-1A.</b> (4+4 Lab) <b>DSE-2A.</b> (5+1 Tutorial) <b>DSE-3A</b> <i>Operating Systems OR Web Technologies</i>	SEC=1 DSE=3 <hr/> 4	SEC=1*4=4 DSE=3*6=18 <hr/> 22  Credits Earned by Computer Subjects=10

<b>VI</b>			<b>SEC -4</b> <i>Basics of Database Management System</i> <b>OR</b> <i>System Analysis and Design</i> [ 3/4 Theory +2 Lab/ 1 Tutorial]	<b>DSE-1B.</b> (4+4 Lab) <b>DSE-2B.</b> (5+1 Tutorial) <b>DSE-3B.</b> <i>Database Applications</i> <b>OR</b> <i>Computer Networks</i>	SEC=1 DSE=3 <hr/> 4	SEC=1*4=4 DSE=3*6=18 <hr/> 22 Credits Earned by Computer Subjects=10
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Total credits earned in all semesters (in all subjects) =22+22+22+22+22+22=132 credits

Total credits earned through Computer Science in all semesters=6+6+6+6+10+10=44 credits

Total credits earned through Computer Science in odd semesters (I+III+V) =6+6+10=22 credits

Total credits earned through Computer Science in even semesters (II+IV+VI) = 6+6+10=22 credits

=> Number of Assistant Prof. (Computer Application) required to run the course=02

- Practical / Tutorial are with every core and discipline specific papers.
- Whenever there is practical there will be no tutorials and vice versa.
- No. of Practical=4 periods / week for Practical of 2 credits. No. of Tutorial=1 Period / week for Tutorial of 1 credit.
- Credits for Core Course Paper (DSC) = (i) **For Theory + Practical:** Theory [4 credits] (4 Period / week) + Practical [2 credit](4 Period / week)= Total Six (06) credits and Total Eight (8) periods/week.  
(ii) **For Theory + Tutorial:** Theory [5 credits] (5 Period / week) +Tutorial [1 credit] (1 Period / week) = Total Six (06) credits and Total Six (6) periods/week.
- The size of the practical group for practical papers is recommended to be 12-15 students.

COURSE OPTED	COURSE NAME	SEME - STER	COURSE CODE	CR-EDI-TS	ESE (THEORY)	CCA IA)	TOTAL MARKS	
<b>Ability Enhancement Compulsory Course-I</b>	<b>English/MIL communications/ Environmental Science</b>	<b>1</b>		4	80	20	100	
<b>Core course-I</b>	<b>Mechanics</b>			4	80	20	100	
<b>Core Course-I Practical</b>	<b>Mechanics Lab</b>			2	80	20	100	
<b>Core course-II</b>	<b>Differential Calculus</b>			6	80	20	100	
<b>Core Course-III</b>	<b>Object Oriented Programming in C++</b>			BPHS101	4	80	20	100
<b>Core Course-III Practical</b>	<b>Object Oriented Programming in C++ LAB</b>			BPHS101 (P)	2	80	20	100
<b>Ability Enhancement Compulsory Course-II</b>	<b>English/MIL communications/ Environmental Science</b>	<b>2</b>		4	80	20	100	
<b>Core course-IV</b>	<b>Electricity, Magnetism and EMT</b>			4	80	20	100	
<b>Core Course-IV Practical</b>	<b>Electricity, Magnetism and EMT Lab</b>			2	80	20	100	
<b>Core course-V</b>	<b>Differential Equations</b>			6	80	20	100	
<b>Core Course-VI</b>	<b>Data Structures</b>			BPHS201	6	80	20	100

