



# **RANI CHANNAMMA UNIVERSITY**

## **BELAGAVI**

THE COURSE STRUCTURE AND SYLLABUS OF UNDERGRADUATE

B.Sc(CS) PROGRAMME

w.e.f.

Academic Year 2020-21 and Onwards Under

CHOICE BASED CREDIT SYSTEM (CBCS)

**CHOICE BASED CREDIT SYSTEM (CBCS)**

I Semester B.Sc(CS) w.e.f 2020-21 and onwards CHOICE BASED CREDIT SYSTEM (CBCS)									
Part	Subject Code	Subject Name	Teaching Hrs/week	Practical Hrs/week	Examinations				Credits
					Duration Hrs	Marks			
						Theory/Practical	IA	Total	
Part I AEC C	BCSAEC1.1	MIL	4	-	3	80	20	100	3
	BCSAEC 1.2	English	4	-	3	80	20	100	3
Part II DSC	BCSDSC1.3	C Programming	5	-	3	80	20	100	3
	BCSDSC 1.4	Basic Electrical & Electronics	5	-	3	80	20	100	3
	BCSDSC 1.5	Mathematics-I	5	-	3	80	20	100	3
	BCSDSC 1.6	C Programming Lab	-	3	2	40	10	50	1
	BCSDSC 1.7	Computer Fundamentals Lab	-	3	2	40	10	50	1
	BCSDSC 1.8	Basic Electrical & Electronics Lab	-	3	2	40	10	50	1
Part III AECC	BCSAEC 1.9	Indian Constitution	2	-	2	40	10	50	2
	BCSAEC 1.10	CC/EA	2	-	-	-	50	50	1
Total			27	9				750	21

**II Semester B.Sc(CS) w.e.f 2020-21 and onwards  
CHOICE BASED CREDIT SYSTEM  
(CBCS)**

Part	Subject Code	Subject Name	Teaching Hrs/week	Practical Hrs/week	Examination			Credits	
					Duration Hrs	Marks			
						Theory /Practical	IA		Total
Part I AECC	BCSAEC 2.1	MIL	4	-	3	80	20	100	3
	BCSAEC 2.2	English	4	-	3	80	20	100	3
Part II DSC	BCSDSC 2.3	Data Structures	5	-	3	80	20	100	3
	BCSDSC 2.4	Analog & Digital Electronics	5	-	3	80	20	100	3
	BCSDSC 2.5	Web Programming	5	-	3	80	20	100	3
	BCSDSC 2.6	Data Structures Lab	-	3	2	40	10	50	1
	BCSDSC 2.7	Analog & Digital Electronics Lab	-	3	2	40	10	50	1
	BCSDSC 2.8	Web Programming Lab	-	3	2	40	10	50	1
Part III AECC	BCSAEC 2.9	Environmental Studies	2	-	2	40	10	50	2
	BCSAEC 2.10	CC/EA	2	-	-	-	50	50	1
Total			<b>27</b>	<b>9</b>				<b>750</b>	<b>21</b>

**III Semester B.Sc(CS) w.e.f 2021-22 and  
onwards CHOICE BASED CREDIT  
SYSTEM (CBCS)**

Part	Subject Code	Subject Name	Teaching Hrs/week	Practical Hrs/week	Examination			Credits	
					Duration Hrs	Marks			
						Theory /Practical	IA		Total
Part I AECC	BCSAEC 3.1	MIL	4	-	3	80	20	100	3
	BCSAEC 3.2	English	4	-	3	80	20	100	3
Part II DSC	BCSDSC 3.3	OOPS using C++	5	-	3	80	20	100	3
	BCSDSC 3.4	Operating System	5	-	3	80	20	100	3
	BCSDSC 3.5	Design and Analysis of Algorithms	5	-	3	80	20	100	3
	BCSDSC 3.6	OOPS using C++ Lab	-	3	2	40	10	50	1
	BCSDSC 3.7	Operating Systems Lab	-	3	2	40	10	50	1
	BCSDSC 3.8	Design and Analysis of Algorithms-Lab	-	3	2	40	10	50	1
Part III SEC	BCSSEC 3.9	Computer Organization Architecture	2	-	2	40	10	50	2
	BCSAEC3.10	CC/EA	2	-	-	-	50	50	1
Total			<b>27</b>	<b>9</b>				<b>750</b>	<b>21</b>

**IV Semester B.Sc(CS) w.e.f 2021-22 and onwards  
CHOICE BASED CREDIT SYSTEM (CBCS)**

Part	Subject Code	Subject Name	Teaching Hrs/week	Practical Hrs/week	Examination			Credits	
					Duration Hrs	Marks			
						Theory/Practical	IA		Total
Part I AECC	BCSAEC 4.1	MIL	4	-	3	80	20	100	3
	BCSAEC 4.2	English	4	-	3	80	20	100	3
Part II DSC	BCSDSC 4.3	Software Engineering	5	-	3	80	20	100	3
	BCSDSC 4.4	Database Management Systems	5	-	3	80	20	100	3
	BCSDSC 4.5	Java programming	5	-	3	80	20	100	3
	BCSDSC 4.6	Database Management Systems Lab	-	3	2	40	10	50	1
	BCSDSC 4.7	Java Programming Lab	-	3	2	40	10	50	1
	BCSDSC 4.8	PL/SQL Lab	-	3	2	40	10	50	1
Part III SEC	BCSSEC 4.9	Computer Networks	2	-	2	40	10	50	2
	BCSAEC 4.10	CC/EA	2	-	-	-	50	50	1
<b>Total</b>			<b>27</b>	<b>9</b>				<b>750</b>	<b>21</b>

V Semester B.Sc(CS) w.e.f 2022-23 and onwards CHOICE BASED CREDIT SYSTEM (CBCS)									
Part	Subject Code	Subject Name	Teaching Hrs/week	Practical Hrs/week	Examination				Credits
					Duration Hrs	Marks			
						Theory /Practical	IA	Total	
Part I DSC / DSE	BCSDSC 5.1	Advanced java	5	-	3	80	20	100	3
	BCSDSC 5.2	Data Warehousing and Mining	5	-	3	80	20	100	3
	BCSDSC 5.3	Network Security	5	-	3	80	20	100	3
	BCSDSC5.4	Software Testing	5	-	3	80	20	100	3
	BCSDSE 5.5	<b>Elective I</b> a. .Net Using C# b. Android Programming	5	-	3	80	20	100	3
	BCSDSE 5.6	<b>Elective II</b> a. PHP b. Gaming & animation	5	-	3	80	20	100	3
	BCSDSE 5.7	<b>Elective Lab I</b> a. C# Lab b. Android Lab <b>Elective Lab II</b> a. PHP Lab b. Gaming & animation Lab	-	4	3	80	20	100	2
	BCSDSE 5.8	Advanced java Lab	-	4	3	80	20	100	2
	BCSDSE 5.9	Software Testing Lab	-	4	3	80	20	100	2
Part III SEC	BCSSEC 5.10	Personality Development	2	-	2	40	10	50	2
<b>Total</b>			<b>32</b>	<b>12</b>				<b>950</b>	<b>26</b>

Note: Students have to choose Elective Lab I or Elective Lab II with respective to Elective I & Elective II.

**VI Semester B.SC(CS) w.e.f 2022-23 and onwards**  
**CHOICE BASED CREDIT SYSTEM (CBCS)**

Part	Subject Code	Subject Name	Teaching Hrs/week	Practical Hrs/week	Examination			Credits	
					Duration Hrs	Marks			
						Theory /Practical	IA		Total
Part I DSC / DSE	BCSDSC 6.1	Cyber Security	5	-	3	80	20	100	3
	BCSDSC 6.2	Artificial Intelligence	5	-	3	80	20	100	3
	BCSDSC 6.3	Programming with Python	5	-	3	80	20	100	3
	BCSDSC6.4	Business Intelligence	5	-	3	80	20	100	3
	BCSDSE 6.5	<b>Elective-III</b> a. Cloud Computing b. Internet of Things	5	-	3	80	20	100	3
	BCSDSE 6.6	<b>Elective-IV</b> a. Big Data Analytics b. Image Processing	5	-	3	80	20	100	3
	BCSDSE 6.7	Project Work	-	4	3	160	40	200	4
	BCSDSE 6.8	Programming with Python Lab	-	4	3	80	20	100	2
Part III ISE C	BCSSEC 6.9	Communication Skills	2	-	2	40	10	50	2
<b>Total</b>			<b>32</b>	<b>08</b>				<b>950</b>	<b>26</b>

**Paper Code:** BCSAEC1.1

**Paper Title:** MIL

**Teaching Hours:** 4 Hrs / Week

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+IA-20

**Credits:** 3

**Syllabus as prescribed by the University**



**Paper Code:** BCSAEC 1.2

**Paper Title:** English

**Teaching Hours:** 4 Hrs / Week

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+IA-20

**Credits:** 3

**Syllabus as prescribed by the University**

**Paper Code:** BCSDSC1.3

**Paper Title:** C Programming

**Teaching Hours:** 5 Hrs / Week

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+IA-20

**Credits:** 3

### UNIT I

Programming Languages and its Classification, Compiler, Interpreter, Linker, Loader. Steps for Problem Solving, flowcharts, algorithms, Program Coding, Program Testing and Execution. Examples of flow charts and algorithms- Largest of three numbers, reversing the digits of an integer, GCD of two integers, generating prime numbers, computing nth Fibonacci numbers.

**12 Hrs**

### UNIT II

Overview of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant, Structure of a C Program, Operators & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, shorthand assignment operators, conditional operators and increment and decrement operators, Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associativity, Library Functions: Standard Mathematical functions.

**12 Hrs**

### UNIT III

Input/output Functions and Control Structures: Unformatted & formatted I/O function in C. Decision making & branching: Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto statement. Looping: For, while, and do-while loop, jumps in loops - break, continue statement, Nested loops.

**12 Hrs**

### UNIT IV

Arrays and Strings : Definition, types, initialization, processing an array, passing arrays to functions, Array of Strings. String constant and variables, Declaration and initialization of string, Input/output of string data, String Handling: String Library Functions: strlen, strcat, strcmp, strcpy, strrev.

**12 Hrs**

### UNIT V

User defined functions: Definition, types of user defined functions, prototype, Local and global variables, passing parameters, recursion, Storage classes in C: auto, extern, register and static storage class, their scope, storage, &lifetime. Structure & Union: Definition of Structure, declaring Structure, accessing Structure elements, array of Structure, Nesting of structure. Definition of Union, declaring and using Union, Difference between Structure & Union.

**12 Hrs**

### References:

1. Balagurusamy E., Computing Fundamentals and C Programming, Tata McGrawHill.
2. YashawantKanetkar : „ Let us C"
3. Stephen G. Kochan, Programming in Ansi C, SamsPublishing
4. Kenneth. A., C problem solving and programming, PrenticeHall.
5. R.G. Dromey, How to Solve it by Computer, PearsonEducation

### Additional reading:

1. Anil V. Chouduri, The Art of Programming through Flowchart and Algorithms, LaxmiPub.
2. Gottfried, Byron S., Programming with C, Tata McGrawHill.
3. E. Balaguruswamy, Programming in ANSI C, McGrawhill.
4. Ashok N. Kamthane, Programming in C, PearsonEducation.
5. [www.cprogramming.com](http://www.cprogramming.com)

**Paper Code:** BCSDSC 1.4

**Paper Title:** Basic Electrical & Electronics

**Teaching Hours:** 5 Hrs /

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+IA-20

**Credits:** 3

### Unit –I

**A.C. Circuits:** Alternating voltage and current - Sinusoidal alternating voltage and current - Generation of altering voltages and currents – Equation alternating voltage and current - important a.c. terminology and their Important relations-Values of alternating voltage and current - Peak value -Average value- Average value sinusoidal current - R.M.S. or effective value - R.M.S value of sinusoidal current importance of R.M.S. value of sinusoidal current - Importance of R.M.S values- Form factor and Peak factor - Phase, Phase difference - Representation of alternating voltages and currents - Phasor representation of sinusoidal quantities-Phasor diagram of sine waves of same frequency - Addition of alternating quantities, Phasor diagrams using r.m.s. values R-L series circuit - Impedance triangle - Power factor - True power and Reactive power - Significance of power. factor R-C series circuit - R-L-C series circuit - R-L-C series circuit.

(12 Hrs)

### Unit -II

**Poly-phase system** - Reasons for use of 3-phase system - Elementary 3-phase alternator - Some Concepts - Interconnection of three phases - Star or Y -connection - Voltage and Current in balanced Y -connection - How to apply load? Delta or Mesh connection - Voltages and currents in balanced delta connection Advantages of star and delta connected system. Use of single wattmeter – power measurement in 3 – phase circuits.

**Transformers:** Principle of operation & construction of single phase transforms (core & shell types), EMF equation, power losses, efficiency and voltage regulation (OC / SC tests, equivalent circuits and phasor diagrams are excluded)

**Semiconductor – Diode Characteristics:** quantitative theory of a PN junction, PN junction as a diode, volt- ampere characteristics, temperature dependence of PN characteristics, half wave rectifiers, other full wave a circuits, ripple factor, capacitor filter, Zener diode – characteristics, Zener and avalanche breakdown, Zener regulated power supply.

(12 Hrs)

### Unit -III

**Transformers characteristics:** junction transistor, transistor current components, transistor as an amplifier, common base. Configuration, common-emitter configuration, CE cut-off region, CE saturation region, large-signal, DC and small – signal CE values of current gain, operating point, bias stabilization, cascading transistor amplifier, decibel; classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, RC coupled amplifier.

**Theory of Sinusoidal Oscillators:** Concepts of feedback, sinusoidal oscillators, working of RC phase shift

(12 Hrs)

### Unit -IV

**Theory of Sinusoidal Oscillators** (conti..) Colpitt's and Hartely's oscillators using BJT expression for frequency of oscillation (no derivation)

**Operational Amplifiers:** (Op- Amp): Introduction, ideal Op-Amp inverting and non-inverting Op-Amp, need fro Op-Amp, Op-Amp characteristics, voltage follower, addition and subtraction using Op-Amp circuits, Op-Amp integrating and differentiating circuits.

(12 Hrs)

### Unit -V

**Communication Systems:** basic block diagram of communication system modulation, Amplitude Modulation, Frequency spectrum, power relations, phase and telephony, super heterodyne receivers.

**Microwave Components & Measurements:** (LCR Bridge/Q meters), study of microwave bench, types of Antenna.

**Ultrasonic Inter Fore meter:** Studies on Structural aspects.

(12 Hrs)

### TEXT BOOK:

1. V.K. Mehta, Basic Electrical Engineering.
2. Hughes: Hughes Electrical & Electronics Technology, 8/e. Pearson Education 3.
3. Storey: Electronics: A Systems Approach, 2/e Pearson Education. ""

### References:

1. V.N. Mittle, Basic Electrical Engineering - Tata - McGraw Hill Publishing Com. Ltd.
2. H. Cotton, Advanced Electrical Technology, Pitman Publication.
3. K.R.Krishnamurthy, M.R.Raghuveer : Electrical and Electronics Engineering for

4. Scientists and Engineers, NEW AGE INTERNATIONAL (P) LTD. Bangalore Millman and Hawkes : Integrated Electronics, TMH Publication (1999)
5. Sedra / Smith: Microelectronic circuits, Oxford University press (1998)
6. A.J. Diefenderfer: Principles of Electronic Instrumentation, for R.H. Holtan, ,
7. Saunders College publication (1998 )
8. Allen Mottershead : Electronic Devices and circuits: PHI Publications (1997)

**Paper Code:** BCSDSC 1.5

**Paper Title:** Mathematics-I

**Teaching Hours:** 5 Hrs / Week

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+IA-20

**Credits:** 3

#### Unit -I

**Analytical Geometry in 3 dimensions:** Direction cosines and direction ratios – planes – straight lines – angle between planes/straight lines – coplanar lines – shortest distance between skew lines, right circular cone and right circular cylinder.

(12 Hrs)

#### Unit - II

**Differential Calculus:** Determination of  $n^{\text{th}}$  derivatives of standard functions, Leibnitz's theorem(without proof) – problems only. Polar curves – Angle between the radius vector and the tangent – pedal equations of polar curves only. Partial Differentiation: Euler's Theorem, Total differentiation. Differentiation of Composite and Implicit functions – Jacobians – Errors and approximations – Illustrative Engg. Oriented problems.

(12Hrs)

#### Unit -III

**Integral Calculus:** Reduction formulae for the functions  $\sin^n x$ ,  $\cos^n x$ ,  $\tan^n x$ ,  $\cot^n x$ ,  $\sec^n x$ ,  $\operatorname{cosec}^n x$ , and  $\sin^m x \cos^n x$  – Evaluations of these integrals with standard limits – Problems, Tracing of Standard curves in Cartesian form, Parametric form and Polar form. Applications to find area, length, volume and surface area.

(12Hrs)

#### Unit- IV

**Differential Equations:** Solutions of 1<sup>st</sup> order and 1<sup>st</sup> degree equations – variables separable – Homogeneous and Non-Homogeneous, Exact equations and reducible and exact form, Linear and Bernoulli's equations. Orthogonal trajectories of Cartesian and polar form.(Use of initial condition should be emphasized). – Illustrative examples from Engineering Field.

