



Rani Channamma University Belagavi

Vidyasangama, NH-04, Bhutaramanahatti, Belagavi – 591 156

Bachelor of Science (B.Sc.) in Computer Science

Syllabus for III and IV Semester

(as per National Education Policy – 2020)

2022-23 onwards



RANI CHANNAMMA UNIVERSITY

Vidyasangama, NH-04, Bhutaramanahatti, Belagavi – 591 156

SYLLABUS

Bachelor of Science (B.Sc.) in Computer Science

(as per National Education Policy – 2020)

Submitted by

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Curriculum Structure for B.Sc. (Computer Science) III SEM Program of RCUB as per NEP 2020 w.e.f. 2022-23

SEMESTER-III										
Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
			IA	SEE	Total	L	T	P		
L5	21BSC3L5LK3	Kannada	40	60	100	4	-	-	3	2
	21BSC3L5LFK3	Functional Kannada								
L6	21BSC3L6EN3	English	40	60	100	4	-	-	3	2
	21BSC3L6HI3	Hindi								
	21BSC3L6SN3	Sanskrit								
	21BSC3L6TE3	Telugu								
	21BSC3L6UR3	Urdu								
DSC3	21BSC3C3CS1L	Object Oriented Programming in JAVA	40	60	100	4	-	-	4	2
	21BSC3C3CS1P	JAVA Lab	25	25	50	-	-	4	2	3
DSC3	Another Department Code	Another Department Course Title with lab	40	60	100	4	-	-	4	2
			25	25	50	-	-	4	2	3
AECC2	21BSC4AE1CI2	Constitution of India	20	30	50	1	-	2	2	1hr30min
VBC5	21BSC3V5PE3	Physical Education- Sports	25	-	25	-	-	2	1	-
VBC6	21BSC3V6NC2	NCC/NSS/R&R(S&G) / Cultural	25	-	25	-	-	2	1	-
OEC3	21BSC3O3CS5	Python Programming Concepts	40	60	100	3	-	-	3	2
						Total Marks	700	Semester Credits		25

Curriculum Structure for B.Sc. (Computer Science) IV SEM Program of RCUB as per NEP 2020 w.e.f. 2022-23

SEMESTER-IV										
Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
			IA	SE E	Total	L	T	P		
L7	21BSC4L7LK4	Kannada	40	60	100	4	-	-	3	2
	21BSC4L7LFK4	Functional Kannada								
L8	21BSC4L8EN4	English	40	60	100	4	-	-	3	2
	21BSC4L8HI4	Hindi								
	21BSC4L8SN4	Sanskrit								
	21BSC4L8TE4	Telugu								
	21BSC4L8UR4	Urdu								
DSC4	21BSC4C2CS2L	Database Management Systems	40	60	100	4	-	-	4	2
	21BSC4C2CS2P	DBMS Lab	25	25	50	-	-	4	2	3
DSC4	Another Department Code	Another Department Course Title	40	60	100	4	-	-	4	2
			25	25	50	-	-	4	2	3
SEC2	21BSC3SE2ES2	Artificial Intelligence	20	30	50	3	-	-	2	1hr30min
VBC7	21BSC4V5PE4	Physical Education- Sports	25	-	25	-	-	2	1	-
VBC8	21BSC4V6NC3	NCC/NSS/R&R(S&G) / Cultural	25	-	25	-	-	2	1	-
OEC4	21BSC4O3CS7	Financial Education and Investment Awareness	20	30	50	3	-	-	2	1hr30min
Total Marks						650	Semester Credits		24	
Exit option with Diploma in Science (with the completion of courses equal to a minimum of 96 credits) OR continue studies with Major and Minor						2750			99	

Syllabus for BSc III and IV Semesters

Subject: Computer Science

Sem	Discipline Specific Core Courses(DSC)	Hour / Week	
		Theory	Lab
III	DSC-3: Object Oriented Programming Concepts and Programming in JAVA	4	-
	DSC-3 Lab: JAVA Lab	-	4
	OEC: Python Programming Concepts	3	-
IV	DSC-4: Database Management Systems	4	-
	DSC-4 Lab: DBMS Lab	-	4

Syllabus for BSc III Semester

Course Title: Object Oriented Programming Concepts and Programming in Java	Course code: 21BSC3C3CS1L
Total Contact Hours: 52	Course Credits: 04
Formative Assessment or IA Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the object-oriented concepts and JAVA.
- Write JAVA programs using OOP concepts like Abstraction, Encapsulation, Inheritance and Polymorphism.
- Implement Classes and multithreading using JAVA.
- Demonstrate the basic principles of creating Java applications with GUI.