	<i>and File Processing</i>						
<b>Core course-VII</b>	<b>Thermal Physics and Statistical Mechanics</b>	<b>3</b>		4	80	20	100
<b>Core Course-VII Practical</b>	<b>Thermal Physics and Statistical Mechanics Lab</b>			2	80	20	100
<b>Core course-VIII</b>	<b>Real Analysis</b>			6	80	20	100
<i>Core Course-IX</i>	<i>Numerical Computing</i>		BPHS301	6	80	20	100
<b>SEC-1</b>				4	80	20	100
<b>Core course-X</b>	<b>Waves and Optics</b>	<b>4</b>		4	80	20	100
<b>Course-X Practical</b>	<b>Waves and Optics Lab</b>			2	80	20	100
<b>Core course-XI</b>	<b>Algebra</b>			6	80	20	100
<i>Core course-XII</i>	<i>Design and Analysis of Algorithms</i>		BPHS401	6	80	20	100
<b>SEC -2</b>				4	80	20	100
<b>SEC -3</b>	<b>PHP Programming</b>	<b>5</b>	BPHS501	4	80	20	100
	<b>OR</b>		<b>OR</b>				
	<b>E-Commerce</b>		BPHS502	4	80	20	100
<b>DSE-1A</b>			6	80	20	100	
<b>DSE-2A</b>			6	80	20	100	
<b>DSE-3A</b>	<b>Operating Systems</b>		BPHS503	6	80	20	100
	<b>OR</b>		<b>OR</b>				
	<b>Web Technologies</b>		BPHS504	6	80	20	100
<b>SEC -4</b>	<b>Basics of Database Management System</b>		<b>6</b>	BPHS601	4	80	20
	<b>OR</b>	<b>OR</b>					
	<b>System Analysis and Design</b>	BPHS602		4	80	20	100
<b>DSE-1B</b>		6		80	20	100	
<b>DSE-2B</b>		6		80	20	100	
<b>DSE-3B</b>	<b>Database Applications</b>	BPHS603		6	80	20	100
	<b>OR</b>	<b>OR</b>					
	<b>Computer Networks</b>	BPHS604		6	80	20	100
<b>Total Credits</b>				<b>132</b>			

The passing marks for each component (ESE- Theory/ Practical and CCA- Theory/ Practical) will be 45% and the candidate has to qualify each component separately to be declared successfully qualified.

<b>SEMESTER</b>	<b>COURSE OPTED</b>	<b>COURSE NAME</b>	<b>Credits</b>
<b>I</b>	<b>Ability Enhancement Compulsory Course-I</b>	<b>English/MIL communications/ Environmental Science</b>	<b>4</b>
	<b>Core course-I</b>	<b>Mechanics</b>	<b>4</b>
	<b>Core Course-I Practical/Tutorial</b>	<b>Mechanics Lab</b>	<b>2</b>
	<b>Core course-II</b>	<b>Differential Calculus</b>	<b>6</b>
	<b>Core Course-III</b>	<b>Object Oriented Programming in C++</b>	<b>6</b>
<b>II</b>	<b>Ability Enhancement Compulsory Course-II</b>	<b>English/MIL communications/ Environmental Science</b>	<b>4</b>
	<b>Core course-IV</b>	<b>Electricity, Magnetism and EMT</b>	<b>4</b>
	<b>Core Course-IV Practical/Tutorial</b>	<b>Electricity, Magnetism and EMT Lab</b>	<b>2</b>
	<b>Core course-V</b>	<b>Differential Equations</b>	<b>6</b>
	<b>Core Course-VI</b>	<b>Data Structures and File Processing</b>	<b>6</b>
<b>III</b>	<b>Core course-VII</b>	<b>Thermal Physics and Statistical Mechanics</b>	<b>4</b>
	<b>Core Course-VII Practical/Tutorial</b>	<b>Thermal Physics and Statistical Mechanics Lab</b>	<b>2</b>
	<b>Core course-VIII</b>	<b>Real Analysis</b>	<b>6</b>
	<b>Core Course-IX</b>	<b>Numerical Computing</b>	<b>6</b>
	<b>Skill Enhancement Course -1</b>	<b>SEC-1</b>	<b>4</b>
<b>IV</b>	<b>Core course-X</b>	<b>Waves and Optics</b>	<b>4</b>
	<b>Course-X Practical/Tutorial</b>	<b>Waves and Optics Lab</b>	<b>2</b>
	<b>Core course-XI</b>	<b>Algebra</b>	<b>6</b>
	<b>Core course-XII</b>	<b>Design and Analysis of Algorithms</b>	<b>6</b>
	<b>Skill Enhancement Course -2</b>	<b>SEC -2</b>	<b>4</b>
<b>V</b>	<b>Skill Enhancement Course -3</b>	<b>SEC -3</b>	<b>4</b>
	<b>Discipline Specific Elective -1</b>	<b>DSE-1A</b>	<b>6</b>
	<b>Discipline Specific Elective -2</b>	<b>DSE-2A</b>	<b>6</b>
	<b>Discipline Specific Elective -3</b>	<b>DSE-3A</b>	<b>6</b>
<b>VI</b>	<b>Skill Enhancement Course -4</b>	<b>SEC -4</b>	<b>4</b>
	<b>Discipline Specific Elective -4</b>	<b>DSE-1B</b>	<b>6</b>
	<b>Discipline Specific Elective -5</b>	<b>DSE-2B</b>	<b>6</b>
	<b>Discipline Specific Elective-6</b>	<b>DSE-3B</b>	<b>6</b>
<b>Total Credits</b>			<b>132</b>