(12 Hrs)

#### Unit –V

**Infinite Series:** Convergence, divergence and oscillation of an infinite series, Comparison Test, P-series, D' alembert's ration test, Raabe's test, Cauchy's root test, Cauchy's integral test (All tests without proof ) for series of positive terms. Alternating series. Absolute and conditional convergence, Leibnitz's (without proof)

(12 Hrs)

#### TEXT BOOKS:

- 1) B.S. Grewal “ Higher Engineering Mathematics”, 36<sup>th</sup> Edition
- 2) B.S. Grewal “ Elementary Engineering Mathematics”.
- 3) Rainville E.D “ A short course in differential Equation”, 4<sup>th</sup> Edition

#### REFERENCES:

1. E. Kreyszing, Advance Engineering Mathematics
2. Greenberg, Advance Engineering Mathematics, Pearson Education

**Paper Code:** BCSDSC 1.6

**Paper Title:** C Programming Lab

**Teaching Hours:** 3 Hrs / Week

**Marks:** Th-40+1A-10

**Credits:** 1

Students are encouraged to use Linux-Open Source OS for executing c –programs using gcc/similar compiler available with Linux. Students shall gain familiarity with working in Linux environment with the help of course teacher in Lab. Following shall be practiced

- Using vi/gedit/geany editor for writing c programs
- Familiarity with bash/similar shell for executing basic shell commands such as ls, cd, mv, mkdir, rm, cat, etc.

URL for reference:

<http://www.ee.surrey.ac.uk/Teaching/Unix/>

<https://www.tutorialspoint.com/unix/unix-vi-editor.html>

[https://www.tutorialspoint.com/compile\\_c\\_online.php](https://www.tutorialspoint.com/compile_c_online.php)

**Note:** Students shall draw flow charts/algorithms for all programs.

#### **Assignment Programs -**

##### **Section A:**

1. Write a program to enter P, T, R and calculate Simple Interest.
2. Write a program to check whether year is leap year or not using conditional/ternary operator.
3. Write a program to find HCF (GCD) of two numbers.
4. Write a C program that accepts a number „n', and prints all prime numbers between 1 to n.
5. Write a C program to print sum of even numbers and sum of odd numbers from array of integers.
6. Write a program to find maximum between three numbers.
7. Write a program to function as a basic calculator; it should ask the user to input what type of arithmetic operation he would like, and then ask for the numbers on which the operation should be performed. The calculator should then give the output of the operation. Use switch. Error message should be reported, if any attempt is made to divide by zero.
8. Program to generate and print first n Fibonacci numbers.
9. Write a C program to concatenate two strings without using library function
10. Write a C program to create array of structure which stores Roll No, Name and Average marks of students. Accept „n' students and print it in proper format.

##### **Section B:**

1. Write a C program to add two matrices.
2. Write an iterative function calculate factorial of a given integer.
3. Write a function that accepts array of integers to find maximum and minimum element in an array.
4. Write a C program to illustrate difference between structure and union by defining emp\_no, emp\_name, salary as members and display the size of the defined structure
5. Write a C program that reverse a given integer number and check whether the number is palindrome or not.
6. Write a program that takes in three arguments, a start temperature (in Celsius), an end temperature (in Celsius) and a step size. Print out a table that goes from the start temperature to the end temperature, in steps of the step size; Celsius to Fahrenheit.

##### **Practice programs –**

1. Write a C program to calculate area and circumference of a circle.
2. Write a program to check whether an alphabet is vowel or consonant using switch case.
3. Write a C Program to check the given number is Armstrong number or not? Armstrong number is a number that is the sum of its own digits each raised to the power of the number of digits. Example:  $153 = 1^3 + 5^3 + 3^3$

**Paper Code:** BCSDSC 1.7

**Paper Title:** Computer Fundamentals Lab

**Teaching Hours:** 3 Hrs / Week

**Marks:** Th-40+IA-10

**Credits:** 1

### **Part-I**

Students shall gain familiarity of Windows 10/Windows 8 OS- Basics of Windows, basic components of windows, icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders. Control panel features, adding and removing software and hardware.

### **Part-II**

Students shall know about the various hardware components of a typical desktop computer/laptop. Identify motherboard, processor, network card, data bus, i/o devices, hard drive, hard disk, flash drive, various ports and other parts of computer.

### **Part-III**

Students shall gain familiarity with word processing software such as MS Word/Open Office. Understand various editing and formatting features, mail-merge option, encrypting the document, and inserting clipart/shapes,/hyperlink/word art. Students shall gain familiarity with spreadsheet software such as MS Excel/Open Office. Concepts of spreadsheet and other features such as, entering text, menus, insert rows/columns, formatting, formula, sort, filter. Advanced features such as graphs, library functions (Arithmetic, Date and Time, Financial, Logical, text and statistical)

### **Part-IV**

Students shall practice working in Linux Environment-Open Source OS. Student shall understand basic shell environment. Following shall be practiced :OS boot process,Description of the basic shell commands, Basics of shell scripting, Usage of if statements in scripts, Usage of vi editor, Description of vi editor with commands, Creating new variables and echoing

### **Lab Assignments:**

**Students shall write**

#### **Section: A**

1. Description about motherboard components of computer system.
2. MS-Word assignment to draw Architecture of Linux using various shapes.
3. MS-Word assignment to demonstrate Bullets and Numbering.
4. MS-Word assignment to demonstrate header, footer, and hyperlink.
5. MS-Word assignment to design a pamphlet for the advertisement of your college features.
6. MS-Word assignment to demonstrate SmartArt and Watermark.
7. MS-Word assignment to demonstrate usage of tables and encryption.
8. MS-Word assignment to demonstrate usage of mail merge.

#### **Section: B**

1. MS-Excel assignment to demonstrate math and statistical functions.
2. MS-Excel assignment to demonstrate graphs.
3. Familiarity with bash/similar shell for executing basic shell commands such as cal, date, bc, who, ls, pwd, cd, mkdir, rmdir etc.
4. Familiarity with commands to work with file (cat, cp, rm, mv, file, wc, head, tail)
5. File ownership and permissions (chmod)
6. echo command
7. Write a shell script to read and display student name, roll number, and marks of five subjects.
8. Write a shell script to find eligibility for voting
9. Write a shell script to find maximum and minimum of three numbers.

**Section: A**

1. List of Experiments: (At least any twelve experiments to be conducted),
2. LCR circuit series and parallel resonance
3. Voltage and current in delta and Star connection
4. Capacity of condenser by charging and discharging.
5. Figure of merit and sensitivity of mirror galvanometer
6. Identification and measurement of R,L&C in a block box
7. Energy gap of a semiconductor (Thermistor)
8. Semiconductor Diode Characteristics
9. Zener Diode Characteristics and Dynamic Resistance.
10. Transistor Characteristics-determination of Alpha and Beta.

**Section: B**

1. Half wave Rectifier and full wave Rectifier-Construction of halfwave / Fullwaverctifier using semiconductor diode
2. Inverting and Non Inverting Amplifier using IC 741
3. R.C Phase shift and Collpities oscillators.
4. Study of standing wave pattern.
5. Measurement of guide wavelength and frequency
6. Measurement of VSWR
7. Measurement of unknown impedance
8. Radiation pattern of horn antenna
9. Measurement of Relaxation time using X-band RF frequency( LCR bridge/2 metre) and Dielectric constant at sodium D-line using Abbe's refrequency at different temperatures / concentration
10. Study of strucral aspects of organic molecule using ultrasonic velocities at different temperatures



**Paper Code:** BCSAEC 1.9

**Paper Title:** Indian Constitution

**Teaching Hours:** 2 Hrs / Week

**Total Teaching Hours:** 30Hrs

**Marks:** Th-40+IA-10

**Credits:** 2

**Syllabus as prescribed by the University**

**II Semester B.Sc(CS) w.e.f 2020-21 and onwards  
CHOICE BASED CREDIT SYSTEM  
(CBCS)**

Part	Subject Code	Subject Name	Teaching Hrs/week	Practical Hrs/week	Examination			Credits	
					Duration Hrs	Marks			
						Theory /Practical	IA		Total
<b>Part I AECC</b>	BCSAEC 2.1	MIL	4	-	3	80	20	100	3
	BCSAEC 2.2	English	4	-	3	80	20	100	3
<b>Part II DSC</b>	BCSDSC 2.3	Data Structures	5	-	3	80	20	100	3
	BCSDSC 2.4	Analog & Digital Electronics	5	-	3	80	20	100	3
	BCSDSC 2.5	Web programming	5	-	3	80	20	100	3
	BCSDSC 2.6	Data Structures Lab	-	3	2	40	10	50	1
	BCSDSC 2.7	Analog & Digital Electronics Lab	-	3	2	40	10	50	1
	BCSDSC 2.8	Web Programming Lab	-	3	2	40	10	50	1
<b>Part III AECC</b>	BCSAEC 2.9	Human Rights and Environmental Studies	2	-	2	40	10	50	2
	BCSAEC 2.10	CC/EA	2	-	-	-	50	50	1
<b>Total</b>			<b>27</b>	<b>9</b>				<b>750</b>	<b>21</b>

**Paper Code:** BCSAEC 2.1

**Paper Title:** MIL

**Teaching Hours:** 4 Hrs / Week

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+IA-20

**Credits:** 3

**Syllabus as prescribed by the University**

<b>Paper Code:</b> BCSAEC 2.2	<b>Paper Title:</b> English	<b>Teaching Hours:</b> 4 Hrs / Week
<b>Total Teaching Hours:</b> 60Hrs	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

Syllabus as prescribed by the University

**Paper Code:** BCSDSC 2.3

**Paper Title:** Data Structures

**Teaching Hours:** 5 Hrs / Week

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+IA-20

**Credits:** 3

### UNIT I

Advanced C: Dynamic memory allocation and pointers in C- Declaring and initializing pointers, Pointer & Functions, Pointer & Strings, Pointer& Structure, Pointer to Pointer. Command line arguments, Static and dynamic memory allocation. Memory allocation functions :malloc, calloc, free and realloc. File Management in C: Defining ,declaring a file, Opening & Closing File, Input & Output Operations on Files, Random Access to Files, File error handling functions.

12 Hrs

### UNIT II

Introduction to Data structures: Definition, Classification of data structures: primitive and non-primitive. Operations on data structures Search: Basic Search Techniques- sequential search, Binary search- Iterative and Recursive methods. Sort-General Background: Definition, different types: Bubble sort, Selection sort, Merge sort, Insertion sort, Quick sort.

12 Hrs

### UNIT III

Recursion: Definition, Recursion in C, Writing Recursive programs – Binomial coefficient, Fibonacci, GCD, towers of Hanoi. Stack – Definition, Array representation of stack, Operations on stack-push and pop, Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix, applications of stacks.

12 Hrs

### UNIT IV

Queue - Definition, Array representation of queue, Types of queue: Simple queue, circular queue, double ended queue (dequeue) priority queue, operations on ordinary queue and circular queues.

12 Hrs

### UNIT V

Linked list – Definition, components of linked list, representation of linked list, advantages and disadvantages of linked list, Arrays versus linked list, Types of linked list: Singly linked list, doubly linked list, Circular linked list and circular doubly linked list. Operations on singly linked list: creation, insertion, deletion, search and display.

12 Hrs

### References

1. Data structures using „C“– Padma Reddy
2. A.K. Sharma, Data Structures Using C, 2nd edition, Pearson Education.
3. Achuthsankar S. Nair, T. Makhalekshmi, Data Structures in C, PHI.
4. Prof. S.Nandagopalan, Fundamental of Data Structures with C.
5. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Pearson Education.

### Additional Reading

1. A.M. Tenenbaum, Y. Langsam, M. J. Augustein, R. L. Kruse, B. P. Leung and C. L. Tondo, Data Structures using C, PHI.
2. Trembley, An introduction to Data Structures with applications, Tata McGrawHill.
3. C. Loudon, Mastering Algorithms, SPD/O'REILL

<b>Paper Code:</b> BCSDSC 2.4	<b>Paper Title:</b> Analog & Digital Electronics	<b>Teaching Hours:</b> 5 Hrs / Week
<b>Total Teaching Hours:</b> 60Hrs	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

### Unit I

**Diode Circuits:** Diffusion Capacitance, Diode as a Circuit element, Load line concept, Piecewise linear diode model, Clipping circuits, Clipping at two independent levels, comparators, Full-wave rectifier with C filter, Voltage doublers  
**Transistor Biasing:** Operating point, Bias stability, Self-bias or emitter bias, Bias compensation, Biasing techniques for linear integrated circuits.

**Transistor at Low Frequencies:** Graphical analysis of CE configuration, Two port devices. The hybrid model, Transistor hybrid model, The h parameters, Analysis of transistor amplifier circuit using h parameters. (CE amplifier only), The emitter follower, Millers Theorem and its dual. R.C. coupled amplifier.

12 Hrs

### Unit II

**Feedback Amplifiers:** Classification, Feedback concept, Transfer gain with feedback, General characteristics of negative feedback amplifiers, Input resistance, Output resistance.

**Power Amplifier:** Class A large signal amplifiers, Second harmonic distortion, Higher order harmonic generation, Transformer coupled audio power amplifier, Efficiency, Push pull amplifiers, Class B operation.

**555 Timer:** Monostable and Astable multi-vibrators and applications.

12 Hrs

### Unit III

**Introduction:** Analog Signals, Digital Signals, Digital Computer as a Data Processor, Electronic Switch positive and Negative logic, Pulse waveform, Digital troubleshooting instruments.

**Number Systems and Codecs:** Introduction to all types of Number system, conversion from one number system to another and vice-versa. Binary arithmetic operations such as addition and subtraction using (r-1)'s and r's complement method. BCD code and BCD addition Gray code and its conversion to Binary code ASCII Codes, Error Detection code, weighted and non-weighted codes.

12 Hrs

### Unit IV

**Logic Gates and Simplification of Boolean Expressions:** Introduction of all logic gates, Realization of logic gates and lets using universal gates Boolean algebra relations, Demorgan's theorems, Standard forms of logic functions, Complementary nature of miniterms and maxterms, Using K-Map obtain minimal sum and product for complete and incomplete Boolean forms. Simplification logical functions using Boolean algebra technique.

**Logic levels and families:** Logic levels, Integration levels, Output switching times, Specifications and Characteristics of Digital IC's TTL, wired logic, TL with Totem-pole output, open collector o/p configuration, Three state o/p TTL, Schottky TTI, The MOSFET: Operation of n-channel, Enhancement Type MOSFET, The MOSFET as a Resistor, NMOS and PMOS logic; the NMOS Inverter, NMOS NOR gate, NMOS NAND gate, PMOS logic, performance. The CMOS Inverter, CMOS NOR gate, CMOS NAND gate, performance, Comparison of the above logic families.

12 Hrs

### Unit V

**Logic Design with MSI components:** Binary Adders and Subtractors; Carry Look ahead Adder, Decimal, Encoders, Multiplexers, Logic Design using Multiplexers, Demultiplexers, Logic Design using Demultiplexers.

**Flip-flops & Simple Flip-flop applications:** The Basic Bistable Element Latches, The SR Latch, An application of the SR latch, An application of the SR latch, Aswitch Debouncer, The gated SR latch. The gated D, latch JK Flip-flop, JK Master – Slave flip flop, Edgetriggered Jk Flip-flop, The positive Edge-triggered D- flip-flop, Negative Edge-triggered D-flip-flop, Characteristic Equations, Registers.

12 Hrs

### TEXT BOOKS:

- Jacob Milman & Christos C Halkias, " Intergrated Ekectronics", McGraw Hill.
- Ramakanth A Gayakwad, " Operational Amplifiers and Linear Intergrates Circuits", PHI, 3<sup>rd</sup> Editions.
- Digital System- Tocci
- Digital Priniples & Applications- Malvino & Leach.

### REFERENCE:

- R.S. Alurkar, "Logic Design", CBSE Publications, Delhi
- Jacob Milman & Arvin Grabel " Microelectronics" Second Edition. McGraw Hill.
- A.P. Malvino,, " Electronic Principles" TMH 5<sup>th</sup> Edition.

4. Nashelesky & boylestead “ Electric Devices & Circuit Theory”, PHI, 6<sup>th</sup> Edition. Coverage in the Test books:
5. Dgital Funcementals –flyod
6. Digital Principles & Design – Donal D. Givone
7. Switching & Finite Automata Theory- Zvi Kohavi.

<b>Paper Code:</b> BCSDSC 2.5	<b>Paper Title:</b> Web Programming	<b>Teaching Hours:</b> 5 Hrs / Week
<b>Total Teaching Hours:</b> 60Hrs	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

### Unit I: Fundamentals of Web

Internet, WWW, Web Browsers, and Web Servers, URLs, MIME,HTTP, XHTML- Basic Syntax, Standard structure, Basic text markup, Images, Hypertext, Links, Lists, Tables, Forms- <form>,<input>,<label>,<select>,<textarea> tags and action buttons(submit and reset).