DSC3: Object Oriented Programming Concepts and Programming in Java

Unit	Description	Hours
1	Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.	09
2	Objects and Classes: Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.	10
3	Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.	09
4	Event and GUI programming: Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism.	12
5	I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files. Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try catch-finally, Collections in java, Introduction to JavaBeans and Network Programming	12

References:

1. Programming with Java, By E Balagurusamy – A Primer, 4th Edition, McGraw Hill Publication.
2. Core Java Volume I – Fundamentals, By Cay S. Horstmann, Prentice Hall.
3. Object Oriented Programming with Java: Somashekara M.T., Guru, D.S., Manjunatha K.S, 1st Edition, PHI Learning 2017.
4. Java 2 - The Complete Reference, Herbert Schildt, 5th Edition, McGraw Hill Publication, 2017.
5. Java - The Complete Reference, Herbert Schildt, 7th Edition, McGraw Hill Publication, 2017.

Year	II	Course Code: 21BSC3C3CS1P	Credits	02
Sem.	III	Course Title: JAVA LAB	Hours	40
Course Pre-requisites, if any:	Knowledge of Programming			
Formative Assessment Marks: 25	Summative Assessment Marks: 25		Duration of ESA: 03 hrs.	

Practice Labs

1. Program to print the following triangle of numbers

```

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

```

2. Program to simple java application, to print the message, "Welcome to java"
3. Program to display the month of a year. Months of the year should be held in an array.
4. Program to find the area of rectangle.
5. program to demonstrate a division by zero exception
6. Program to create a user defined exception say Pay Out ofBounds.

Part A: Programming Lab – Java Fundamentals – OOPS in JAVA

1. Program to assign two integer values to X and Y. Using the "if" statement the output of the program should display a message whether X is greater than Y.
2. Program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint: Fact of 4 = 4*3*2*1)
3. Program to find the area and circumference of the circle by accepting the radius from the user.
4. Program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading.
Program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from AddSub class to use the member data of the super class. MulDiv should have methods to multiply and divide. A main function should access the methods and perform the mathematical operations.
6. Program with class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occur in the object's member variable values.
7. Program to create a student class with following attributes; Enrollment No: Name, Mark of sub1, Mark of sub2, mark of sub3, Total Marks. Total of the three marks must be calculated only when the student passes in all three subjects. The passing mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declared as zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main

method create an array of three studentobjects and display the details.

8. Write a program to demonstrate multiple inheritance and use of Implementing Interfaces
9. Illustrate creation of thread by
 - a) Extending Thread class.
 - b) Implementing RunnableInterfaces
10. Write a program to demonstrate multiple inheritance and use of implementing Interfaces.

PART B: Exception Handling & GUI Programming

1. Program to catch Negative Array Size Exception. This exception is caused when the array size is initialized to negative values.
2. Program to demonstrate exception handling with try, catch and finally.
3. Program which creates and displays a message on the window
4. Program to draw several shapes in the created window
5. Program to create a 4×4 grid and fills it in with 15 buttons, each labeled with its index.
6. Program which creates a frame with two buttons father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother button similar details of mother also appear.
7. Create a frame which displays your personal details with respect to a button click
8. Program to create a window with Text Fields and Buttons. The "ADD" button adds the two integers and display the result. The "CLEAR" button shall clear all the text fields.
9. Program to create a window, when we press M or m, the window displays "Good morning", A or a, the window displays Good Afternoon", E or e, the window displays "Good Evening", N or n, the window displays "Hello".
10. Demonstrate the various mouse handling events using suitable example.

Evaluation Scheme for Java Lab Examination

Assessment Criteria	Marks
Program – 1 from Part A	Writing the Program
	Execution and Formatting
Program -2 from Part B	Writing the Program
	Execution and Formatting
Viva Voice	05

Open Elective for III Semester

Course Code: 21BSC3O3CS5	Course Credits: 3 (3L+0T+0P)
Course Title: Python Programming Concepts	
Semester: III	Duration of SEE: 02 Hour
Total Contact Hours: 42	Summative Assessment Marks : 60 Marks Formative Assessment Marks: 40 Marks

Course Outcomes (COs):

- Explain the fundamentals of Computers.
- Explain the basic concepts of Python Programming.
- Demonstrate proficiency in the handling of loops and the creation of functions.
- Identify the methods to create and store strings.

Unit I Fundamentals of Computers

10 Hrs

Introduction to Computers - Computer Definition, Characteristics of Computers, Evolution and History of Computers, Types of Computers, Basic Organization of a Digital Computer; Number Systems – different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Boolean Algebra – Boolean Operators with Truth Tables; Types of Software – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Planning a Computer Program - Algorithm, Flowchart and Pseudo code with Examples.

Unit II Python Basics

10 Hrs

Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program. Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples; Illustrative programs.

Unit III

08 Hrs

Python Control Flow: Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range () and exit () functions; Illustrative programs.

Unit IV

08 Hrs

Python Functions: Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Illustrative programs.

Unit V**06 Hrs**

Strings: Creating and Storing Strings; Accessing String Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifiers; Escape Sequences; Raw and Unicode Strings; Python String Methods; Illustrative programs.