# **COMPUTER SCIENCE**

## **Skill Enhancement Course (SEC)**

### **SEC 1**

\* Paper from other discipline of choice

### **SEC 2 (choose one)**

\* Paper from other discipline of choice

### **SEC 3 (choose one from COMPUTER SCIENCE)**

1. PHP Programming (Paper: BPHS501)
2. Electronic Commerce (Paper: BPHS502)

### **SEC 4 (choose one from COMPUTER SCIENCE)**

1. Basics of Database Management System (Paper: BPHS601)
2. Web Technologies (Paper: BPHS602)

## **Discipline Specific Electives (DSE)**

\* Six DSE papers in all.

\* Two each from each discipline of choice (Physics, Mathematics and Computer Science)

### **1. DSE 1A**

### **2. DSE 1B**

- \* (choose 2 Papers from the discipline of PHYSICS)
- \* (One paper in 5<sup>th</sup> Semester and one in 6<sup>th</sup> Semester)

### **3. DSE 2A**

### **4. DSE 2B**

- \* (choose 2 Papers from the discipline of MATHEMATICS)
- \* (One paper in 5<sup>th</sup> Semester and one in 6<sup>th</sup> Semester)



**5. DSE 3A (choose one from the discipline of COMPUTER SCIENCE)**

\* Paper in 5<sup>th</sup> Semester

1. Operating Systems (Paper: BPHS503)
2. Web Technologies (Paper: BPHS504)

**6. DSE 3B (choose one from the discipline of COMPUTER SCIENCE)**

\* Paper in 6<sup>th</sup> Semester

1. Database Applications (Paper: BPHS603)
2. Computer Networks (Paper: BPHS604)

## **BPHS101: Object Oriented Programming in C++**

### **Theory: 60 Lectures**

#### **UNIT – I**

**Programming Concepts:** Algorithm and its characteristics, pseudo code / flow chart, program, identifiers, variables, constants, primitive data types, expressions, structured data types, arrays, compilers and interpreters **(15 LECTURE)**

#### **UNIT – II**

**Object Oriented Concepts:** Abstraction, encapsulation, objects, classes, methods, constructors, inheritance, polymorphism, static and dynamic binding, overloading. Program Development: Object oriented analysis, design, unit testing & debugging, system testing & integration, maintenance. **(15 LECTURE)**

#### **UNIT – III**

**Introduction to structured programming:** Data types- simple data types, floating data types, character data types, string data types, arithmetic operators and operator precedence, variables and constant declarations, expressions, input using the extraction operator >> and cin, output using the insertion operator << and cout, preprocessor directives, increment (++) and decrement operations (--). **(15 LECTURE)**

#### **UNIT – IV**

**Creating a C++ program:** Input/output, relational operators, logical operators and logical expressions, if and if ... else statement, switch and break statements. “for”, “while” and “do – while” loops, break and continue statement, nested control statement, value returning functions, void functions, value versus reference parameters, local and global variables, static and automatic variables, enumeration type. **(15 LECTURE)**

#### **Books Recommended:**

- 1 Richard Johnson, “*An Introduction to Object-Oriented Application Development*”, Thomson Learning, 2006.
- 2 B. Stroustrup, “*The C++ Programming Language*”, Addison Wesley, 2004.

## **BPHS101P: Object Oriented Programming in C++ LAB**

### **Practical: 60 Lectures**

# **BPHS201: Data Structures and File Processing**

## **Theory: 60 Lectures**

### **UNIT - I**

**Basic Data Structures:** Abstract data structures- stacks, queues, linked lists and binary trees. Binary trees, balanced trees **(15 LECTURE)**

### **UNIT - II**

**Searching:** Internal and external searching, Memory Management: Garbage collection algorithms for equal sized blocks, storage allocation for objects with mixed size **(15 LECTURE)**

### **UNIT - III**

**Physical Devices:** Characteristics of storage devices such as disks and tapes, I/O buffering. Basic File System Operations: Create, open, close, extend, delete, read-block, write-block, protection mechanisms. **(15 LECTURE)**