**12 Hrs**

### Unit II: CSS

CSS- Introduction, Levels of style sheets, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The <span> and <div>tags.

**12 Hrs**

### Unit III: Basics of Javascript

Overview of Javascript, Object Oriented and javascript, General Syntactic characteristics, Primitives, operations and expressions, Screen output and keyboard input, Control statements, Object creation and modification.

**12 Hrs**

### Unit IV: Javascript Concepts and XHTML Documents

Arrays, Functions, Constructor ,Element access in javascript, Event and event Handling , Handling events from body elements, Handling events from button elements, Handling events from Textbox and password elements.

**12 Hrs**

### Unit V: Introduction to XML

Introduction, Syntax of XML , XML document structure, Displaying raw XML documents, Displaying XML documents with CSS,XSLT Stylesheets and Displaying XML documents with XSLT.

**12 Hrs**

### References:

1. Robert W. Sebestra, "Programming the World Wide Web", 7th Edition /4th edition Addison Wesley Publication,2013.

### Additional Reading:

1. Chris Bates, "Web Programming: Building Internet Applications", 3rd Edition Wiley 2009
2. Eric Freeman, "Head First HTML with CSS and XHTML", O' Rielly,2006.
3. S SGornale&Basavanna M, ""Web Programming for Beginners", ISBN: 978-93-5213-363-5, Shroff Publisher & Distributors PVT Ltd, Mumbai-2016
4. David Flnagan, "JavaScript, The Definitive Guide", 6th Edition, O' Rielly2011.
5. Internet & World Wide Web – How to Program – Deitel&Deitel – Fourth edition



**Paper Code:** BCSDSC 2.6

**Paper Title:** Data Structures Lab

**Teaching Hours:** 3 Hrs / Week

**Marks:** Th-40+IA-10

**Credits:** 1

#### Section A:

1. Write a C program to demonstrate the Dynamic Memory Allocation for Structure by reading and printing „n“ employee details.
2. Write a C program to read one dimensional array, and print sum of all elements along with inputted array elements using Dynamic Memory Allocation.
3. Write a program that takes a file as an argument and counts the total number of lines. Lines are defined as ending with a newline character. Program usage should be count filename.txt and the output should be the line count.
4. Write a C program to find n Fibonacci numbers using recursion.
5. Write a C program to search for an element in an array using Sequential search
6. Write a C program to sort a list of N elements using Bubble sort Technique
7. Write a C program to sort a list of N elements using Insertion sort Technique
8. Write a C program to demonstrate the working of stack of size N using an array. The elements of the stack may assume to be of type integer or real, the operations to be supported are 1. PUSH 2. POP 3. DISPLAY. The program should print appropriate messages for STACK overflow, Under flow and empty, use separate functions to implement the same.

#### Section B:

1. Write a C program to search for an element in an array using Binary search
2. Write a C program to sort a list of N elements using Selection Sort Technique
3. Write a C program to sort a list of N elements using Merge sort Technique
4. Write a C program to read a text file and convert the file contents in capital (upper-case) and write the contents in an output file.
5. Write a C program to convert a given infix expression into its postfix Equivalent, Implement the stack using an array
6. Write a C program to simulate the working of an ordinary Queue using an array. Provide the operations QINSERT, QDELETE and QDISPLAY. Check the Queue status for empty and full detect these cases
7. Using dynamic variables and pointers Write a C program to construct a singly linked list consisting of the following information in each node; Roll – No (Integer), Name (Character string). The operations to be supported are:
  - LINSERT Inserting a node in the front of the list
  - LDELETE Deleting the node based on Roll –No
  - LSEARCH Searching a node based on Roll-No
  - LDISPLAY displaying all the nodes in the list

**Paper Code:** BCSDSC 2.7

**Paper Title:** Analog Digital Lab

**Teaching Hours:** 3 Hrs / Week

**Marks:** Th-40+IA-10

**Credits:** 1

**Section: A**

1. Experiments: (At least any 15 to be conducted)
2. RC-Coupled Amplifier. (Frequency response study)
3. Full wave rectifier with filters (Bridge Rectifier)
4. Clipping & Clamping circuit
5. Hybrid analysis of transistor amplifiers (n-parameter calculation)
6. Emitter follower
7. Transformer-coupled amplifiers
8. Op-amp as a Converter
9. Op-amp as a Schmitt-Triggers
10. Op-amp D/A Converter

**Section: B**

1. Astable Multivibrator using IC 555 Timer
2. Monostable Multivibrator using IC 555 Timer
3. Design and test adder circuit using IC 741
4. Design and test signal changer circuits using IC 741
5. Flip-Flops (Basic study, Truth table, Verification).
6. Shift registers (Right and left shift)
7. Design sequential CRT for the given state diagram
8. 3 bit binary counter
9. 4 bit synchronous (ripple) counter
10. Mod 10 ripple counter
11. Mod and synchronous up down counter

**Paper Code:** BCSDSC 2.8

**Paper Title:** Web Programming Lab

**Teaching Hours:** 3 Hrs / Week

**Marks:** Th-40+IA-10

**Credits:** 1

**Section A:**

1. Write an html program to display the following table.

Day	Today	Tomorrow	Monday
Condition	Sunny	Mostly sunny	Partly cloudy
Temperature	19°C	17°C	12°C
Wind	E 13 km/h	E 11 km/h	S 16 km/h

Use cell spacing, align and cell padding attribute.

2. Demonstrate the use of following in HTML  
Font family, font variant, font style, font size and text decoration.
3. Write a HTML program which displays random contents using.  
a. Ordered list b. Unordered list  
use list properties for both.
4. Write a HTML program to demonstrate  
a. Inline CSS b. Class CSS c. External CSS
5. Write a HTML Program to demonstrate how the following selector forms can be used.  
a. Simple selectors b. Class selector
6. Write a HTML Program to demonstrate how the following selector forms can be used.  
a. Generic selector b. Id selector c. Universal selector

**Section B:**

1. JavaScript Program to Convert temperatures from Celsius to Fahrenheit and vice versa
2. Write a JavaScript program which displays 4 radio buttons and displays a suitable text based on radio button selection.
3. Write a HTML program which accepts username and password from the user, provide a option to reset the contents. [use action attribute in form tag.]
4. Write a HTML program that displays random text on load of Java Script.
5. Develop a XML document to display information about subjects in BCA second semester and display the same using CSS.
6. Design an XML document to store information about a student in an BCA college affiliated to RCU. The information must include USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3students.

**Paper Code:** BCSAEC 2.9    **Paper Title:** Human Rights and Environmental Studies    **Teaching Hours:** 2 Hrs / Week

**Total Teaching Hours:** 30Hrs

**Marks:** Th-40+IA-10

**Credits:** 2

Syllabus as prescribed by the University

**III Semester B.Sc(CS) w.e.f 2021-22 and  
onwards CHOICE BASED CREDIT  
SYSTEM (CBCS)**

Part	Subject Code	Subject Name	Teaching Hrs/week	Practical Hrs/week	Examination			Credits	
					Duration Hrs	Marks			
						Theory /Practical	IA		Total
Part I AECC	BCSAEC 3.1	MIL	4	-	3	80	20	100	3
	BCSAEC 3.2	English	4	-	3	80	20	100	3
Part II DSC	BCSDSC 3.3	OOPS using C++	5	-	3	80	20	100	3
	BCSDSC 3.4	Operating System	5	-	3	80	20	100	3
	BCSDSC 3.5	Design and Analysis of Algorithms	5	-	3	80	20	100	3
	BCSDSC 3.6	OOPS using C++ Lab	-	3	2	40	10	50	1
	BCSDSC 3.7	Operating Systems Lab	-	3	2	40	10	50	1
	BCSDSC 3.8	Design and Analysis of Algorithms-Lab	-	3	2	40	10	50	1
Part III SEC	BCSSEC 3.9	Computer Organization Architecture	2	-	2	40	10	50	2
	BCSAEC3.10	CC/EA	2	-	-	-	50	50	1
Total			<b>27</b>	<b>9</b>				<b>750</b>	<b>21</b>

<b>Paper Code:</b> BCSAEC 3.1	<b>Paper Title:</b> MIL	<b>Teaching Hours:</b> 4 Hrs / Week
<b>Total Teaching Hours:</b> 60Hrs	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

Syllabus as prescribed by the University

**Paper Code:** BCSAEC 3.2

**Paper Title:** English

**Teaching Hours:** 4 Hrs / Week

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+1A-20

**Credits:** 3

Syllabus as prescribed by the University

<b>Paper Code:</b> BCSDSC 3.3	<b>Paper Title:</b> OOPS using C++	<b>Teaching Hours:</b> 5 Hrs / Week
<b>Total Teaching Hours:</b> 60Hrs	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

## OOPs Using C++

### Unit -I

**1. Introduction:** Procedural Languages, definition of OOP, Basic concept of OOP, Object, Class, Data Abstraction, Data Encapsulation, Data Hiding member functions, Reusability, Inheritance, Creating new Data Types, Polymorphism, Overloading, Dynamic binding, and Message passing. C++ Features: The i/o-stream class, C++ Comments, C++ Keywords, Variable declaration, The Const Qualifier. The Endl, Set W, set precision, Manipulators, The scope resolution operator, the new & delete Operators. Functions: Simple Functions: Function declaration, calling the function, function definition; Passing argument to, returning value from function; passing constants, Variables, pass by value, passing structure variables, pass by reference, Default arguments, return statements, return by reference, overloaded functions; Different number of arguments, Different Kinds of arguments, inline function.

(12 Hrs)

### Unit -II

**Objects & Classes:** Classes & Objects, Class Declaration, Class members; Data Constructors, Destructors, Member functions, Class member visibility; private, public, protected. The scope of the class object constructors; Default Constructor, Constructor with argument, constructor with default arguments, Dynamic constructor, copy constructor, Overloaded constructor, Objects as function arguments; member functions defined outside the class, Objects as arguments, returning objects from functions, class conversion, manipulating private Data members, Destructors, classes, objects & memory, array as class member data, Array of objects, string as class member

(12 Hrs)

### Unit -III

**Operator Overloading:** Overloading unary operator: Operator Keyword, Operator Arguments, Operator return value, Nameless temporary objects, limitations of increment operator, overloading binary operator, arithmetic operators, comparison. Operator, arithmetic assignment operator, Data conversion., conversion .between Basic types, Conversion between objects & Basic types, conversion between objects of different classes.

**Inheritance:** Derived Class & Base Class: Specifying the Derived class accessing Base class members, the protected access specifier, derived class constructor.

(12 Hrs)

### Unit -IV

**Inheritance:** Overriding member functions, public and private inheritance; Access Combinations, Classes & Structures, Access Specifiers, Level of inheritance; multilevel inheritance, Hybrid inheritance, Multiple inheritance; member functions in multiple inheritance, constructors in multiple inheritance, Containership; Classes within classes, Inheritance & Program Development.

**Virtual Functions:** Normal member function accessed with pointers, Virtual member functions accessed with pointers, Dynamic binding, pure virtual functions.

(12 Hrs)

### Unit -V

**Virtual Functions:** Friend function; Friends for functional notation, friend classes, this pointer Accessing Member Data with this, using this for returning values.

**Templates & Exception Handling:** Introduction, Templates, Class Templates, function templates, Member function templates, Template arguments, Exception Handling.

**Streams:** The Stream class Hierarchy, Stream classes -Header file, string I/O: Writing strings, reading strings, character J/O, Detecting End - of - file. Object J/O; writing an object to disk, reading an object from disk, J/O with multiple objects; the f stream class, The open function, File Pointers; Specifying the position, Specifying the offset. The tellg Function, Disk I/O with Memory Functions; Closing Files, Error Handling, Command Line Arguments

(12 Hrs)



**Text books:**

- 1 Prata: C++ Primer plus, 4/e Pearson Education
- 2 Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications

**References:**

1. Lippman: C++ Primer, 3/e Pearson Education
2. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill. Publications.
3. Strousstrup: The C++ Programming Language, Pearson Edition, 3rd Edition
4. Kamthane: Object Oriented Programming with. ANSI and Turbo C++, Pearson Education
5. Bhawe: Object Oriented Programming Using C++, Pearson Education

<b>Paper Code:</b> BCSDSC 3.4	<b>Paper Title:</b> Operating System	<b>Teaching Hours:</b> 5 Hrs / Week
<b>Total Teaching Hours:</b> 60Hrs	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

### UNIT I

Introduction: Basics of Operating Systems: Definition, types of Operating Systems, OS Services, System Calls, OS structure: Layered, Monolithic, Microkernel Operating Systems – Concept of Virtual Machine.

**12 Hrs**

### UNIT II

Process Management Process Definition, Process states , Process State transitions , Process Control Block , Context switching , Threads, Concept of multithreads, Benefits of threads, Types of threads. Process Scheduling: Definition, Scheduling objectives, Types of Schedulers, CPU scheduling algorithms.

**12 Hrs**

### UNIT III

Inter-process Communication Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Peterson's Solution, The Producer Consumer Problem, Semaphores, Monitors, Message Passing, and Classical IPC Problems. Deadlocks: Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance: Resource Allocation graph and Banker's Algorithm with problem.

**12 Hrs**

### UNIT IV

Memory Management: Logical and Physical address map, Memory allocation, Internal and External fragmentation and Compaction, Paging. Virtual Memory: Demand paging, Page Replacement algorithms( FIFO,LRU and Optimal), Allocation of frames, Thrashing.

**12 Hrs**

### UNIT V

I/O Management- Principles of I/O Hardware: Disk structure, Disk scheduling algorithms File Management: Access methods, File types, File operation, Directory structure, File System structure, Allocation methods, Free-space management, and directory implementation.

**12 Hrs**

### References:

1. Silberschatz, Peter B. Galvin and Greg Gagne, Operating System Concepts, 9th Edition, WileyIndianEdition
2. Andrew S Tanenbaum, Modern Operating Systems, Third Edition, Prentice HallIndia
3. Sumitabha Das, UNIX Concepts and Applications,4th Edition, Tata McGrawHill

### Additional Reading:

1. Milankovic, Operating Systems, Tata McGrawHill
2. Naresh Chauhan, Principles of Operating Systems, OxfordPress
3. D.M. Dhamdhare, Operating Systems: A concept based approach, 2nd edition, Tata McGraw Hill

**Paper Code:** BCSDSC 3.5      **Paper Title:** Design and Analysis of Algorithms      **Teaching Hours:** 5 Hrs / Week

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+IA-20

**Credits:** 3

#### UNIT I

INTRODUCTION: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation, Big oh notation, Omega notation, Theta notation.

12 Hrs

#### UNIT II

DIVIDE AND CONQUER: General method, applications-Binary search, Quick sort, Strassen's Matrix multiplication, Finding Max Min, Selection sort.

12 Hrs

#### UNIT III

GREEDY METHOD: General method, applications-Job sequencing with deadlines, Knapsack problem, Single source shortest path, Minimum cost spanning trees, Optimal storage on tapes.

12 Hrs

#### UNIT IV

DYNAMIC PROGRAMMING: General method, applications- Multistage graph, All pairs shortest path problem, Travelling sales person problem.

12 Hrs

#### UNIT V

Basic Traversal and Search Techniques: Binary search tree, techniques for binary trees, techniques for graphs, connected components and spanning trees, BACKTRACKING: General method, applications- N-queen problem, sum of subsets problem, Hamiltonian cycles.

12 Hrs

#### References:

1. Ellis Horowitz, SatrajSahni and Rajasekharan, Fundamentals of Computer Algorithms, 2nd Edition, University Press, 2008.
2. M. T. Goodrich and R. Tomassia, Algorithm Design Foundations, Analysis and Internet examples, 1st Edition, John Wiley and Sons, 2006.

#### Additional Reading:s

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, Introduction to Algorithms, 3rd Edition, PHI / Pearson Education, 2009.
2. Aho, Ullman and Hopcroft, "Design and Analysis of algorithms", 3rd Edition, Pearson Education, 2008.
3. <http://nptel.iitm.ac.in/courses/106101060/>

**Paper Code:** BCSDSC 3.6

**Paper Title:** OOPS using C++ Lab

**Teaching Hours:** 3 Hrs / Week

**Marks:** Th-40+IA-10

**Credits:** 1

- 1) Write a program to implement digital clock
- 2) Write a program to swap two numbers using friend function
- 3) Write a program to calculate area and circumference of circle using inline function
- 4) Write a program to create electricity bill
- 5) Write a program to prepare a shopping lists
- 6) Write a program to perform bank transaction
- 7) Write a program to perform addition of two matrices using operator overloading.
- 8) Write a program to perform multiplication of two matrices using operator overloading.
- 9) Write a program to find sum of complex number using friend function.
- 10) Write a program to implement operation on stack.
- 11) Write a program to add two distance variable.
- 12) Write a program to implement operation on queue.
- 13) Write a program to sort elements using templates.
- 14) Write a program to find the maximum of two numbers using template.
- 15) Write a program to compare two string using equal to operator.

