Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

Semester-3

Name of the Course: BCA **Subject:** Object Oriented Programming & Object Oriented Programming Lab	
Course Code: BCA301 + BCA391	**Semester: 3rd**
Duration: 36 Hours	**Maximum Marks: 100 + 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4 hrs./week	Continuous Assessment: 25
Credit: 3 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1	In-depth understanding of various concepts of object oriented programming language.
2	Ability to read, understand and trace the execution of programs
3	Skill to debug a program.
4	Skill to write program code in java to solve real world problems.

Objective:	
Sl. No.	
1	To introduce students to a powerful programming language
2	To understand the basic structure of object oriented program
3	To gain knowledge of various programming errors.
4	To enable the students to make flowchart and design an algorithm for a given problem.
5	To enable the students to develop logics and programs

Pre-Requisite:	
Sl. No.	
1	Understanding of basic programming logic.

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Object oriented design** Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.	5	10

Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

02	**Object oriented concepts** Difference between OOP and other conventional programming – advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism	4	10
03	**Basic concepts of object oriented programming using Java** Implementation of Object oriented concepts using Java. Language features to be covered:	5	10
04	**Class & Object properties** Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String [discuss charAt[] , compareTo[], equals[], indexOf[], length[] equalsIgnoreCase[], substring[], toCharArray[] , toLowerCase[], toString[], toUpperCase[] , trim[] , valueOf[] methods] & StringBuffer classes [discuss append[], capacity[], charAt[], delete[], deleteCharAt[], ensureCapacity[], getChars[], indexOf[], insert[], length[], setCharAt[], setLength[], substring[], toString[] methods], concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.	**8**	**10**
05	**Reusability properties** Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super[ ] method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.	**6**	**10**
06	**Exception handling & Multithreading [6L]**Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, interthread communication, deadlocks for threads, suspending & resuming threads.	**6**	**10**
07	**Applet Programming [using swing]** Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint[], getDocumentBase[], getCodeBase[] methods, layout manager [basic	**4**	**10**

	concept], creation of buttons [JButton class only] & text fields.		
	Sub Total:	**38**	**70**
	Internal Assessment Examination & Preparation of Semester Examination		**30**
	Total:		**100**

Practical
Course Code: BCA391
Credit: 2
Skills to be developed:
Intellectual skills:

1. Ability to read, understand and write object oriented programs.
2. Ability to analyze problems and provide program based solutions.

List of Practical:

1. As compatible to theory syllabus.

Assignments:
Based on the curriculum as covered by subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
E. Balaguruswamy	Object Oriented Modelling and Design		Tata McGraw-Hill
Ali Bahrami	Object Oriented System Development		Mc Graw Hill
Reference Books:			
Patrick Naughton, Herbert Schildt	The complete reference-Java2		TMH
Kenneth A. Reek	Pointers on C		Pearson
R.K Das	Core Java For Beginners		VIKAS PUBLISHING

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer with moderate configuration
2.	A programming language compiler

Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1 to 5	10	10				
B	1 to 5			5	3	5	70
C	1 to 5			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)	**5*2=10**	
On Spot Experiment(one for each group consisting 5 students)	**10**	
Viva voce	**5**	

Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

Name of the Course: BCA **Subject:** Computer Graphics & Computer Graphics Lab	
Course Code: BCA302 + BCA392	**Semester: 3rd**
Duration: 36 Hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4 hrs./week	Continuous Assessment: 25
Credit: 3 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1.	To gain knowledge of working of display systems.
2.	To enhance skill to execute various Scan Conversion algorithms in laboratory so as to draw Graphics primitives
3.	Familiarization with 2D and 3D graphics.

Objective:	
Sl. No.	
1.	To understand the basics of computer graphics, different display devices and applications of computer graphics.
2.	To learn about algorithmic development of graphics primitives like: point, line, circle, ellipse etc.
3.	To impart knowledge of2D and 3D transformations on graphics objects.
4.	To familiarize with 2D Viewing and different clipping methods

Aim:	
Pre-Requisite:	
Sl. No.	
1.	Basic knowledge of mathematical logic and coordinate geometry.