References

1. Computer Fundamentals (BPB), P. K. Sinha & Priti Sinha
2. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2nd Edition, Green Tea Press. Freely available online 2015.
@<https://www.greenteapress.com/thinkpython/thinkCSpv.pdf>
3. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
4. <http://www.ibiblio.org/g2swap/byteofpython/read/>
5. http://scipy-lectures.org/intro/language/python_language.html
6. <https://docs.python.org/3/tutorial/index.html>

Syllabus for BSc IV Semester

Course Title: Database Management System	Course code: 21BSC4C2CS2L
Total Contact Hours: 52	Course Credits: 04
Formative Assessment or IA Marks: 40	Duration of SEE/Exam: 02 Hours
Summative Assessment Marks: 60	

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the various database concepts and the need for database systems.
- Identify and define database objects, enforce integrity constraints on a database using DBMS.
- Demonstrate a Data model and Schemas in RDBMS.
- Identify entities and relationships and draw ER diagram for a given real-world problem.
- Convert an ER diagram to a database schema and deduce it to the desired normal form.
- Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
- Explain the transaction processing and concurrency control techniques.

DSC7: Database Management System (DBMS)

Unit	Description	Hours
1	Database Architecture: Introduction to Database system applications. Characteristics and Purpose of database approach. People associated with Database system. Data models. Database schema. Database architecture. Data independence. Database languages, interfaces, and classification of DBMS.	10
2	E-R Model: Entity-Relationship modeling: E – R Model Concepts: Entity, Entity types, Entity sets, Attributes, Types of attributes, key attribute, and domain of an attribute. Relationships between the entities. Relationship types, roles and structural constraints, degree and cardinality ratio of a relationship. Weak entity types, E -R diagram.	10
3	Relational Data Model: Relational model concepts. Characteristics of relations. Relational model constraints: Domain constraints, key constraints, primary & foreign key constraints, integrity constraints and null values. Relational Algebra: Basic Relational Algebra operations. Set theoretical	12

	operations on relations. JOIN operations Aggregate Functions and Grouping. Nested Sub Queries-Views. Introduction to PL/SQL & programming of above operations in PL/SQL	
4	Data Normalization: Anomalies in relational database design. Decomposition. Functional dependencies. Normalization. First normal form, Second normal form, Third normal form. Boyce-Codd normal form.	09
5	Query Processing Transaction Management: Introduction Transaction Processing. Single user & multiuser systems. Transactions: read & write operations. Need of concurrency control: The lost update problem, Dirty read problem. Types of failures. Transaction states. Desirable properties (ACID properties) of Transactions. Concurrency Control Techniques: Locks and Time stamp Ordering. Deadlock & Starvation.	11
References:		
<ol style="list-style-type: none"> 1. Fundamentals of Database Systems, Ramez Elmasri, Shankant B. Navathe, 7th Edition, Pearson, 2015 2. An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010. 3. Introduction to Database System, C J Date, Pearson, 1999. 4. Database Systems Concepts, Abraham Silberschatz, Henry Korth, S.Sudarshan, 6th Edition, McGraw Hill, 2010. 5. Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2002 		

Year	II	Course Code: 21BSC4C2CS2P Course Title: DBMS LAB	Credits	02	
Sem.	III		Hours	40	
Course Prerequisites, if any:	Knowledge of Programming				
Formative Assessment Marks: 25	Summative Assessment Marks: 25		Duration of ESA: 03 hrs.		
		<p>Practical: CO: Student would be able to create tables, execute queries and PL/SQL programs.</p> <ol style="list-style-type: none"> 1. Execute a single line query and group functions. 2. Execute DDL Commands. 3. Execute DML Commands 4. Execute DCL and TCL Commands. 5. Implement the Nested Queries. 6. Implement Join operations in SQL 7. Create views for a particular table 8. Implement Locks for a particular table 9. Write PL/SQL procedure for an application using exception handling. 10. Write PL/SQL procedure for an application using cursors. 11. Write a PL/SQL procedure for an application using functions 12. Write a PL/SQL procedure for an application using package 			

Evaluation Scheme for DBMS Lab Examination

Assessment Criteria		Marks
Program – 1 from Part A	Writing the Program	03
	Execution and Formatting	07
Program -2 from Part B	Writing the Program	03
	Execution and Formatting	07
Viva Voice		05

Semester End Exam Question Paper Pattern

Duration of the examination: 2hour

Max. Marks:60

Section A

Answer any TEN from the following, each carries 2 marks: [10X2=20]

1. -----
2. -----
3. -----
4. -----
5. -----
6. -----
7. -----
8. -----
9. -----
10. -----
11. -----
12. -----

Section B

Answer any FOUR from the following questions each carries 5 marks.

[4X5=20]

13. -----
14. -----
15. -----
16. -----
17. -----

Section C

Answer Any two from the following questions each carries 10 marks.

(The Question may consist two sub-questions)

[2X10=20]

18. -----
19. -----
20. -----

Theory Paper IA 40 Marks distribution

	C1	C2	Total Marks
First IA	Test-1: 15marks	Assignment/Activity-1: 05Marks	20
Second IA	Test-2: 15marks	Assignment/Activity-2 : 05Marks	20
	30	10	40

Theory Paper IA 20 Marks distribution

	C1	C2	Total Marks
First IA	Test-1: 10 marks	---	10
Second IA	Test-2: 5marks	Assignment/Activity-2 : 05	10
	15	05	20