### **UNIT - IV**

**File Organizations:** Sequential, indexed sequential, direct, inverted, multi-list, directory systems, Indexing using B-tree, B+ tree. **(15 LECTURE)**

#### **Books Recommended:**

1. M.T. Goodrich, R. Tamassia and D. Mount, “*Data Structures and Algorithms in C++*”, John Wiley and Sons, Inc., 2004.
2. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, “*Introduction to Algorithms*”, 2nd Ed., Prentice-Hall of India, 2006.
3. Robert L. Kruse and A.J. Ryba, “*Data Structures and Program Design in C++*”, Prentice Hall, Inc., NJ, 1998.
4. B. Stroustrup, “*The C++ Programming Language*”, Addison Wesley, 2004.
5. D.E. Knuth, “*Fundamental Algorithms (Vol. I)*”, Addison Wesley, 1997.

## **BPHS301: Numerical Computing**

### **Theory: 60 Lectures**

#### **UNIT – I**

**Solution to Transcendental and Polynomial Equations:** Iterative methods, bisection method, secant method, Newton-Raphson method, fixed point iteration, methods for finding complex roots. **(15 LECTURE)**

#### **UNIT – II**

**Interpolation:** Polynomial interpolation, Newton-Gregory, Stirling's, Bessel's and Lagrange's interpolation formula, Newton's divided differences interpolation formulae. **(15 LECTURE)**

#### **UNIT – III**

**Numerical Differentiation and Integration:** Numerical differentiation and errors in numerical differentiation, Newton-Cotes formulae, trapezoidal rule, Simpson's rule, Gaussian integration. **(15 LECTURE)**

#### **UNIT – IV**

**Numerical Solutions of Ordinary Differential Equations:** Picard's and Taylor's series, Euler's and Runge-Kutta (RK) methods. **(15 LECTURE)**

#### **Books Recommended:**

1. K.E. Atkinson, W. Han, "*Elementary Numerical Analysis*", 3rd Ed., Wiley, 2003.
2. C. Xavier, S.S. Iyengar, "*Introduction to Parallel Algorithms*", Wiley-Interscience, 1998.
3. A. Kharab, R.B. Guenther, "*An Introduction to Numerical Methods: A MATLAB Approach*", 1<sup>st</sup> Ed., Chapman and Hall/CRC, 2001.
4. B. Bradie, "*A Friendly Introduction to Numerical Analysis*", Pearson Education, 2007.
5. S.R. Otto and J.P. Denier, "*An Introduction to Programming and Numerical Methods in MATLAB*", Springer, 2005.
6. M.K. Jain, S.R.K. Iyengar and R.K. Jain, "*Numerical Methods for Scientific and Engineering Computation*", 7th Ed., New Age International Publishers, 2007.

## **BPHS401: Design and Analysis of Algorithms**

### **Theory: 60 Lectures**

#### **UNIT – I**

**Introduction:** RAM model,  $O(\log n)$  bit model. Review of data structures: Balanced trees, Mergeable sets. Algorithm Design Techniques: Iterative techniques, Divide and conquer, dynamic programming, greedy algorithms. **(15 LECTURE)**

## UNIT – II

**Searching and Sorting Techniques:** Review of elementary sorting techniques-selection sort, bubble sort, insertion sort, more sorting techniques-quick sort, heap sort, merge sort, shell sort, external sorting. **(15 LECTURE)**

## UNIT – III

**Lower bounding techniques:** Decision Trees, Adversaries, String Processing: KMP, Boyre-Moore, Robin Karp algorithms. **(15 LECTURE)**

## UNIT – IV

**Introduction to randomized algorithms:** Random numbers, randomized Qsort, randomly Built BST Number Theoretic Algorithms: GCD, Addition and Multiplication of two large numbers.

**Graphs:** Analysis of Graph algorithms Depth-First Search and its applications, minimum Spanning Trees and Shortest Paths. **(15 LECTURE)**

### Books Recommended:

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, “*Introduction to Algorithms*”, Prentice-Hall of India, 2006.
2. J. Kleinberg and E. Tardos, “*Algorithms Design*”, Pearson Education, 2006.
3. S. Baase, “*Computer Algorithms: Introduction to Design and Analysis*”, Addison Wesley, 1999.
4. A.V. Levitin, “*Introduction to the Design and Analysis of Algorithms*”, Pearson Education, 2006.