**Paper Code:** BCSDSC 3.7

**Paper Title:** Operating Systems Lab

**Teaching Hours:** 3 Hrs / Week

**Marks:** Th-40+IA-10

**Credits:** 1

**Section A:**

1. Write a C/Java program that implements a producer-consumer system with two processes.
2. Write a C/Java program to allow cooperating processes to lock a resource for exclusive use, using Semaphores
3. Write a C program to implement SJF CPU scheduling.
4. Write a C program to implement FCFS CPU scheduling.
5. Write a C program to implement Priority based CPU scheduling.
6. Write a C program to implement FIFO page replacement.
7. Write a C program to implement LRU scheduling.
8. Write a C program to implement memory management using paging technique.

**Section B :**

1. Write a shell script to generate mark-sheet of a student by reading five subject marks, calculate and display total marks, percentage and Class obtained by the student.
2. Write a shell script that displays first n prime numbers as output.
3. Write a shell script to read n numbers as command arguments and sort them in descending order.
4. Write a shell script to read 2 filenames and find which file has more number of words (lines/characters)
5. Find which file is older.
6. Read a directory name and find the number of subdirectories, text files and link files.
7. Write a shell script to display all executable files, directories and zero sized files from current directory.
8. Write a shell script to check entered string is palindrome or not.
9. Write a shell script to perform basic arithmetic operations(use case statement)
10. Write a shell script to determine whether a given file exists or not, file name is supplied as command line argument

**Paper Code:** BCSDSC 3.8

**Paper Title:** Design and Analysis of Algorithms-Lab

**Teaching Hours:** 3 Hrs / Week

**Marks:** Th-40+IA-10

**Credits:** 1

**Section A:**

1. Write a program to find minimum and maximum value in an array using divide and conquer.
2. Write a program to sort a list of N elements using Selection Sort Technique.
3. Sort a given set of n integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of  $n > 5000$ , and record the time taken to sort.
4. Sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of  $n > 5000$  and record the time taken to sort.
5. Write C program that accepts the vertices and edges for a graph and stores it as an adjacency matrix. Implement function to print In-Degree, Out-Degree and to display that adjacency matrix.

**Section B:**

1. Write a program to perform Knapsack Problem using Greedy Solution
2. Write a program to perform Travelling Salesman Problem
3. Write a program to find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm
4. Design and implement in Java to find a subset of a given set  $S = \{S_1, S_2, \dots, S_n\}$  of n positive integers whose SUM is equal to a given positive integer d. For example, if  $S = \{1, 2, 5, 6, 8\}$  and  $d = 9$ , there are two solutions  $\{1, 2, 6\}$  and  $\{1, 8\}$ . Display a suitable message, if the given problem instance doesn't have a solution.
5. Write a program to implement N Queen Problem using Backtracking.

**Note:** Programs to be implemented using java language

**Paper Code:** BCSSEC 3.9

**Paper Title:** Computer Organization  
Architecture

**Teaching Hours:** 2 Hrs / Week

**Total Teaching Hours:** 30Hrs

**Marks:** Th-40+1A-10

**Credits:** 2

### Unit I

**DIGITAL LOGIC CIRCUITS:** Logic gates Boolean algebra. map simplification, combinational circuits, flip-flop, sequential circuits. **INTEGRATED CIRCUITS AND DIGITAL FUNCTIONS:** Digital integrated circuits, IC flip-flops and registers, decoders and multiplexes, binary counters, shift registers, random - access memories (RAM) read-only memories (ROM) **10 Hrs**

### Unit II

**DATA REPRESENTATION:** Data types, fixed-point representation. Floating-point representation, other binary codes, error detection codes.

**BASIC COMPUTER ORGANIZATION AND DESIGN:** Instruction codes. Computer instruction, timing and control, execution and instruction. Input-output and interrupt, design of computer.

**10 Hrs**

### Unit III

**CENTRAL PROCESSOR ORGANIZATION:** Processor bus organization, arithmetic logic unit (ALU), stack organization, instruction formats. Addressing modes. Data transfer and manipulation. Program control, microprocessor organization.

**10 Hrs**

### References:

1. M. Moris Mano, Computer System Architecture, 2nd Edition Prentice Hall of India (1991).
2. Heuring and Jordan, Computer systems design and Architecture, Pearson Education (2003)
3. William Stallings, Computer Organization and Architecture, Pearson Education (2003)
4. Floyd, Digital Fundamentals, 8th Edition, Pearson Education (2003)
5. Andrew S. Tenenbaum, Structured Computer Organization, 3rd Edition, Prentice Hall of India (1990)
6. R. S. Alurkar, Logic Design, CBSE publications, New Delhi

**IV Semester B.Sc(CS) w.e.f 2021-22 and onwards  
CHOICE BASED CREDIT SYSTEM (CBCS)**

Part	Subject Code	Subject Name	Teaching Hrs/week	Practical Hrs/week	Examination			Credits	
					Duration Hrs	Marks			
						Theory/Practical	IA		Total
Part I AECC	BCSAEC 4.1	MIL	4	-	3	80	20	100	3
	BCSAEC 4.2	English	4	-	3	80	20	100	3
Part II DSC	BCSDSC 4.3	Software Engineering	5	-	3	80	20	100	3
	BCSDSC 4.4	Database Management Systems	5	-	3	80	20	100	3
	BCSDSC 4.5	Java programming	5	-	3	80	20	100	3
	BCSDSC 4.6	Database Management Systems Lab	-	3	2	40	10	50	1
	BCSDSC 4.7	Java Programming Lab	-	3	2	40	10	50	1
	BCSDSC 4.8	PL/SQL Lab	-	3	2	40	10	50	1
Part III SEC	BCSSEC 4.9	Computer Networks	2	-	2	40	10	50	2
	BCSAEC 4.10	CC/EA	2	-	-	-	50	50	1
<b>Total</b>			<b>27</b>	<b>9</b>				<b>750</b>	<b>21</b>



**Paper Code:** BCSAEC 4.1

**Paper Title:** MIL

**Teaching Hours:** 4 Hrs / Week

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+IA-20

**Credits:** 3

**Syllabus as prescribed by the University**

**Paper Code:** BCSAEC 4.2

**Paper Title:** English

**Teaching Hours:** 4 Hrs / Week

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+IA-20

**Credits:** 3

**Syllabus as prescribed by the University**

<b>Paper Code:</b> BCSDSC4.3	<b>Paper Title:</b> Software Engineering	<b>Teaching Hours:</b> 5 Hrs / Week
<b>Total Teaching Hours:</b> 60Hrs	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

#### **UNIT 1:**

Introduction to Software Engineering: Defining Software, Software Application Domains, Software Engineering Layers, Software Myths. Process Models: The Waterfall Model, Incremental process model, Evolutionary Process Model – Prototyping and The Spiral model. **12 Hrs**

#### **UNIT 2:**

Software Requirement: Functional and non functional requirement, Software requirements document, requirements specification. Requirements Engineering Process: Requirements elicitation and analysis, requirements validation, Requirements management. System Models: Behavioral models, Object Models. **12 Hrs**

#### **UNIT 3:**

Design Engineering: Design Concepts, Architectural Styles, Architectural Design. Modeling Component-level design: designing class –based components, conducting component-level design. User Interface Design: Golden rules, User interface analysis and design **12 Hrs**

#### **UNIT 4:**

Testing Strategies: A strategic approach to software testing, Validation testing, System testing. Testing Conventional Applications: White-Box Testing (Basis Path Testing), Black Box Testing (Equivalence Partitioning, Boundary Values Analysis). **12 Hrs**

#### **UNIT 5:**

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM plan. Software Quality Assurance: Software Reviews, Formal technical Reviews, Statistical Software quality Assurance, Software reliability. **12 Hrs**

#### **Text Books:**

1. Ian Somerville, Software Engineering, 9th Edition, Pearson Publication Ltd. 2011
2. Roger Pressman, Software Engineering – A practitioner's approach 6th edition McGraw Hill 2010.

#### **References:**

1. Carlo Ghejgietal, Fundamentals of software – engineering, Pearson Education.
2. PanakajJalote, An Integrated approach to software engineering – Narosa Publishing house.

**Paper Code:** BCSDSC 4.4      **Paper Title:** Database Management Systems      **Teaching Hours:** 5 Hrs / Week

**Total Teaching Hours:** 60Hrs

**Marks:** Th-80+IA-20

**Credits:** 3

#### UNIT I

Introduction: Database and Database Users, Characteristics of the Database Approach, Actors on the scene, Workers behind the Scene, Advantages of using DBMS, Brief History. Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three Schema Architecture and Data Independence, Database language and interfaces, the database system Environment. **12 Hrs**

#### UNIT II

Data modeling using the Entity–Relationship(ER) model: High level conceptual data models for database design with an example, Entity types, Entity sets, Attributes and Keys, Relationship types, Relationship sets, Roles and Structural Constraints, Weak Entity Types, ER Diagrams, Naming Conventions and Design Issues. **12 Hrs**

#### UNIT III

Relational Data Model and Relational Algebra: Relation Data Model and Relational Database Constraints, Relation Algebra, Relational Database Design by ER to Relational Mapping. **12 Hrs**

#### UNIT IV

Functional dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relational Schemas, Functional Dependencies, Normal Forms based on Primary Keys, General Definition of 2NF and 3NF, Boyce-Codd Normal Form(BCNF). **12 Hrs**

#### UNIT V

Relational Database Language: Data definition in SQL, Queries in SQL, Insert, Delete and Update Statements in SQL, Views in SQL, PL/SQL: Introduction, Datatypes, The PL/SQL syntax, Logical Comparison in PL/SQL, Understanding PL/SQL block structure- Identifiers, conditional control, iterative control, cursors- Declaring, opening, closing and fetching from a cursor, stored procedures- syntax, creating, calling and deleting a procedure. (Ref.2) **12 Hrs**

#### Reference Book:

1. RamezElmasri&Shamkant B. Navathe, Fundamentals of Database Systems(Sixth Edition),Pearson Education, 2011
2. Commercial Application Development using Oracle Developer 2000, Ivan Bayross, BPB Publications.
3. Abrahamsi, Silberschataz, Henry. F. Korth, S. Sudarshan, Database System Concepts, Mc. Raw hill.
4. Feuerstein, Oracle PL/SQL Programming, SPD/O'REILLY
5. Oracle Press: ORACLE – Computer reference.
6. C.J. Date, Introduction to database systems, Sixth Edition, Addison Wesley 1995.

<b>Paper Code:</b> BCSDSC 4.5	<b>Paper Title:</b> java Programming	<b>Teaching Hours:</b> 5 Hrs / Week
<b>Total Teaching Hours:</b> 60Hrs	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

### UNIT I

Concept - Object, classes, abstraction, encapsulation, inheritance, polymorphism .History of Java, features of Java, JDK Environment, Java Virtual Machine, Java Runtime environment, Identifiers and Keywords, Data types and typecasting, Variables, Java coding conventions, Expressions, Control structures, Decision making statements, Arrays and its methods, command line arguments. **12 Hrs**

### UNIT II

Java classes, Define class with instance variables and methods, Object creation, Accessing member of class, argument passing, Constructors, Method overloading, Static data, Static methods, Static blocks, This keyword, Garbage collection & finalize() method, Nested & Inner classes, Wrapper Classes, String (String Arrays, String Methods, String Buffer, String Builder) **12 Hrs**

### UNIT III

Inheritance: Super class & subclass, abstract method and classes, method overriding, final keyword, super keyword, dynamic method dispatch. Packages and Interfaces: Implementing interfaces, user defined interfaces; modifiers & access control (Default, public, private and protected), user defined packages, Importing classes, Exploring java.util package: Vector, Scanner, Date, Calendar. **12 Hrs**

### UNIT IV

Exception handling: Types of Exceptions, try, catch, finally, throw, throws keywords, creating your own exception, nested try blocks, multiple catch statements, user defined exceptions. Java Input Output: Java IO package, File, Class Byte/Character Stream, Buffered reader / writer, File reader / writer, Print Writer; Multithreading: Multithreading concept, Java thread model, Main thread, Creating a thread, Creating multiple threads, Using isAlive() and join(), Thread priorities, Synchronization, Inter-thread communication, Suspending, Resuming and Stopping threads. **12 Hrs**

### UNIT V

Applets: How Applets differ from Applications, Preparing to write applet, Building applet code, Applet life cycle, Creating an executable applet, Applet tags, Adding applet to HTML file, Getting input from the user. Graphics: The graphics class, Lines and rectangles, Circles and ellipses, Drawing arcs, Drawing polygons, Line graphs, Drawing bar charts. **12 Hrs**

### References:

1. Balaguruswamy, Programming with JAVA A primer, 4th Edition, TATAMcGraw-Hill
2. Herbert Schildt, The Java 2 : Complete Reference, Fourth edition, TMH,
3. Cay S Horstmann, Fary Cornell, Core Java 2, Volume – I, Sun MicrosystemsPress
4. <https://docs.oracle.com/javase/tutorial/>

### Additional Reading:

1. Peter Van der Liden, Just Java, Prentice Hall
2. H. M. Deitel, P. J. Deitel, Java: how to program, 5th edition, Prentice Hall of India
3. Y. Daniel Liang, Introduction to Java programming, 9thEdition, Pearson education

**Paper Code:** BCSDSC 4.6

**Paper Title:** Database Management Systems Lab

**Teaching Hours:** 3 Hrs / Week

**Marks:** Th-40+IA-10

**Credits:** 1

**Q1.** Consider the following schema for a Insurance database given below. The primary keys are underlined and the data types are specified.

PERSON (Driver\_id:String, name:String, address:String)

CAR (Regno:String, model:String, year:int)

ACCIDENT(report-number:int, accd-date:date, location:String)

OWNS(driver-id:String, Regno:String)

PARTICIPATED (driver\_id: String, Regno : String, report\_number : int, damageamount : int)

- Create the above relations by specifying appropriate constraints.
- Insert at least five tuples in each relation.

#### Demonstrate how you

1. Update the damage amount for the car with a specific Regno in the accident with report number 12 to 25000.
2. Add a new accident to the database.
3. Find the total number of people who owned cars that were involved in accidents in 2008.
4. Find the number of accidents in which cars belonging to a specific model were involved.
5. Find the details of the cars owned by a specific person.
6. Display the name of the person and model of the car that are met with an accident along with the report-number and damage amount.

**Q2.** Consider the following schema for a Library Database:

BOOK (Book\_id:number, Title:String, Publisher\_Name:String, Pub\_Year:String)

BOOK\_AUTHORS (Book\_id:number, Author\_Name:String)

PUBLISHER (Name: String, Address:String, Phone:number)

BOOK\_COPIES (Book\_id:number, Branch\_id:number, No-of\_Copies:number)

CARD(Card\_No:number)

BOOK\_LENDING (Book\_id:number,Branch\_id:number,Card\_No:number, Issue\_Date:date)

LIBRARY\_BRANCH (Branch\_id:number, Branch\_Name:String, Address:String)

- Create the above relations by specifying appropriate constraints.
- Insert at least five tuples in each relation.

1. Retrieve details of all books in the library–id, title, name of publisher, authors, branch\_name and number of copies in each branch.
2. Create a view of all books that include book\_title and its total number of copies that are currently available in the Library.
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
5. Modify Book\_Lending table to add the field : Due\_Date : Date
6. Update Book\_Lending table to calculate Due\_Date ( 15 days after Issue\_Date)

**Q3.** Consider the following schema for a Movie Database:

ACTOR (Act\_id:String, Act\_Name:String, Act\_Gender:String)

DIRECTOR (Dir\_id:String, Dir\_Name:String, Dir\_Phone:String)

MOVIES (Mov\_id:String, Mov\_Title:String,., Mov\_Year:number, Mov\_Lang:String, Dir\_id:String)

MOVIE\_CAST (Act\_id:String,Mov\_id: String, Role:String)

RATING (Mov\_id:String, Rev\_Stars:number)

- Create the above relations by specifying appropriate constraints
- Insert at least five tuples in each relation.

1. List the titles of all movies directed by „Hitchcock“.
2. Find the movie names and the number of actors
3. Create a view to display movie details of a particular actor.

4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
5. List the movie details released in the year 2018.
6. Update rating of all movies directed by „Steven Spielberg“ to 5.

**Q4.** Consider the following schema for Order Processing Database:

CUSTOMER (cust\_id: int, cname: String, city: String)  
 ORDER (order\_id: int, odate: date, cust\_id: int, ord-Amt: int)  
 ORDER – ITEM (order\_id: int, item\_id: int, qty: int)  
 ITEM (item\_id: int, item\_name : String ,unit price: int)  
 SHIPMENT (order\_id: int, warehouse\_id: int, ship-date: date)  
 WAREHOUSE (warehouse\_id: int, city: String)

- Create the above tables by properly specifying the primary keys and the foreign keys.
  - Enter at least five tuples for each relation.
1. Produce a listing: CUSTNAME, Number of orders, AVG\_ORDER\_AMT, where the middle column is the total numbers of orders by the customer and the last column is the average order amount for that customer.
  2. create a view to display customer name, items ordered by him with item number,item name, order number, order amount, warehouse city.
  3. Demonstrate the deletion of an item from the ITEM table and demonstrate a method of handling the rows in the ORDER\_ITEM table that contain this particular item.
  4. List the order numbers for orders that were shipped from all the warehouses that the company has in a specific city.
  5. Raise the price of all the items by 15%.
  6. Display details of the orders placed by a specific customer, include item number, item name,order number, order amount and warehouse city.

**Paper Code:** BCSDSC 4.7

**Paper Title:** Java Programming Lab

**Teaching Hours:** 3 Hrs / Week

**Marks:** Th-40+IA-10

**Credits:** 1

### Assignment Programs:

#### Section A:

1. Write a Java program to find factorial of a number reading input as command line argument.
2. Write a Java program that creates an object and initializes its data members using constructor. Use constructor overloading concept.
3. Write a Java program to demonstrate method overloading.
4. Write a Java program to demonstrate static variables, methods and blocks.
5. Program to demonstrate multilevel inheritance. Show the usage of super().
6. Write a program to demonstrate use of user defined package by importing the package and access the member variable of classes contained in the package.
7. Write a java program to demonstrate at least 5 string methods using Scanner class.
8. Write a program to demonstrate use of implementing interfaces.

#### Section B:

1. Write a java program to implement exception handling using multiple catch statements. Also include code to identify the significance of finally block in handling exceptions.
2. Illustrate creation of thread by
  - a) Extending Thread class.
  - b) Implementing Runnable interface
3. Write a Java Program to implement inheritance and demonstrate use of method overriding.
4. Write a Java Program to implement Wrapper classes and their methods.
5. Write a program to create student report using applet, read the input using text boxes and generate the grades.
6. Write an applet program for drawing bar chart.
7. Program to copy bytes from one file to another.

### Practice Programs

1. Write a Java program to perform matrix multiplication.
2. Write a Java program to count the frequency of words, characters in the given line of text.
3. Write a Java program to find GCD and LCM of two numbers (GCD is calculated using Euclidean Algorithm. LCM is found using factorization method.).
4. Illustrate thread join concept.
5. Write a Java program implement basic queue operations.
6. Write a Java Program to implement Vector class and its methods.
7. Write a program to implement the concept of Exception Handling by creating user defined exceptions.



**Paper Code:** BCSDSC 4.8

**Paper Title:** PL/SQL Lab

**Teaching Hours:** 3 Hrs / Week

**Marks:** Th-40+IA-10

**Credits:** 1

**Section A:**

1. Write a PL/SQL code block to find sum and average of three numbers.
2. Write a PL/SQL program to find the greatest among three numbers.
3. Write a PL/SQL code block to find reverse of a number.
4. Write a PL/SQL program using FOR loop to insert even numbers between 1 to 10 (as rows) into temp table. Use appropriate SQL statement to display the output.
5. Write a PL/SQL code block to find area of circles with radius less than equal to 7 and store the result in a table with attributes radius and area. Use appropriate SQL statement to display the output.

**Section B:**

1. Write a PL/SQL program using procedures to find the minimum of two values. The procedure should take two numbers using the IN mode and return their minimum using the OUT parameter.
2. Write a PL/SQL stored procedure titled as 'COMPOUND\_INTR' to calculate the amount of interest on a bank account, which compounds interest yearly. A stored procedure should accept the values of 'p', 'r' and 'y' as parameters and insert the Interest and total amount into temp table.
  - a. [Note: The following formula is used to calculate the interest.
  - b.  $\text{Amount} = p \cdot (1 + r / 100)^y$        $\text{CI} = \text{Amount} - p$  ]
3. Create a table EMPLOYEE with following fields (EmpNo, Name, and Salary). Insert at least 5 tuples. Write a cursor to select the five highest paid employees from the table.
4. Create a table CUSTOMER table with following fields(CustID, Name, Age, Salary) Insert at least 5 tuples. Update the table to increase the salary of each customer by 500. Display the number of rows affected(Hint: use the SQL%ROWCOUNT )
5. Create Explicit Cursor for the above Table (Customer) that fetches the details of Customer whose age is greater than 40. Display the details from the cursor.

<b>Paper Code:</b> BCSSEC 4.9	<b>Paper Title:</b> Computer Networks	<b>Teaching Hours:</b> 2 Hrs / Week
<b>Total Teaching Hours:</b> 30Hrs	<b>Marks:</b> Th-40+IA-10	<b>Credits:</b> 2

### UNIT I

IEEE LAN standards- IEEE 802.3 (Ethernet), IEEE 802.5 (Token Ring), IEEE 802.11(Wireless LAN standard).

10 Hrs

### UNIT II

The network Layer: Network layer design issues, Routing algorithms –Flooding, Distance vector routing, Hierarchical routing, Link state routing, Congestion, control algorithms – Leaky bucket, token bucket algorithm, admission control, Hop by Hop choke packets.

10 Hrs

### UNIT III

The Transport Layer and Application Layer: Elements of Transport service, Elements of Transport, protocols, Internet transport protocols (TCP & UDP), DNS, Electronic Mailing, and WorldWide Web

10 Hrs

### References:

1. Andrew S. Tanenbaum, Computer Networks, 5th Ed, Pearson Education
2. Behrouza A Forouzan, Data Communication & Networking, Tata McGraw Hill
3. William Stallings, Data and Computer Communications, 7th Edition, PHI.
4. W. A. Shay, Understanding communications and Networks, 3e, Cengage Learning.

### Additional Reading:

1. W. Stalling, Wireless Communication and Networks, PearsonEducation.
2. Brijendra Singh, Data Communication and Computer Networks,PHI.
3. Dr. Prasad, Data Communication & Network, WileyDreamtech.
4. <http://highered.mheducation.com/sites/0072967757/index.htmls>

V Semester B.Sc(CS) w.e.f 2022-23 and onwards

CHOICE BASED CREDIT SYSTEM (CBCS)

Part	Subject Code	Subject Name	Teaching Hrs/week	Practical Hrs/week	Duration Hrs	Examination			Credits
						Marks			
						Theory /Practical	IA	Total	
Part I DSC / DSE	BCSDSC 5.1	Advanced java	5	-	3	80	20	100	3
	BCSDSC 5.2	Data Warehousing and Mining	5	-	3	80	20	100	3
	BCSDSC 5.3	Network Security	5	-	3	80	20	100	3
	BCSDSC5.4	Software Testing	5	-	3	80	20	100	3
	BCSDSE 5.5	<b>Elective I</b> c. .Net Using C# d. Android Programming	5	-	3	80	20	100	3
	BCSDSE 5.6	<b>Elective II</b> c. PHP d. Gaming & animation	5	-	3	80	20	100	3
	BCSDSE 5.7	<b>Elective Lab I</b> c. C# Lab d. Android Lab <b>Elective Lab II</b> c. PHP Lab d. Gaming & animation Lab	-	4	3	80	20	100	2
	BCSDSE 5.8	Advanced java Lab	-	4	3	80	20	100	2
	BCSDSE 5.9	Software Testing Lab	-	4	3	80	20	100	2
Part III SEC	BCSSEC 5.10	Personality Development	2	-	2	40	10	50	2
<b>Total</b>			<b>27</b>	<b>12</b>				<b>950</b>	<b>26</b>

Note: Students have to choose any one subject from Elective-I and Elective-II.

**Paper Code:** BCSDSC 5.1

**Paper title:** Advanced Java

**Teaching Hours –** 5 hrs/week

**Total Teaching Hours:** 60 Hrs.

**Marks:** Th-80+IA-20

**Credits:** 4

#### **UNIT I**

Event Handling: Event, Event Source, Event Classes, Event Listener interface, Examples, Handling Windows Events, Adapter Classes, Inner classes. **12 Hrs**

#### **UNIT II**

Swing: Introduction to JFC (Java Foundation Classes), Swing, Swing Features, JComponent, JApplet, JFrame, JPanel, JTextField, JButtons, JCheckBox and JRadioButton, JComboBox, JScrollPane, JList. **12 Hrs**

#### **UNIT III**

JDBC Architecture: Introduction to JDBC, Java and JDBC, JDBC VS ODBC, JDBC DRIVER MODEL, JDBC Driver Types, Types of Driver Managers, JDBC Connection process, Statement object, preparedStatement object, operations on Resultset (Read, insert, update and delete), transaction processing, Metadata, Resultset Metadata, Data types. **12 Hrs**

#### **UNIT IV**

Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, javax.servlet package, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http Package, Handling HTTP. Java Server Pages(JSP): JSP, JSP Tags, Request string, Cookies, User session, Session object. **12 Hrs**

#### **UNIT V**

Networking Basics, InetAddress, TCP/IP Client-Server Socket, URLConnection, HTTPURLConnection, Datagram, Introduction To EJB, Types of EJB. **12 Hrs**

#### **References:**

1. Jim Keogh, J2EE: The complete Reference, McGrawHill
2. Herbert Schildt, The Java 2 : Complete Reference, Fourth edition, TMH
3. <https://docs.oracle.com/javase/tutorial/>

#### **Additional Reading:**

1. H. M. Deitel, P. J. Deitel, Java: how to program, 5th edition, Prentice Hall of India.
2. Y. Daniel Liang, Introduction to Java programming, 9th Edition, Pearson education.
3. Cay S Horstmann, Fary Cornell, Core Java 2, Volume – I&II, Sun Microsystems Press

**Paper Code:** BCSDSC 5.2      **Paper title:** Data Warehousing and Mining      **Teaching Hours** – 5 hrs/week

**Total Teaching Hours:** 60 Hrs.

**Marks:** Th-80+IA-20

**Credits:** 4

#### **UNIT I**

**DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING (OLAP):** Basic Concepts - Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors - Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies - Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP. **12 Hrs**

#### **UNIT II**

**DATA MINING:** Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures. **12 Hrs**

#### **UNIT III**

**DATA MINING - FREQUENT PATTERN ANALYSIS:** Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns. **12 Hrs**

#### **UNIT IV**

**CLASSIFICATION AND CLUSTERING:** Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines — Lazy Learners – Model Evaluation and Selection- Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis-Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods. **12Hrs**

#### **UNIT V**

**WEKA TOOL:** Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database - Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners. **12Hrs**

#### **References:**

1. Jiawei Han and MichelineKamber, –Data Mining Concepts and Techniques||, Third Edition, Elsevier, 2012.
2. Alex Berson and Stephen J.Smith, –Data Warehousing, Data Mining & OLAP||, Tata McGraw – Hill Edition, 35th Reprint 2016

#### **Additional Reading: .**

1. K.P. Soman, ShyamDiwakar and V. Ajay, –Insight into Data Mining Theory and Practice||, Eastern Economy Edition, Prentice Hall of India, 2006.
2. Ian H.Witten and Eibe Frank, –Data Mining: Practical Machine Learning Tools and Techniques||, Elsevier, Second Edition

**Paper Code:** BCSDSC 5.3

**Paper title:** Network Security

**Teaching Hours –** 5 hrs/week

**Total Teaching Hours:** 60 Hrs.

**Marks:** Th-80+IA-20

**Credits:**4

### UNIT I

Introduction - Cyber Attacks, Defence Strategies and Techniques, Guiding Principles, Mathematical Background for Cryptography - Modulo Arithmetic's, The Greatest Comma Divisor, Useful Algebraic Structures, Chinese Remainder Theorem, Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Other Cipher Properties, Secret Key Cryptography – Product Ciphers, DES Construction. **12 Hrs**

### UNIT II

Public Key Cryptography and RSA – RSA Operations, Why Does RSA Work?, Performance, Applications, Practical Issues, Public Key Cryptography Standard (PKCS), Cryptographic Hash - Introduction, Properties, Construction, Applications and Performance, The Birthday Attack, Discrete Logarithm and its Applications - Introduction, Diffie-Hellman Key Exchange, Other Applications. **12 Hrs**

### UNIT III

Key Management - Introduction, Digital Certificates, Public Key Infrastructure, Identity-based Encryption, Authentication-I - One way Authentication, Mutual Authentication, Dictionary Attacks, Authentication – II – Centralised Authentication, The Needham-Schroeder Protocol, Kerberos, Biometrics, IP Sec Security at the Network Layer – Security at Different layers: Pros and Cons, IPSec in Action, Internet Key Exchange (IKE) Protocol, Security Policy and IPSEC, Virtual Private Networks, Security at the Transport Layer - Introduction, SSL Handshake Protocol, SSL Record Layer Protocol, OpenSSL. **12 Hrs**

### UNIT IV

IEEE 802.11 Wireless LAN Security - Background, Authentication, Confidentiality and Integrity, Viruses, Worms, and Other Malware, Firewalls – Basics, Practical Issues, Intrusion Prevention and Detection - Introduction, Prevention Versus Detection, Types of Intrusion Detection Systems, DDoS Attacks Prevention/Detection. **12 Hrs**

### UNIT V

IT act aim and objectives, Scope of the act, Major Concepts, Important provisions, Attribution, acknowledgement, and dispatch of electronic records, Secure electronic records and secure digital signatures, Regulation of certifying authorities: Appointment of Controller and Other officers, Digital Signature certificates, Duties of Subscribers, Penalties and adjudication, **12 Hrs**

### References:

1. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition

### Additional Reading:

1. Cryptography and Network Security- Behrouz A Forouzan, DebdeepMukhopadhyay, Mc-GrawHill, 3rd Edition, 2015
2. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition
3. Cyber Law simplified- VivekSood, Mc-GrawHill, 11th reprint , 2013
4. Cyber security and Cyber Laws, Alfred Basta, Nadine Basta, Mary brown, ravindrakumar, Cengage learning

<b>Paper Code:</b> BCSDSC 5.4	<b>Paper title:</b> Software Testing	<b>Teaching Hours –</b> 5 hrs/week
<b>Total Teaching Hours:</b> 60 Hrs.	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

#### UNIT I:

Principles of Testing, Software Development Life Cycle Models (SDLC), Phases of Software Project, Quality, Quality Assurance and Quality Control, Testing, Verification and Validation, Life Cycle Models, White Box Testing: White Box Testing, Static Testing, Structural Testing **12 Hrs**

#### UNIT II:

Testing Techniques: Black Box Testing, Integration Testing, Top-Down Integration, Bottom-Up Integration, Bi-Directional Integration, System and Acceptance Testing, Functional versus Non-functional Testing, Functional System Testing, Non-Functional System Testing, Acceptance Testing. **12 Hrs**

#### UNIT III:

Performance Testing: Factors, Methodology, Process for performance testing, Regression Testing, Types, Testing of Object-oriented Systems, Usability and Accessibility Testing, approach, Quality factors, Aesthetics Testing, Accessibility Testing **12 Hrs**

#### UNIT IV:

Common People Issues: Perceptions and Misconceptions About Testing, comparison between Testing and Development Functions, Providing Career Paths for Testing Professionals, The role of the Ecosystem and a call for Action. Organization Structures for testing teams:, Structures in Single product Companies, Structures for Multi-Product Companies. (14.1 to 14.3). **12 Hrs**

#### UNIT V:

Test Planning, Management: Test Planning: Preparation, scope management, Test approach, setting up criteria, Identifying responsibilities, test deliveries, testing tasks, activity breakdown, communication and risk management. Software Test Automation: Introduction, Terms used, Skills needed **12Hrs**

#### References:

1. SrinivasanDesikan, Gopaldaswamy Ramesh: Software testing Principles and Practices, 2nd Edition, Pearson, 2012.

#### Additional Reading:

1. Software Testing :AdityaMathur.
2. Software Testing, Ron Patton, Second Edition, SAMS Pearson Publication2011
3. The Craft of Software Testing, Brain Marick, Pearson Publication 2010

<b>Paper Code:</b> BCSDSE 5.5	<b>Paper title:</b> Elective-I: a. NET using C#	<b>Teaching Hours</b> – 5 hrs/week
<b>Total Teaching Hours:</b> 60 Hrs.	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

### Unit I: C# Language fundamentals

Introducing the Building Blocks of the .NET Platform (CLR, CTS, and CLS), Anatomy of C# program, The System. Environment Class, The System. Console Class, Understanding Value Types and Reference Types, The System Data types, Operators, Decision Constructs, Iteration Constructs, , The System. String data types, String Builder, .NET Array Types, Defining Classes and Creating objects, Pillars of OOP, C#'s Inheritance Support, C #'s Polymorphic Support, Understanding C# Partial types, Understanding Boxing and Unboxing Operations.

**12Hrs**

### Unit II: Object Life time and Exception handling

Understanding Object Lifetime classes, Objects and References, the basics of Object Lifetime, System.GC type, Building Finalizable Objects, Building Disposable Objects. Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handling, throwing generic exceptions, catching exceptions, Configuring the state of an exception, System – Level Exception , Application-Level Exception, Processing Multiple Exception, Generic catch statements, Inner exceptions, Finally Block.

**12 Hrs**

### Unit III: Interfaces, Collections, Delegates & Events

Defining Interfaces in C#, Implementing an Interface in C#, Contrasting Interfaces to Abstract Base Classes, Collections: Introducing Collections . Benefits of Collection Classes . Understanding and using commonly used collections, Interfaces of the System. Collections Namespace, .NET Delegate type, defining a Delegate in C#, System. Delegate Base Classes, Delegate examples, C# Events.