**Skill Enhancement Courses (any two) (Credit: 04 each) –  
SEC1 to SEC4 Theory: 03, Labs: 02/01 Tutorial**

**(SEC-3)**

**BPHS501: PHP Programming  
Theory: 45 Lectures**

**UNIT – I**

**Introduction to PHP:** PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.), PHP with other technologies, scope of PHP, Basic Syntax, PHP variables and constants, Types of data in PHP , Expressions, scopes of a variable (local, global). **(12 LECTURE)**

**UNIT – II**

**PHP Operators:** Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary, and MOD operator.PHP operator Precedence and associativity**(11 LECTURE)**

**UNIT – III**

**Handling HTML form with PHP:** Capturing Form Data, GET and POST form methods, Dealing with multi value fields, Redirecting a form after submission. **(11 LECTURE)**

**UNIT – IV**

**PHP conditional events and Loops:** PHP IF Else conditional statements (Nested IF and Else), Switch case, while, For and Do While Loop, Goto, Break, Continue and exit. **(11 LECTURE)**

**Books Recommended**

1. *Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill Education (India), 2007.*
2. *Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify -Reuse)", Wiley India Private Limited, 2008.*
3. *Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", 3rd Edition Paperback, O'reilly, 2014.*
4. *David Sklar, Adam Trachtenberg, "PHP Cookbook: Solutions & Examples for PHP Programmers", 2014.*

**(SEC-3)**  
**BPHS502: E- Commerce**  
**Theory: 45 Lectures**

**UNIT – I**

**Electronic Commerce:** Introduction, types, Advantages, Challenges, Business Oriented, Business Models. **(12 LECTURE)**

**UNIT – II**

**WWW and E-Services:** World Wide Web and E-Commerce, E-Services. **(11 LECTURE)**

**UNIT – III**

**E-Learning:** Introduction, E- Courses, Learning from E-Learning, Revolution, Benefits. **(11 LECTURE)**

**UNIT – IV**

**E- Banking:** Introduction, Evolution of E - Banking, Importance Role of ICT in Banking, Challenges, Models, Future, Opportunities, Strategies. **(11 LECTURE)**

**Books Recommended:**

1. Herny Chah, Raymond Lee, Tharam Dillon, Elizabeth Chang “*E-Commerce, Fundamentals and Applications*”, John Wiley and Sons, Inc., 2001.
2. Kenneth C. Laudon, Carol Guercio Traver, “*E-Commerce Business, Technology, Society*”, Pearson Education, 2009.
3. Ruth Colvin Clark, Richard E. Mayer, “*E-Learning and the Science of Instruction*”, 3<sup>rd</sup> Edition, John Wiley and Sons, Inc., 2011.
4. Marc J. Rosenberg, “*E- Learning, Strategies for Delivering Knowledge in the Digital Age*”, McGraw-Hill, 2001.
5. Mahmood Shah, Steve Clarke, “*E- Banking Management: Issues, Solutions, and Strategies*”, Information Science Reference, IGI Global, 2009.
6. Mohammad Ali Sarlak, Asghar Abolhasani Hastiani, “*E-Banking and Emerging Multidisciplinary Process, Social Economical and Organizational Models*”, Business Science Reference, IGI Global, 2011

**(SEC-4)**

**BPHS601: Basics of Database Management Systems**

**Theory: 45 Lectures**

**UNIT - I**

**Introduction to Database Management Systems:** Characteristics of database approach, data models, DBMS architecture and data independence. **(12 LECTURE)**

**UNIT – II**

**Entity Relationship and Enhanced ER Modeling:** Entity types, relationships, SQL: Schema Definition, constraints. **(11 LECTURE)**

**UNIT – III**

**Relational Data Model:** Basic concepts, relational constraints, SQL queries. **(11 LECTURE)**

**UNIT – IV**

**Database design:** ER and EER to relational mapping, functional dependencies, normal forms up to third normal form. **(11 LECTURE)**

**Books Recommended:**

1. R. Elmasri, S.B. Navathe, “*Fundamentals of Database Systems*”, 5<sup>th</sup> Ed., Pearson Education. 2010.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, “*Database System Concepts*”, 5<sup>th</sup> Ed., McGraw Hill. , 2013.
3. R. Ramakrishanan, J. Gehrke, “*Database Management Systems*”, 3<sup>rd</sup> Ed., McGraw-Hill.2002