**12 Hrs**

### Unit IV: GUI using Windows Forms and Database Programming

Controls- TextBox, label, Button, checkbox, radiobutton, listbox, combobox , Datetime picker, Common properties, methods and events , menus, context menus, Menustrip, Graphics and GDI, SDI and MDI, Dialog boxes; Database Programming - Understanding the Role of Managed Provider and ADO.NET Objects , Connecting to Database, Performing Insert, Update and Delete Operations, Executing Select Statements.

**12Hrs**

### Unit V: Understanding .NET Assemblies and file handling

Assemblies-The Role of .NET Assemblies, Understanding the format of .NET Assemblies, single file assembly, multiframe assembly, Private and Shared Assemblies; File handling:The System IO Namespace, Directory (Info) and File (Info) types, Working with Directory Info, Directory Type, File Info, File Type Classes, Abstract Stream Class, Stream Writers and Stream Readers, String Writers and String Readers, Binary Writers and Binary Readers.

**12 Hrs**

### Reference Books:

1. Andrew Troelsen: Pro C# with .NET 3.0, Special Edition aPress, India,2007.
2. E. Balagurusamy: Programming in C#., 5th Reprint, Tata McGraw Hill,2004.
3. Herbert Schildt: The Complete Reference C#, Tata McGrawHill,2004
4. C# 2008 programming cogent learning solutions Inc. DreamtechPress.
5. C#2008 Programming covers .net 3.5 Black Book – Beginners Edition Kogent learning solutions Inc. DreamtechPress.



<b>Paper Code:</b> BCSDSE 5.4	<b>Paper title: Elective-I: b.</b> Android Programming	<b>Teaching Hours –</b> 5 hrs/week
<b>Total Teaching Hours:</b> 60 Hrs.	<b>Marks:</b> Th-80+1A-20	<b>Credits:</b> 3

### UNIT - I

The First App, How Java and Android work together :The Android API ,Java is object-oriented What exactly is Android?, The development environment ,The JDK 7, Installing the JDK , Setting up Android Studio, What makes an Android app :Android resources, Creating the project, Deploying and testing the app, Deploying to an emulator, Deploying to a real Android device

**12 Hrs**

### UNIT- II

Examining the log output ,Exploring the project assets and code, Examining the layout file, Modifying the UI, Java comments, Sending messages, Writing our first Java code, Writing our own Java methods. Exploring Android Studio: Parts of the UI, The project explorer, Transforming the editor into a design studio,E1 – the Preview toolbar, E2 – exploring the palette, E3 – the layout preview, E4 – the Component Tree, E5 – the Properties window, E6 – text and design view tabs, The project folder and file structure. Structure of a UI design: Configuring and using widgets ,Widget properties, RelativeLayout, Using LinearLayout.

**12 Hrs**

### UNIT- III

Coding in Java – Variables, Decisions, and Loops: Types of variables, Primitive types , Reference types, Variable declaration, Variable initialization, Changing values in variables with operators, More operators, If they come over the bridge, shoot them, Else do this instead, Switching to make decisions, The Switch Demo app, Do while loops , For loops , Loops demo app, The method structure , Modifiers.

**12 Hrs**

### UNIT- IV

Widget Mania: EditText ,ImageView , Radio button and group, A switch widget ,CheckBox ,WebView , Date & Time, Pre-Marshmallow permissions ,Marshmallow permissions. Handling large amount of data with arrays ,Arrays are objects ,A simple array example mini app ,Getting dynamic with arrays , A dynamic array example, ListView and BaseAdapter.

**12 Hrs**

### UNIT-V

Android Intent and Persistence, Switching Activity, Passing data between activities, Persisting data with SharedPreferences , Designing cool animations in XML, Fading in and out,Movement ,Scaling or stretching,Controlling the duration, Rotating animations, Preparing to publish ,Creating an app icon, Preparing the required resources, Building the publishable APK file, Publishing the app

**12 Hrs**

### Reference Books:

1. Android Programming for Beginners: 2015 Packt Publishing
2. Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides) By: Bill Philips & Brian Hardy
3. Android Design Patterns: Interaction design solutions for developers by Greg Nudelman Android User Interface Design: Turning Ideas and Sketches into Beautifully Designed Apps By: Ian G. Clifton
4. Android Recipes: A Problem-Solution Approach By: Dave Smith & Jeff Friesen
5. Hello, Android: Introducing Google's Mobile Development Platform (Pragmatic Programmers) By: Ed Burnette

<b>Paper Code:</b> BCSDSE 5.5	<b>Paper title:</b> Elective-II: a. PHP	<b>Teaching Hours –</b> 5 hrs/week
<b>Total Teaching Hours:</b> 60 Hrs.	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

#### UNIT I

Introducing PHP –Basic development Concepts –Creating first PHP Scripts –Using Variable and Operators –Storing Data in variable –Understanding Data types –Setting and Checking variables–Data types –Using Constants –Manipulating Variables with Operators. **12 Hrs**

#### UNIT II

Controlling Program Flow: Writing Simple Conditional Statements -Writing More Complex Conditional Statements – Repeating Action with Loops –Working with String and Numeric Functions. **12 Hrs**

#### UNIT III

Working with Arrays: Storing Data in Arrays –Processing Arrays with Loops and Iterations –Using Arrays with Forms - Working with Array Functions –Working with Dates and Times. **12 Hrs**

#### UNIT IV

Using Functions and Classes: Creating User-Defined Functions -Creating Classes –Using Advanced OOP Concepts. Working with Files and Directories: Reading Files-Writing Files-Processing Directories. **12 Hrs**

#### UNIT V

Working with Database and SQL : Introducing Database and SQL-Using MySQL-Adding and modifying Data-Handling Errors –Using SQLite Extension and PDO Extension. Introduction XML- Simple XML and DOM Extension. **12 Hrs**

#### REFERENCE BOOKS:

1. PHP A Beginner's Guide, VIKRAM VASWANI,Tata McGraw-Hill, 2008.
2. The PHP Complete Reference, Steven Holzner –Tata McGraw-HillEdition,2010
3. Spring into PHP5, Steven Holzer, Tata McCraw HillEdition,2005

**Paper Code:** BCSDSE 5.5      **Paper title: Elective-II: b. Gaming and Animation**      **Teaching Hours – 5 hrs/week**

**Total Teaching Hours:** 60 Hrs.

**Marks:** Th-80+IA-20

**Credits:** 3

#### UNIT-1

HTML5 – SVG ,Viewing SVG Files ,Embedding SVG in HTML5 ,HTML5 – SVG Circle ,HTML5 – ,SVG Rectangle  
HTML5 – SVG Line ,HTML5 – SVG Ellipse ,HTML5 – SVG Polygon ,HTML5 – SVG Polyline ,HTML5 – SVG  
Gradients ,HTML5 – SVG Star

**12Hrs**

#### UNIT-2

HTML5 – CANVAS- The Rendering Context ,Browser Support ,HTML5 Canvas Examples , Canvas - Drawing Rectangles  
, Canvas - Drawing Paths , Canvas - Drawing Lines , Canvas - Drawing Bezier Curves , Canvas - Drawing Quadratic  
Curves , Canvas - Using Images ,Canvas - Create Gradients ,HTML5 - Styles and Colors , Canvas - Text and Fonts ,  
Canvas - Pattern and Shadow , Canvas - Save and Restore States , Canvas - Translation , Canvas - Rotation , Canvas -  
Scaling , Canvas - Transforms , HTML5 Canvas - Composition , Canvas – Animations.

**12Hrs**

#### UNIT-3

What is an Animation?,The Start and End States , Interpolation ,Animations in HTML, All About CSS  
Animations,Creating a Simple Animation ,24 What Just Happened, Detailed Look at the CSS Animation Property ,  
Reusing Keyframes , Declaring Multiple Animations , Wrap-upAll About CSS Transitions,Adding a Transition ,Looking at  
Transitions in Detail , The Longhand Properties ,Longhand Properties vs. Shorthand Properties , Working with Multiple  
Transitions...and So On, The transitionEnd Event

**12Hrs**

#### UNIT-4

Sliding Background Effect on Link Hover ,Overview of How This Works , How this Effect Really Works,Creating a  
Sweet Content Slider ,Overview of How It Works , The Code,The<BLINK>Tag Shall Live On , Re-creating the Blink  
Effect , Overview of How It Works,Simple Text Fade and Scale Animation , The ExampleMove Element to Click  
Position , The Example ,The Full Code , How This All WorksHover Effects Using Animations , What This Looks Like ,  
Hovering, CSS Animations, and Handoffs

**12Hrs**

#### UNIT-5

Animations Created in Code, Why Animate Using JavaScript , Breaking Down a JavaScript Animation , Looking at a  
Real Example , Going a Little More CrazyMeetrequestAnimationFrame , Meet requestAnimationFrame ,Using It  
,Another Example ,Your Frame Rate ,Stopping your requestAnimationFrameLoopVendor Prefixes in JavaScript , Meet  
the Vendor Prefixes in JavaScript , Dealing with Vendor PrefixesAnimating What You Draw, How This Is All Going to  
Work , Actually Drawing and Animating on a Canvas ,Animating Your Circle. Game IntroGame, CanvasGame,  
ComponentsGame, ControllersGame, ObstaclesGame, ScoreGame, ImagesGame, SoundGame, GravityGame,  
BouncingGame, RotationGame, Movement

**12Hrs**

#### References:

1. Animation in HTML, CSS, and JavaScript ByKirupaChinnathambi
2. <https://www.tutorialspoint.com/html5/index.htm>
3. Gaming Section last unit :[https://www.w3schools.com/graphics/game\\_intro.asp](https://www.w3schools.com/graphics/game_intro.asp)
4. [https://cloudinary.com/blog/creating\\_html5\\_animations](https://cloudinary.com/blog/creating_html5_animations)

**Paper Code:** BCSDSE 5.6

**Paper title: Elective-I:** a. C# Lab

**Teaching Hours –** 4hrs/week

**Marks:** Th-80+IA-20

**Credits:** 2

### Assignment Programs:

#### Journal Programs:

1. Write a C# program to show the machine details like machine name, Operating System, Version, Physical Memory and calculate the time since the Last Boot Up.(Hint: Use System. Environment Class)
2. Write a C# Sharp program to calculate roots of Quadratic Equation
3. Write a program in C# Sharp to count a total number of alphabets, digits and special characters in a string.
4. Demonstrate operator overloading two complex numbers.
5. Write a program to implement multilevel inheritance
6. Write a object oriented program to demonstrate bank transaction. Include methods for amount deposit, amount withdrawal and display.
7. Write a program to demonstrate System exception.
8. Draw a square with sides 100 pixels in length. Then inscribe a circle of radius 50 inside the square. Position the square and the inscribed circle in the middle of the screen.
9. Write a program that inputs the coordinates of three mouse clicks from the user and then draws a triangle in the output window using those three points.

#### Practice Programs :

1. Write a program to demonstrate Application exception.
2. Create an application to simulate the working of Font Dialog box using list boxes, label and button controls
3. Write a Program to insert the data in the database having fields such as Roll No, Name, Age and ContactNo using Execute-Non Query.
4. Write a Program to input Roll No and display the corresponding student details using database
5. Write a program to demonstrate Directory Info and File Info.
6. Write a program to implement Stream Reader and Stream Writer classes.

**Paper Code:** BCSDSE 5.6

**Paper title: Elective-I:** b. Android Lab

**Teaching Hours –** 4hrs/week

**Marks:** Th-80+IA-20

**Credits:** 2

**Assignment Programs:**

**Journal Programs:**

1. Develop an application to demonstrate toast and intent
2. Create an Application with multiple activities and a simple menu using listview.
3. Develop the android mobile application which consists of GUI components for Login Page Creation.
4. Develop an application to illustrate using of Images and colors.
5. Develop an application to illustrate webview.
6. Illustrate using of audio functions in Android
7. Write an application that draws basic graphical primitives on the screen.
8. Develop an application to create a calculator
9. Write an android program to demonstrate Radio Buttons
10. Develop an application to demonstrate splash screen

**Practice Programs:**

1. Write a mobile application that creates alarm clock.
2. Write an Android Program to Demonstrate Alert Dialog Box
3. Develop an application to demonstrate shared preferences.
4. Develop an application to demonstrate Navigation Drawer Activity.
5. Develop an Android Program to Demonstrate Progress Dialog in Android

**Paper Code:** BCSDSE 5.6

**Paper title:** Elective-II: a. PHP Lab

**Teaching Hours –** 4hrs/week

**Marks:** Th-80+IA-20

**Credits:** 2

#### **Assignment Programs:**

#### **Journal Programs:**

1. Develop a PHP program to display prime numbers between the given range and display the total number of prime numbers.
2. Develop a PHP program and check message passing mechanism between pages.
3. Write a PHP program to implement simple calculator operations.
4. Develop a PHP program to demonstrate String functions. (any6).
5. Write a PHP program to illustrate built in Array manipulation functions.(any 6)
6. Write a PHP program that displays a different message based on time of day. For example page should display “Good Morning” if it is accessed in the morning.
7. Write a PHP program that accepts two numbers using a web form and calculates greatest common divisor (GCD) and least common multiple (LCM) of entered numbers.(Use recursive function)
8. Develop a PHP program to demonstrate constructors and destructors.
9. Write a PHP program that writes contents of one file to another.
10. Develop a PHP code to read the values entered into the form and test them against the values in the Mysql database. Perform necessary exception handling.

#### **Practice Programs:**

1. Develop a PHP program to demonstrate inheritance.
2. Write a PHP program to sort the student records which are stored in the database using selection sort.
3. Develop a PHP program to design a college admission form using MYSQL database.
4. Develop a PHP program using session.
5. Develop a PHP program using cookie and session.

**Journal Programs:****Section A:**

1. Write a HTML5 program to draw circle using *SVG*.
  2. Write a HTML5 program to draw rectangle using *SVG*.
  3. Write a HTML5 program to draw line using *SVG*.
  4. Write a HTML5 program to draw ellipse using *SVG*.
  5. Write a HTML5 program to draw polygon using *SVG*.
  6. Write a HTML5 program to draw polyline using *SVG*.
  7. Write a HTML5 program to draw gradient ellipse using *SVG*.
  8. Write a HTML5 program to draw Star using *SVG*.
  9. Write an html canvas program to Add a red square onto the game area.
  10. Write an html canvas program to add random size obstacles with red square and push button.
- Write an html canvas program to add background music with obstacle and push button

**Practice Programs:**

1. Write an html canvas program to draw line and rectangle, circle.
2. Write an html canvas program to add Push the buttons to move the red square.
3. Write an html canvas program to count the score with obstacle moves and push button.
4. Write an html canvas program to addPush the buttons to move the smiley.

**Paper Code:** BCSDSE 5.8

**Paper title:** Advanced Java Lab

**Teaching Hours –** 4hrs/week

**Marks:** Th-80+IA-20

**Credits:** 2

### Assignment Programs:

#### Section A:

1. Write a java program to implement mouse events like mouse pressed, mouse released and mouse moved by means of adapter classes.
2. Write a java program to implement keyboard events.
3. Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the Textfields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialogbox.
4. Write a Java program to illustrate basic calculator using grid layout manager.
5. Design a ice-cream menu form that displays 4 flavors. Display the flavors selected by the user.
6. Write a Java program that loads names and phone numbers from a database file. It takes a name or phone number as input and prints the corresponding other value.
7. Write a java program that connects to a database using JDBC. Demonstrate insertion and modification of table data.

#### Section B:

1. Write a servlet program: Ask the user for a color in a JSP in say "Home.jsp" file.
2. Display "Hello World" in the chosen color using a servlet, say in "helloWorld.java". (Hint: use tomcat server).
3. Write a Java servlet program to implement a dynamic HTML using servlet.
4. (username and password should be accepted using HTML and displayed using servlet).
5. Write a Java program to establish client server communication using TCP/IP socket.
6. Write a Java Program to find the IP address of a given website specified by the user.
7. Write a Java Servlet program to create a cookie and read its contents.
8. Write a Java Servlet program to create a Session and display its attributes

#### Practice Programs:

1. Write a program to create a session bean (both stateful and stateless) using any IDE
2. Write a java program to demonstrate preparedstatement operations
3. Write a servlet program to demonstrate page redirection
4. Demonstrate usage of get() and post() methods using servlets



**Paper Code:** BCSDSE 5.9

**Paper title:** Software Testing Lab

**Teaching Hours –** 4hrs/week

**Marks:** Th-80+IA-20

**Credits:** 2

**Section A:**

1. Write and test a program to login a specific web page. Use Selenium IDE to record Test Scripts for “Successful Login” as well “Login Fail”. Run the Test Suite.
2. Write a program(C/C++/Java) to test the following constructs. Use TestNG
  - a. do...while
  - b. if...else
  - c. for loop
3. Black Box testing: (Functional Testing and performance Testing with database) Design a Web page to update the student record into the database and test the same.
4. Black Box testing: (Functional Testing and performance Testing ) Design a web page to provide the total number of objects present / available on the page and test the same.
5. Black Box testing: (Load Testing ) Design a web page to get the count of visitors who visit your web page.