**(SEC4)**

**BPHS602: System Analysis and Design**

**Theory: 45 Lectures**

**UNIT – I**

**Planning Phase:** Introduction, Development Life Cycle, Project Identification, Feasibility Analysis, Project Selection, Project Plan, Management and Control **(12 LECTURE)**

**UNIT – II**

**Analysis Phase:** Requirement Determination, Requirement and Analysis Techniques, Requirement Gathering Techniques, Use Cases. Process Modeling, Creating Data Flow Diagram, Data Modeling: E-R Diagram, Validating an ERD. **(11 LECTURE)**

**UNIT – III**

**Design Phase:** Transition from Requirement to Design, Influences on the Acquisition Strategy. Architecture Design: Elements of Architecture, Creating and Architecture Design, Hardware and Software Specification, Use Interface Design, Moving from Logical to Physical Process Models. **(11 LECTURE)**

**UNIT – IV**

**Implementation Phase:** System Implementation, Training and Supporting Users, Coding, Testing, Program Test, System Test, System Implementation, Maintenance. Audit of computer system usage, Audit trails, Threat to computer system and control measures, Disaster recovery and contingency planning **(11 LECTURE)**

**Books Recommended:**

1. Alan Dennis, Barbara Haley Wixom, Roberta M. Roth, “*System Analysis Design*”, 4<sup>th</sup> Edition, John Wiley & Sons, Inc. 2005.
2. Jeffrey A. Hofer Joey F. George Joseph S. Valacich, Addison Weseley, “*Modern System Analysis and Design*”.

**Discipline Specific Elective Papers: (Credit: 06 each) (2 papers to be selected in Computer Science) –**

**(DSE-3A)**

**BPHS503: Operating Systems**

**Theory: 60 Lectures**

**UNIT – I**

**Introduction:** System Software, Resource Abstraction, OS strategies, Types of operating systems - Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Process Control & Real Time Systems. **(15 LECTURE)**

**UNIT – II**

**Operating System Organization:** Factors in operating system design, basic OS functions, implementation consideration; process modes, methods of requesting system services –system calls and system programs. **(15 LECTURE)**

**UNIT – III**

**Process Management:** System view of the process and resources, initiating the OS, process address space, process abstraction, resource abstraction, process hierarchy, Thread model. **(15 LECTURE)**

**UNIT – IV**

**Scheduling:** Scheduling Mechanisms, Strategy selection, non-pre-emptive and pre-emptive strategies. Memory Management: Mapping address space to memory space, memory allocation strategies, fixed partition, variable partition, paging, virtual memory. **(15 LECTURE)**

**Books Recommended:**

1. A Silberschatz, P.B. Galvin, G. Gagne, “*Operating Systems Concepts*”, 8<sup>th</sup> Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, “*Modern Operating Systems*”, 3<sup>rd</sup> Edition, Pearson Education 2007.
3. G. Nutt, “*Operating Systems: A Modern Perspective*”, 2<sup>nd</sup> Edition Pearson Education 1997.
4. W. Stallings, “*Operating Systems, Internals & Design Principles*” , 5<sup>th</sup> Edition, Prentice Hall of India. 2008.
5. M. Milenkovic, “*Operating Systems -Concepts and design*”, Tata McGraw Hill 1992.

**(DSE-3A)**

**BPHS504: Web Technologies**

**Theory: 60 Lectures**

**UNIT – I**

**Introduction to Web Design:** Introduction to hypertext markup language (HTML) document type definition, creating web pages, graphical elements, lists, hyperlinks, tables, web forms, inserting images, Divisions, Sections. **(15 LECTURE)**

**UNIT – II**

**Customized Features:** Cascading style sheets, (CSS) for text formatting and other manipulations, Types, Introduction to DHTML **(15 LECTURE)**

**UNIT – III**

**JavaScript:** Data types, operators, functions, control structures, events and event handling. JQuery: Introduction, Basics, Selectors, Attributes. **(15 LECTURE)**

**UNIT – IV**

**Bootstrap:** Introduction, Environment, a simple web page using bootstrap template, Designing tables, forms, buttons **(15 LECTURE)**