**Section B:**

1. White Box Testing: Code Coverage- JaCoCo Write a Java program to compute the factorial of a given non-negative number using:
  - a. Iterative Process
  - b. Recursion
2. Produce the Coverage Information using the JaCoCo tool
3. Write and test a program to get the number of list items in a list / combo box.
4. Write and test a program to count number of check boxes on the page checked and unchecked count.
5. Write and test a program to update 10 student records into table into Excel file .
6. Write and test a program to select the number of students who have scored more than 60 in any one subject ( or all subjects ). (Use the same Worksheet)

**Paper Code:** BCSSEC 5.9

**Paper title:** Personality Development

**Teaching Hours** – 2 hrs/week

**Total Teaching Hours:** 30 Hrs.

**Marks:** Th-40+IA-10

**Credits:** 2

**Unit I:**

Meaning and definition of personality : Personality development as a process, Importance of pass, Importance of personality development , Theories of Personality, Psychological theory(Signed Freud),Phenomenological theory (Car Rogers) Cognitive theory (George A Kelly) A trait factor – Analytic approach(Raymond B. Cattel), Psychosocial development theory(Erickson). **10Hrs**

**Unit II:**

Determinants of Personality: Physical, intellectual, Emotional, social, educational familial. **10Hrs**

**Unit III:**

The self-Concept: Individual as a self-sculptor, process of perception cognition and their impact , Learning process, What is attitude, The process of attitude formation. **10Hrs**

**Reference:**

1. Cloninger, susan C,(2000) Theories of personality, prentice Hall London.
2. Hurloack, Elizabeth B(?) Personality Development.
3. Kagan Jerome (1969), Personality Development , Harcourt Brace, New york.
4. Kundu C.L.(1989) Personality Development , Sterling Bangalore.
5. Personality Development and communication skills, Mulgund&Kenchappanavar, Srhishtiprakashana

VI Semester B.SC(CS) w.e.f 2022-23 and onwards CHOICE BASED CREDIT SYSTEM (CBCS)									
Part	Subject Code	Subject Name	Teaching Hrs/week	Practical Hrs/week	Examination				Credits
					Duration Hrs	Marks			
						Theory /Practical	IA	Total	
Part I DSC / DSE	BCSDSC 6.1	Cyber Security	5	-	3	80	20	100	3
	BCSDSC 6.2	Artificial Intelligence	5	-	3	80	20	100	3
	BCSDSC 6.3	Programming with Python	5	-	3	80	20	100	3
	BCSDSC6.4	Business Intelligence	5	-	3	80	20	100	3
	BCSDSE 6.5	<b>Elective-III</b> c. Cloud Computing d. Internet of Things	5	-	3	80	20	100	3
	BCSDSE 6.6	<b>Elective-IV</b> a. Big Data Analytics b. Image Processing	5	-	3	80	20	100	3
	BCSDSE 6.7	Project Work	-	4	3	160	40	200	4
	BCSDSE 6.8	Programming with Python Lab	-	4	3	80	20	100	2
Part III ISE C	BCSSEC 6.9	Communication Skills	2	-	2	40	10	50	2
<b>Total</b>			<b>27</b>	<b>08</b>				<b>950</b>	<b>26</b>

Note: Students have to choose any one subject from Elective-III and Elective-IV

**Paper Code:** BCSDSC 6.1

**Paper title:** Cyber Security

**Teaching Hours –** 5hrs/week

**Total Teaching Hours:** 60 Hrs.

**Marks:** Th-80+IA-20

**Credits:** 3

### UNIT I

Introduction to Cybercrime: Cybercrime definition and origins of the world, Cybercrime and information security, Classifications of cybercrime, Cybercrime and the Indian ITA 2000, A global Perspective on cybercrimes. **12 Hrs**

### UNIT II

Cyber offenses & Cybercrime: How criminal plan the attacks, Social Engg, Cyber stalking, Cybercafé and Cybercrimes, Botnets, Attack vector, Cloud computing, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones. **12 Hrs**

### UNIT III

Tools and Methods Used in Cyberline: Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Steganography, DoS DDoS Attacks, SQL Injection, Buffer Over Flow, Attacks on Wireless Networks, Phishing, Identity Theft (ID Theft) Cybercrimes and Cybersecurity: The Legal Perspectives Why do we need Cyberlaw: The Indian Context, The Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment. **12 Hrs**

### UNIT IV

Understanding Computer Forensics: Digital Forensics Science, The Need for Computer Forensics, Cyberforensics and Digital Evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting of a Computer Forensics Laboratory: Understanding the Requirements, Computer Forensics and Steganography, The Security/Privacy Threats, Forensics Auditing, Anti Forensics. **12 Hrs**

### UNIT V

Cryptography: Mathematical Background for Cryptography - Modulo Arithmetic's, The Greatest Comma Divisor, Useful Algebraic Structures, Chinese Remainder Theorem, Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Other Cipher Properties, Secret Key Cryptography – Product Ciphers, DES Construction. **12 Hrs**

### References:

1. Nina Godbole, SunitBelapure, Cyber Security, Wiley India, New Delhi (UNIT I, II, III, IV)
2. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition (UNIT V)

### Additional Reading:

1. Kenneth J. Knapp, Cyber Security & Global Information Assurance Information Science
2. Publishing. William Stallings, Cryptography and Network Security, Pearson Publication

<b>Paper Code:</b> BCSDSC 6.2	<b>Paper title:</b> Artificial Intelligence	<b>Teaching Hours</b> – 5hrs/week
<b>Total Teaching Hours:</b> 60 Hrs.	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

#### Unit -1

What is Artificial Intelligence: The AI Problems, The Underlying assumption, What is an AI Technique?, The Level of the model. Problems, problem spaces, and search: Defining the problem as a state space search, Production systems, Problem characteristics, Production system characteristics. Heuristic search techniques: Generate-and-test, Hill climbing, Best-first search, Problem reduction, Constraint satisfaction, Mean-ends analysis. **12 Hrs**

#### Unit -2

Knowledge representation issues: Representations and mappings, Approaches to knowledge representation, Issues in knowledge representation, The frame problem. Using predicate logic: Representing simple facts in logic, representing instance and ISA relationships, Computable functions and predicates, Representing knowledge using Rules : Procedural verses Declarative Knowledge, Logic Programming, Forward verses Backward Reasoning, Matching. **12 Hrs**

#### Unit – 3

Symbolic Reasoning Under Uncertainty: Introduction to nonmonotonic reasoning, Logic for nonmonotonic reasoning, Implementation Issues, Augmenting a problem-solver, Implementation: Depth-first search, Implementation: Breadth-first search. Statistical Reasoning: Probability and Bayes Theorem, Certainty factors and rule-based systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy logic. Weak Slot-and-filter structures: Semantic Nets, Frames. **12 Hrs**

#### Unit -4

Strong slot-and –filler structures: Conceptual dependency, scripts, CYC. Game Playing: Overview, The minimax search procedure, Adding Alpha-beta cutoffs, Additional Refinements, Iterative Deepening. **12 Hrs**

#### Unit -5

Natural Language Processing: Semantic Analysis, Discourse and Pragmatic Processing, Statistical Natural Language Processing, Spell checking. Learning: What is learning?, Rote Learning. Learning by taking advice, Learning in Problem-Solving, Learning from Examples, Discovery, Analogy, Formal Learning Theory, Neural Net Learning and Genetic Learning. **12Hrs**

#### References:

1. Elaine Rich, Kevin Knight, Shivashanka B Nair: Artificial Intelligence, Tata McGraw Hill 3rd edition. 2013

#### Additional Reading:

1. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2013.
2. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, ISBN-13: 9780934613101

**Paper Code:** BCSDSC 6.3

**Paper title:** Programming with Python

**Teaching Hours** – 5hrs/week

**Total Teaching Hours:** 60 Hrs.

**Marks:** Th-80+IA-20

**Credits:** 3

## UNIT I

Introduction to Python: Working with python, Variables, expressions, and statements, accepting user input, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Iteration, Function Basics- Built-in Functions, Declaring and calling user defined functions, Parameters and default arguments, Fruitful functions and void functions, Recursion, Scope :Global, Local variables. Modules : Creating and importing modules- importing all or specific classes from module.

**12 Hrs**

## UNIT II

Lambda -- functions as objects, map() function, Strings, indexing, Slicing, Built-in String methods, Lists, Dictionaries and Tuples, Files: Opening the file – modes : read, write, append. Reading from and writing to a file, closing, deleting a file.

**12 Hrs**

## UNIT III

Exception: Exceptions in Python, Handling Exceptions: try block, except block, else block, finally block, Raising an exception, User defined exception, Assertions.Object-Oriented Programming: Classes : defining classes with \_\_init\_\_() and methods, creating objects, class variables and instance variables, Inheritance \_super() function.

**12 Hrs**

## UNIT IV

Regular Expressions: Concept of regular expression, meta characters, using match() function, search(), findall(), sub() and split() functions. GUI Programming in Python (using Tkinter): Introduction to GUI library. Layout management with pack, grid and place, Widgets with their attributes: Frame, Label, Button, Checkbutton, Radiobutton, Entry, Listbox, Text. Events and bindings, Drawing on canvas (line, oval, rectangle, arc.).

**12 Hrs**

## UNIT V

Database connectivity in Python: Installing mysql connector, Accessing connector module, Using connect, cursor, execute & close functions, Reading single & multiple results of query execution, Executing different types of SQL statements, Executing transactions, Handling exceptions in database connectivity.

**12 Hrs**

## References:

1. Charles R. Severance, “Python for Everybody: Exploring Data Using Python 3”, 1st Edition, Create Space Independent Publishing Platform, 2016.
2. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India
3. Paul Gries , Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf,2/E
4. Lukaszewski, MySQL for Python: Database Access Made Easy, PactPublisher
5. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015
6. Magnus Lie Hetland, Beginning Python: From Novice to Professional, Apress

## Additional Reading:

1. James Payne , Beginning Python: Using Python 2.6 and Python 3, WileyIndia,
2. Python Programming,[http://en.wikibooks.org/wiki/Python\\_Programming](http://en.wikibooks.org/wiki/Python_Programming)
3. The Python Tutorial,<http://docs.python.org/release/3.0.1/tutorial/>
4. Learn Python the Hard way,<http://learnpythonthehardway.org/>
5. Swaroop C H. A Byte of Python,<http://www.swaroopch.com/notes/python>
6. <https://www.tutorialspoint.com/python3>

<b>Paper Code:</b> BCSDSE 6.4	<b>Paper title:</b> Business Intelligence	<b>Teaching Hours</b> – 5 hrs/week
<b>Total Teaching Hours:</b> 60 Hrs.	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

Unit I: Business View of Information Technology applications: Business Enterprise Organization , Its functions, and core business process, baldrige business excellence frame work (Optional reading) Key purpose of using IT in business, The connected world : Characteristics of Internet \_Ready IT Applications, Enterprise applications(ERP/CRM) and bespoke IT applications, information users and their requirements, Types of digital data , structured data , unstructured data, Semi-structured data , Difference between semi structured and structured data. **12 Hrs**

Unit II: Introduction to OLTP and OLAP : OLTP(online transaction processing) OLAP(online Analytical Processing) Different OLAP Architectures , OLTP and OLAP, Data models for OLTP and OLAP, Role of OLAP tools in the BI Architecture , should OLAP be performed directly on operational data bases. Business intelligence: Using analytical information of decision support, Information sources before dawn of BI , BI defined , evolution of BI and role of DSS , EIS, MIS and digital dash boards, Need for BI at virtually all levels , BI for past , present and future, The BI value Chain , Introduction to Business analytics. **12 Hrs**

Unit III:BI definitions and concepts : BI component Framework , BI Users, Business Intelligence Applications, BI roles and responsibilities, Basics of data integration , Need for data Warehouse ,Definition of data Warehouse, ODS, Ralph Kimball's Approach vs Inmon's Approach , Goals of data warehouse, Constituents of data Warehouse , Data integration, Data integration technologies , Data Quality , Data Profiling, A case Study from the Healthcare Domain. **12 Hrs**

Unit IV:Types of Data Model: Data Modelling techniques, Fact table, Dimension table, Typical dimensional Models, Dimensional Modelling Life cycle, Understanding Measures and performance measurement System terminology , navigating a Business Enterprise. **12 Hrs**

Unit V:Basics of Enterprise Reporting: Reporting perspectives common to all levels of Enterprise, Report Standardization and Presentation practices, Enterprise Reporting characteristics in OLAP World , Balanced score card , Dash boards. **12 Hrs**

**Text Books:** 1. R.N.Prasad, Seema Acharya , Fundamentals of Business analytics, First Edition , 2011, Wiley-India

**Reference Books:** 1. GaliShmueli,. Nitin R Patel , peter C . Bruce, “ Data mining for Business Intelligence” Wiley-India, 2011. 2. Ralph Kimball ,Margy Ross, “Practical tools for Data Warehosuing and Business Intelligence” , second Edition Wiley-India 2011.

**Paper Code:** BCSDSE 6.5      **Paper title:** Elective-III: a. Cloud Computing      **Teaching Hours** – 5 hrs/week

**Total Teaching Hours:** 60 Hrs.

**Marks:** Th-80+IA-20

**Credits:** 3

#### **UNIT I**

Cloud Computing Basics: Cloud Computing Overview, applications, Intranets and the Cloud, Why Cloud Computing Matters, benefits, limitations, Companies in the Cloud today, Cloud services. **12 Hrs**

#### **UNIT II**

Cloud Computing Technology: Hardware and Infrastructure, clients, security, network, services, accessing the Cloud , Platform, Web Applications, Web APIs, web browsers, Cloud Storage – Overview, Cloud Storage Providers, standards, Application, Client, Infrastructure, Service. **12 Hrs**

#### **UNIT III**

Cloud Computing At Work: Software as a service – Overview, driving forces, Company offerings, Industries, Software plus Services – Overview, Mobile Device Integration –Providers, Microsoft Azure, Google Cloud Platform, AWS (Workflow Demonstration). **12Hrs**

#### **UNIT IV**

Developing Applications: Google, Microsoft, Intuit Quick Base, Cast Iron Cloud, Bungee Connect, Local clouds and Thin Clients, Virtualization, Server Solutions, Thin Clients. **12Hrs**

#### **UNIT V**

Migrating to the Cloud: Cloud Services for Individuals, Cloud services aimed at the mid, market – Enterprise, Class Cloud Offerings, Migration. **12 Hrs**

#### **References:**

1. Velte T. Antony, Velte J. Toby. and Elsen Peter Robert, Cloud Computing: A Practical Approach, Tata McGraw-Hill
2. Miller Michael, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, QuePublishing.
3. Beard Haley, Cloud Computing Best Practices for Managing and Measuring Processes for On- demand Computing, Applications and Data Centers in the Cloud with SLAs, EmereoPvt. Limited.
4. Mark I. Williams, A Quick Start Guide to Cloud Computing: Moving Your Business into the Cloud, Kogan Page, Great Britan

#### **Additional Reading:**

1. Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications, Cambridge University Press
2. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach McGraw-Hill Osborne Media;
3. Chris Hay, Brian Prince, “Azure in Action” Manning Publications



<b>Paper Code:</b> BCSDSE 6.5	<b>Paper title: Elective-III:</b> b. Internet of Things	<b>Teaching Hours –</b> 5 hrs/week
<b>Total Teaching Hours:</b> 60 Hrs.	<b>Marks:</b> Th-80+IA-20	<b>Credits:</b> 3

#### UNIT I:

Introduction of Internet of Things: Introduction: Definition and characteristics of IOT, Physical design of IOT: Things in IOT, IOT Protocols, Logical Design of IOT: IOT Functional Blocks, IOT Communication Models, IOT Communication APIs, IOT Enabling Technologies: Wireless Sensors Networks, Cloud Computing, Big Data Analytics, Communication Protocols and embedded System, IOT Level and Deployment Templates: IOT level-1, level-2, level-3, level-4, level-5 and level-6. **12 Hrs**

#### UNIT II:

Domain Specific IOTs and M2M: Introduction: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry and Health & Lifestyle, Introduction to M2M, M2M, difference between IOT and M2M, SDN and NFV for IOT: Software Defined Networking , Network Function Virtualization **12 Hrs**

#### UNIT III:

Developing Internet of Things :IOT Design Methodology : Step 1 to Step 10, IOT System Logical Design using Python: Data types & data structures, control flow, functions , modules, packages, date /time operations and classes**12 Hrs**

#### UNIT IV:

IOT Physical Device and Endpoints: What is IOT Device, Basic building blocks of an IOT, Exemplary Device: Raspberry Pi, About Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python. **12 Hrs**

#### UNIT V:

Case study Illustrating IOT Design: Smart Lighting, Home intrusion Detection, Smart parking, Weather Monitoring System, Weather Reporting Bot, Air Pollution Monitoring, forest fire Detection, Smart Irrigation and IOT Printer. **12Hrs**

#### References:

1. ArshdeepBahga, Vijay Madiseti, –Internet of Things – A hands-on approach, Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi , –The Internet of Things – Key applications and Protocols, Wiley, 2012 (for Unit2).
3. Jan Ho" ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), –Architecting the Internet of Things, Springer,2011.
5. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O'Reilly Media,2011.