**Books Recommended:**

1. Ivan Bayross, “*Web Enabled Commercial Application Development Using Html, Dhtml, javascript*”, Perl CGI, BPB Publications, 2009.
2. Ivan Bayross, “*Web Enabled Commercial Application Development Using Html, Dhtml, javascript*”, Perl CGI, BPB Publications, 2009.
3. “*BIG Java Cay Horstmann*”, Wiley Publication , 3rd Edition., 2009.
4. David Flanagan, “*jQuery, Pocket Reference*”, O'Reilly, 2011. Jake Spurlock, “*Bootstrap*”, O'Reilly, 2013. JQuery Web Application Library, Tutorials Point ([http://www.tutorialspoint.com/jquery/jquery\\_tutorial.pdf](http://www.tutorialspoint.com/jquery/jquery_tutorial.pdf))

**(DSE-3B)**

## **BPHS 603: Database Applications**

**Theory: 60 Lectures**

### **UNIT – I**

**Application Design and Development:** User interfaces and tools, web interfaces to Databases  
Web Fundamentals: HTML, static vs. dynamic web pages, client (Java script/VB) and server side scripting (JSP/ASP/PHP/VB), web servers and sessions, two level & three level architecture, Real Life Application **(15 LECTURE)**

### **UNIT – II**

**Development using Popular DBMS:** SQL, procedures & functions, exception handling, triggers, large objects, user defined data types, collection types, bulk loading of data. **(15 LECTURE)**

### **UNIT – III**

**Query Optimization:** Query Processing, query tree, query plans, measures of query cost, estimates of basic operations, equivalent relational algebra expressions, evaluation of expressions **(15 LECTURE)**

### **UNIT – IV**

**Authorizations in SQL:** System and user privileges, granting and revoking privileges, roles, authorization on views, functions and procedures, limitations of SQL authorizations, audit trails  
Application Security: Encryption techniques, digital signatures and digital certificates. **(15 LECTURE)**

#### **Books Recommended:**

1. A. Silberschatz, H. Korth and S. Sudarshan, *Database System Concepts*, 5th Ed., Tata McGraw Hill, 2006.
2. J. Morrison, M. Morrison and R. Conrad, *Guide to Oracle 10g*, Thomson Learning, 2005.
3. Loney and Koch, *Oracle 10g: The Complete Reference*, Tata McGraw Hill, 2006.
4. David Flanagan, Java Script, *The Definitive Guide*, O'Reilly Media, 2006.
5. Marty Hall, Larry Brown, and Yaakov Chaikin, *Core Servlets and Java ServerPages: Core Technologies* (Vol. II), 2nd Ed., Sun Microsystems Press, 2006.
6. S.K. Singh, *Database Systems Concepts, Design and Applications*, Pearson Education 2006.

**(DSE-3B) BPHS604: Computer Networks**  
**Theory: 60 Lectures**

**UNIT – I**

**Basic Concepts:** Components of data communication, distributed processing, Line configuration, topology, transmission mode, and categories of networks. OSI and TCP/IP Models: Layers and their functions, comparison of models. Digital Transmission: Interfaces and Modems: DTE-DCE Interface, modems, cable modems.

**Transmission Media:** Guided and unguided, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength, Shannon Capacity.  
**(15 LECTURE)**

**UNIT – II**

**Telephony:** Multiplexing, error detection and correction, Many to one, one to many, WDM, TDM, FDM, circuit switching, packet switching and message switching. Data Link control protocols: Line discipline, flow control, error control, synchronous and asynchronous protocols overview. ISDN: Services, historical outline, subscriber's access, ISDN, Layers, and broadband ISDN.

**(15 LECTURE)**

**UNIT – III**

**Devices:** Repeaters, bridges, gateways, routers, The Network Layer, Design Issues, Network Layer Addressing and Routing concepts (Forwarding Function, Filtering Function); Routing Methods (Static and dynamic routing, Distributed routing, Hierarchical Routing); Distance Vector Protocol, Link State protocol. **(15 LECTURE)**

**UNIT – IV**

**Transport and upper layers in OSI Model:** Transport layer functions, connection management, Functions of session layers, Presentation layer, and Application layer. **(15 LECTURE)**

**Books Recommended:**

1. A.S. Tanenbaum, *Computer Networks*, 4th Ed., Pearson Education Asia, 2003.
2. Behrouz A. Forouzan, *Data Communication and Networking*, 2nd Ed., Tata McGraw Hill.
3. D. E. Comer, *Internetworking with TCP/IP*, Pearson Education Asia, 2001.
4. William Stallings, *Data and Computer Communications*, 7<sup>th</sup> Ed., Pearson education Asia, 2002.