**Paper Code:** BCSDSE 6.6

**Paper title:** Elective-IV: a. Big Data Analytics

**Teaching Hours** – 5 hrs/week

**Total Teaching Hours:** 60 Hrs.

**Marks:** Th-80+IA-20

**Credits:** 3

### Unit I

INTRODUCTION TO BIG DATA- Big Data and its Importance – Four V's of Big Data – Drivers for Big Data – Introduction to Big Data Analytics – Big Data Analytics applications, Architecture Components, Massively Parallel Processing (MPP) Platforms, Unstructured Data Analytics and Reporting, Big Data and Single View of Customer/Product, Data Privacy Protection, Real-Time Adaptive Analytics and Decision Engines. **12 Hrs**

### Unit II

INTRODUCTION TO R & HADOOP-Getting Ready to Use R and Hadoop , Installing R ,Installing R Studio, Understanding the features of R language, Installing Hadoop, Understanding Hadoop features ,Learning the HDFS and MapReduce architecture ,Writing HadoopMapReduce Programs, Introducing HadoopMapReduce, Understanding the HadoopMapReduce fundamentals, Writing a HadoopMapReduce example ,Learning the different ways to write HadoopMapReduce in R. **12 Hrs**

### Unit III

INTEGRATION OF R & HADOOP-Integrating R and Hadoop ,Introducing RHIPE ,Understanding the architecture of RHIPE Understanding RHIPE samples, Understanding the RHIPE function reference, Introducing R Hadoop ,Understanding the architecture of RHadoop, Understanding RHadoop examples, Understanding the RHadoop function reference. HADOOP STREAMING WITH R Using Hadoop Streaming with R - Introduction, Understanding the basics of Hadoop Streaming, Understanding how to run Hadoop streaming with R, Understanding a MapReduce application, Exploring the Hadoop Streaming R package. **12 Hrs**

### Unit IV

DATA ANALYTICS WITH R AND HADOOP -Understanding the data analytics project life cycle – Introduction, Identifying the problem, Designing data requirement ,Preprocessing data ,Performing analytics over data ,Visualizing data, Understanding data analytics problems ,Exploring web pages categorization Case Studies: Computing the frequency of stock market change , Predicting the sale price of blue book for bulldozers. **12 Hrs**

### Unit V

UNDERSTANDING BIG DATA ANALYSIS WITH MACHINE LEARNING Introduction to machine learning, Types of machine-learning algorithms ,Supervised machine- learning algorithms, Unsupervised machine learning algorithm, Recommendation algorithms, Steps to generate recommendations in R ,Generating recommendations with R and Hadoop. **12 Hrs**

### References:

1. ArvindSathi, “Big Data Analytics: Disruptive Technologies for Changing the Game”, 1st Edition, IBM Corporation, 2012 (Chapter 1,2,3 Unit 1)
2. Big Data Analytics with R and Hadoop, VigneshPrajapati, -Packt Publishing 2013 (Chapters 1,2,3,4,5,6 Unit 2,3,4,5,6)

### Additional Reading:

1. Michael Minelli, Michehe Chambers, “Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business”, 1st Edition, AmbigaDhiraj, Wiely CIO Series, 2013. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, 1st Edition, Wiley and SAS Business Series, 2012.
2. Tom White, “Hadoop: The Definitive Guide”, 3rd Edition, O'reilly, 2012.

**Paper Code:** BCSDSE 6.6

**Paper title: Elective-IV:** b. Image Processing

**Teaching Hours** – 5 hrs/week

**Total Teaching Hours:** 60 Hrs.

**Marks:** Th-80+IA-20

**Credits:** 3

**UNIT –I:**

Digital Image Processing -Motivation, Why is Computer vision difficult?, Image representation and image Analysis, Image representation concepts, image digitization, Digital Image properties, Color images **12 Hrs**

**UNIT-II:**

Image Enhancement: Contrast Intensification, Smoothing, Image Averaging, Mean Filter, Ordered Statistic Filter, Edge Preserving Smoothing Low Pass Filtering. Image Sharpening, High Pass Filtering **12 Hrs**

**UNIT-III:**

Segmentation: Thresholding, Edge based segmentation, Region based segmentation, Active contour models **12 Hrs**

**UNIT-IV:**

Image compression: Image data Properties, Discrete image transforms in image data compression, Predictive compression methods, Vector quantization, Hierarchical and progressive compression methods, Coding, JPEG and MPEG image compression **12 Hrs**

**UNIT-V:**

Object Recognition: Knowledge Representation, Statistical pattern recognition, neural Nets, Syntactic pattern recognition **12 Hrs**

**References:**

1. Milan Sonka, "Image Processing Analysis and Machine Vision", PWS Pub.2nd Ed. ISBN-81-315-0300-3
2. B. Chand and D. DuttaMajumder ,Digital Image Processing and analysis, PHI(2001),ISBN-81-203-1618-5
3. Adrian Low, Computer vision and Image Processing, McGraw Hill (1991)
4. Kenneth R. Castle man, Digital Image Processing ,PHI

<b>Paper Code:</b> BCSDSE 6.7	<b>Paper title:</b> Project Work	<b>Teaching Hours –</b> 4hrs/week
	<b>Marks:</b> Th-160+IA-40	<b>Credits:</b> 4

The objective of the B.Sc(CS) project work is to develop a quality software solution by following the software engineering principles and practices. During the development of the project the students should involve in all the stages of the software development life cycle (SDLC).

This Lab. will enable students to demonstrate their practical and theoretical skills gained during five semesters of study in B.Sc(CS) Programme.

- The students are required to carry out the project in a group of two or three students under the guidance of course teacher.
- Project work problem statement shall be identified by the students with the help of the course teachers and students shall submit the synopsis/project proposal of the same during the second week of the commencement of VI semester B.Sc(CS)course.
- During project development students are expected to define a project problem, do requirements analysis, systems design, software development, apply testing strategies and do documentation with an overall emphasis on the development of a robust, efficient and reliable software systems.
- No change in the title of the project work shall be allowed after 3rdweek of the commencement of VI semester B.Sc(CS) course.
- The project development process has to be consistent and should follow standards identified by the guide monitoring the project work.
- There is no restriction on use of hardware's and software's for carrying out the project work except that ready application packages are not allowed.
- The students have to submit the project dissertation of the project work carried out in one hard copy along with soft copy written on compact disc.

#### Project Dissertation Details:

- The standard procedure for documenting the project work shall be followed. However, while writing is in progress, students should show each chapter to their supervisors for necessary feedback especially on technical content. Note that the quality of the dissertation is more important than its number of pages.
- The dissertation text (defined as everything except title page, table of contents, references and appendices) should be around 50 A4 pages. The length (dissertation text together with appendices) of the dissertation should be less than 100pages).
- The students are advised to follow the following typing recommendations

#### Contents of the dissertation

- **Preface:** Title page, certificate, student declaration page, abstract, acknowledgement page, contents, list of figures, list of tables, and list of acronyms.
- **Main chapters**
  - **Introduction:** The motivation for the project should be argued here. Then a brief introduction to the project should be provided indicating its objectives and scope. Finally, a paragraph containing an outline of the remaining chapters (starting with Chapter 2) is recommended.
  - **Analysis:** information on the existing system should be provided-The students can incorporate different types of diagrams to describe the processes and functionalities of the existing system. The candidate should review software of the proposed system. An analysis of the requirements should also be provided in this chapter. For example, the requirements of the system could be listed. A specification of the number of users, the frequency of use, and the jobs of the users could be provided. Functional requirements covering system functionality expected by the users should be addressed. Include a section to the end of the analysis chapter to describe the selected methodology.
  - **Design:** In this chapter the student should consider different competing design strategies (alternative solutions) for his system. The different strategies may involve the way of development (developing from scratch, using open-source components, etc.), the development platform (stand-alone personal computer, client-server environment, etc.), choice of system software (Windows, Linux, etc.). The candidate should compare how the project requirements are satisfied through each alternative. The design of the proposed system should be another major section of this chapter. the candidate should

describe the design of the system referring to different types of diagrams/models; for example, if non-object oriented methodology has been selected then include use case diagrams, use case narratives, activity diagrams, and entity relationship diagrams, and if object oriented methodology has been selected then include use case diagrams and use case narratives, class diagrams, sequence diagrams. User interface design is the next major section of this chapter. The candidates should describe the design considerations for designing user interfaces of the system and justify the design decisions that were made. Layouts of relevant interfaces should be included in order to clarify the design decisions taken.

- **Implementation:** This chapter should describe the implementation of the system. For example, it should identify and explain all major code and module structures. Include a diagram to depict and describe the interaction between modules of the system. Also, the implementation environment (hardware and software), any existing code that was reused by the candidate, development tools used, and any platform dependence must be discussed. Appropriate technical documentation may be included as appendices to the dissertation if they are expected to be useful for the reader. Note that a list of selected code will appear in appendix and the code used in this chapter should be presented for the purpose of explaining the implementation aspects of selected important code. This code should be presented as a code segment.
- **Evaluation:** A comprehensive test plan that was used to verify and validate the system should be provided. Evidence should be provided of using a wide range of test data. Evidence should be produced to show that all aspects of the system have been tested and specification has been met. Description of the effects of various kinds of errors and the required system behaviour upon occurrence of an error should be included. The candidate should report the test results in text in a table in this chapter and include detailed actual test results (in screen shots) in an appendix of the dissertation.
- **Conclusion:** This chapter will conclude the dissertation with a critical evaluation of the system and suggestions for any future work. The evaluation should include a critical discussion and assessment of results of project. This chapter should also identify any deficiencies in the final product and highlight how improvements could be made
- **References:** The details of the references are provided in References section of the dissertation. You should include any web links too.
- **Appendices:** - System Documentation-Provide program installation, compilation and execution details.; Design Documentation- Any design documentation that is not critical to be included in the main text (Chapter 3) but could still be of interest to a reader can be added to the appendices. These could be for example design diagrams (e.g., data flow, entity relationship, database schema and UML) that have not been included in the main text; User
- **Documentation-**User documentation may cover all aspects of the system, with appropriate screen shots and explanations; Management Reports- In addition to producing day to day transaction reports (e.g. a payroll system should produce an individual pay sheet, coin analysis to make cash payments, EPF report etc.) a system must produce summarised reports for the management (e.g. monthly, quarterly payments made by organisation, employees, overtime Hrs by employee, etc.). These reports will be included here; - Code Listing; Glossary and Index

**Note:** Project guidelines shall be notified by the Department at the end of V semester B.Sc(CS) course. The documentation guideline to document the project work in the form of dissertation shall be notified to the students well in advance during VI semester B.Sc(CS) course.

## Assignment Programs:

### Section A:

1. Write a Python function to calculate the factorial of a number (a non-negative integer). The function accepts the number as an argument.
2. Write a Python function that takes a list and returns a new list with unique elements of the first list.
3. Write a Python program of recursion list sum.
4. Write a Python program to get the sum of digits of a non-negative integer.
5. Write a Python program to demonstrate any 5 string operations.
6. Write a Python program that uses List Comprehension to perform any 3 of the following tasks.
  - a. Create an output list which contains only the even numbers from the input list.
  - b. Create an output list which contains squares of all the numbers from 1 to 9.
  - c. Create an output list which extracts all the numbers from an input string.
7. Create an output tuple that converts the words to uppercase from the input tuple of words.
8. Write a Python program to demonstrate any 5 operations performed on dictionary.
9. Write a Python program to create a module Calculation.py that contains functions to perform basic arithmetic operations. Demonstrate importing the module.

### Section B:

1. Write a Python program to demonstrate modification of an existing table data from MySQL database.
2. Write a Python class named Circle constructed by a radius and two methods which will compute the area and the perimeter of a circle.
3. Write a Python class named Rectangle constructed by a length and width and a method which will compute the area and perimeter of rectangle. Inherit a class Box that contains additional method volume. Override the perimeter method to compute perimeter of a Box.
4. Write a program to show use of Regular expressions with match(), search(), findall(), sub() and split().
5. Write a python program to demonstrate Exception handling using „try“, „except“, „finally“ and „else“ block.
6. Write a Python GUI program to draw various shapes on Canvas.
7. Write a Python program to read a file line by line store it into an array.
8. Write a Python GUI program to design Student Registration Form using any 5 widgets.

## Practice Programs:

1. Write a Python program to solve the Fibonacci sequence using recursion.
2. Write a Python function to check whether a number is perfect or not.
3. Write a Python program to converting an Integer to a String in any base.
4. Write a Python program to count the number of lines in a text file.
5. Write a Python program to copy the contents of a file to another file.

<b>Paper Code:</b> BCSSEC 6.9	<b>Paper title:</b> Communication Skills	<b>Teaching Hours –</b> 2hrs/week
<b>Total Teaching Hours:</b> 30 Hrs.	<b>Marks:</b> Th-40+IA-10	<b>Credits:</b> 2

**Unit I:**

Communication and its importance: Process of Communication, written and oral communication, process of listening body language or non verbal communication, the art of public speaking. **10Hrs**

**Unit II:**

Leadership as a process: Working in a team, management of conflict, interpersonal and intrapersonal intergroup, Profiles of great personalities **10Hrs**

**Unit III:**

Career planning and role of career planning and role of career planning in personality development, How to face personal interview and group discussion. **10Hrs**

**References:**

1. EriksenKarin(1979) Communication skills for human services ,Prentice –Hall.
2. Johnson Roy Ivan (1956) Communication : Handling Idea Effectively , McGraw Hill, New York.
3. Personality Development and communication skills, Mulgund&Kenchappanavar, Srhishtiprakashana

**Theory and Practical Evaluation scheme:**

**Internal Marks:**

Internal Test	10 Marks	20 Marks
Duration	45 min	1 Hour
Frequency	2 per Semester	2 per Semester
Average of two tests	6Marks	14 Marks
Attendance	02 marks	03 Marks
Assignments / Seminars	02 Marks	03 Marks

**External Examination-Theory:**

External Theory Examination	Max Marks -40
Duration	2 Hours
<b>Question Paper Pattern</b>	
Section A Q1. Answer any 5 questions (out of 7 sub questions)	5 questions x 2 marks = 10 marks (Min one question from each unit)
Section B Q2. Answer any 5 questions (out of 7 sub questions)	5 questions x 4 marks = 20 marks (Min one questions from each unit)
Section C Q3. Answer any 1 question (out of 3 sub questions)	1 questions x 10 marks = 10 marks (Min two questions from each unit)

External Theory Examination	Max Marks -80
Duration	3 Hours
<b>Question Paper Pattern</b>	
Section A Q1. Answer any 10 questions (out of 12 sub questions)	10 questions x 2 marks = 20 marks (Min two questions from each unit)
Section B Q2. Answer any 4 questions (out of 6 sub questions)	4 questions x 5 marks = 20 marks (Min two questions from each unit)
Section C Q3. Answer any 4 question (out of 5 sub questions)	4 questions x 10 marks = 40 marks (Min one question from each unit)

**External Examination –Practical:**

External Practical Examination	Max Marks -40	Max marks - 80
Duration	2 Hours	3 Hours
Writing Two Programs	20 Marks	30 Marks
Execution	One Program of Examiner"s choice 10 Marks	Both Programs 30Marks
Journal	05	10
Viva – Voce	05	10

Project Examination	Internal -20 Marks
Duration	30 mins / student
Frequency	Twice in a semester
I Internal Test -10 M	Presentation of Project work : <ul style="list-style-type: none"> <li>• Synopsis</li> <li>• SRS / SAD</li> <li>• Database Design</li> </ul>
II Internal Test- 10M	Presentation of Project work : <ul style="list-style-type: none"> <li>• Coding</li> <li>• Forms and reports</li> </ul>



	<ul style="list-style-type: none"> <li>• Demo of the application developed</li> </ul>
<b>Project Examination</b>	<b>External-80 Marks</b>
Duration	03 Hrs
Evaluation shall be based on the following:	
Dissertation / Project Report	20 Marks
Presentation / Demo of the application developed(Navigation of application , features incorporated, data validation, UI, reports etc)	50Marks
Viva – Voce	10 Marks
<b>The external examiner shall evaluate maximum of 4 projects per batch during the final examination</b>	

**Note: V semester elective lab(5.6) is to be offered based on the respective theory subjects(5.1 & 5.2) .The evaluation pattern for the same**

<b>Internal Practical Examination for Elective lab(5.6) in V semester</b>	<b>Max Marks-20</b> (10M each from C# Lab or Android lab and PHP Lab or Gaming & animation lab)
<b>External Practical Examination for Elective lab(5.6) in V semester</b>	<b>Max marks – 80</b>
Duration	3 Hours
Writing Two Programs-One each from C# Lab or Android lab and PHP Lab or Gaming & animation lab	30 Marks
Execution	Both Programs
	30Marks
Journal	10
Viva – Voce	10