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction Video Display Devices, CRT, LCD display devices Raster-Scan and Random-Scan Systems, Graphics Monitors and Workstations, Input devices, keyboard, mouse, trackball, data glove, scanners and Hard Copy Devices, Graphics Software.	**4**	**10**
02	Output Primitives Line Drawing algorithms [DDA and Bresenham's line drawing algorithm], Circle Generating Algorithms [Bresenham's and midpoint circle drawing algorithm], Ellipse Generating Algorithms [midpoint ellipse drawing algorithm], other curves, Antialiasing and filtering techniques, Filled area primitives.	**8**	**15**

Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

03	Two Dimensional Geometric Transformations Basic transformations [translation, rotation, scaling], Matrix representations and Homogeneous Coordinates, Composite transformations, other transformations, Affine transformation, Transformation between coordinate systems, Two Dimensional Viewing, Window - to - viewport Coordinate transformation.	**8**	**15**
04	Clipping Operations Line clipping [Cohen - Sutherland algorithm], clip windows, polygon clipping with Sutherland Hodgeman algorithm.	**6**	**10**
05	Three Dimensional Object Representations Polygon surfaces, Curves lines and Surfaces, Spline representations, Bezier Curves and Surfaces, B-Spline Curves, Beta Splines.	**6**	**10**
06	Three Dimensional Viewing Viewing Pipeline, Viewing Coordinates, Transformation from World to Viewing Coordinates, Projections: Parallel Projections, Perspective Projections	**4**	**10**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination		**30**
	Total:		**100**

Practical
Course Code: BCA392
Credit : 2
Skills to be developed:
Intellectual skills:

1. Skill to write python / c based programming to implement computer graphics related problems.

List of Practical:

1. Compatible with theory syllabus.

Assignments:
Based on the curriculum as covered by the subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
D. Hearn and P. Baker	Computer Graphics		Pearson
Reference Books:			
ames D. Foley	Computer Graphics: Principles and Practice		Addison-Wesley

Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

List of equipment/apparatus for laboratory experiments:	
Sl. No.	
1	Computer with moderate configuration
2	Python/ C compiler.

End Semester Examination Scheme.		**Maximum Marks-70.**			**Time allotted-3hrs.**		
Group	**Unit**	**Objective Questions** (MCQ only with the correct answer)		**Subjective Questions**			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 7**	**10**	**10**				
B	**1 to 7**			**5**	**3**	**5**	**70**
C	**1 to 7**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	**Chapter**	**Marks of each question**	**Question to be set**	**Question to be answered**
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)	**5*2=10**	
On Spot Experiment(one for each group consisting 5 students)	**10**	
Viva voce	**5**	

Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

Name of the Course: BCA **Subject:** Operating Systems & Operating Systems Lab	
Course Code: BCA303 + BCA393	**Semester: 3rd**
Duration: 36 Hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4 hrs./week	Continuous Assessment: 25
Credit: 4	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1	To understand the principles and tasks of operating systems.
2	Ability to apply CPU scheduling algorithms to manage tasks.
3	Initiation into the process of applying memory management methods and allocation policies.
4	Knowledge of methods of prevention and recovery from a system deadlock.

Objective:	
Sl. No.	
1	To deliver a detailed knowledge of integral software in a computer system –Operating System.
2	To understand the working of operating system as a resource manager.
3	To familiarize the students with Process and Memory management.
4	To describethe problem of process synchronization and its solution.
5	

Pre-Requisite:	
Sl. No.	**None**

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction Importance of OS,Basic concepts and terminology,Types of OS,Different views,Journey of a command execution,Design and implementation of OS	**3**	**10**
02	Process Concept and views, OS view of processes, OS services for process management, Scheduling algorithms,Performance evaluation; Inter-process communication and synchronisation, Mutual exclusion, Semaphores, Hardware support for mutual exclusion, Queuing implementation of semaphores, Classical problem of concurrent programming, Critical region and conditional critical region, Monitors, Messages, Deadlocks	**10**	**20**

Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

03	Resource Manager Memory management,File management,Processor management,Device management	**8**	**20**
04	Security and related Issues Security and protection,Authentication,Protection and access control,Formal models of protection ,Worms and viruses	**5**	**5**
05	**Multiprocessor System** Multiprocessor system,Classification and types,OS functions and Requirements, Introduction to parallel computing,Multiprocessor interconnection synchronization	**6**	**10**
06	Distributed OS Introduction to distributed processing	**4**	**5**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination		**30**
	Total:		**100**

Assignments:

Based on the curriculum as covered by subject teacher.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
A Silberschatz, P.B. Galvin, G. Gagne	Operating Systems Concepts	8th Edition	John Wiley Publications
A.S. Tanenbaum	Modern Operating Systems	3rd Edition	Pearson Education

Reference Books:

G. Nutt	Operating Systems: A Modern Perspective	2nd Edition	Pearson Education

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 6**	**10**	**10**				
B	**1 to 6** **1 to 6**			**5**	**3**	**5**	**70**

Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

C				**5**	**3**	**15**	

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- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

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Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

Name of the Course: BCA **Subject:** Mathematics for Computing	
Course Code: BCA304	**Semester: 3rd**
Duration: 40 Hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	End Semester Exam: 70
Tutorial: 1 hr./week	Attendance: 5
Practical:	Continuous Assessment: 25
Credit: 4	Practical Sessional internal continuous evaluation:
	Practical Sessional external examination:

Aim:	
Sl. No.	
1	To develop formal reasoning.
2	Create habit of raising questions
3	Knowledge regarding the use of Mathematics in Computer Science
4	Ability to communicate knowledge, capabilities and skills related to the computer engineer profession

Objective:	
Sl. No.	
1	To understand and solve mathematical problems
2	To impart knowledge regarding relevant topics .
3	To familiarize students with propositional logic, graph theory and probability theory.

Pre-Requisite:	
Sl. No.	
1.	Basic mathematical foundation.

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Propositional Logic Construction of truth table, Tautology, Contradiction, Contingency, Logical equivalence, Generating functions, Recurrence relations	**8**	**20**
02	Graph Theory Graphs, Digraphs, Weighted graph, Connected and disconnected graphs, Bipartite graph, degree of a graph,Theorem on graph,Complement of a graph, Regular graph,Complete graph,Sub- graph, Walks, Paths, Circuits, Hamiltonian and Euler Graph, Cut sets and cut vertices,Adjacency and incidence matrices of a graph,Graph isomorphism, Dijkstra's Algorithm for shortest path problem, Definition and properties of tree, Binary tree, Spanning tree of a graph,Minimal spanning tree, Algorithms:DFS,BFS,Kruskal'sandPrim'salgorithms	**16**	**20**

Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

03	Probability Theory Basics of Probability Theory: Axiomatic definition of probability. Conditional probability, Independent events and related problems, Bay's theorem [Statement only] & its application, One dimensional random variable, Probability distributions-discrete and continuous, Expectation, Binomial, Poisson, Uniform, Exponential, Normal distributions	**10**	**20**
04	Frequency Distribution Collection of data, Charts and diagram, Measure of central tendency, Measure of dispersion	**6**	**10**
	Sub Total:	**40**	**70**
	Internal Assessment Examination & Preparation of Semester Examination		**30**
	Total:		**100**

Assignments:

Based on the curriculum as covered by subject teacher.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Rathore	Discrete Structure & Graph Theory		EPH
G.S.Rao	Discrete Mathematical Structure		New Age International
Goon,Gupta and Dasgupta	Fundamental of Statistics		
Reference Books:			
Banerjee,Dey and Sen	Mathematical Probability		UN DharPvt.Ltd.

End Semester Examination Scheme. **Maximum Marks-70.** **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 4**	**10**	**10**				
B	**1 to 4**			**5**	**3**	**5**	**70**
C	**1 to 4**			**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.

Department of Information Technology (In-house)
Syllabus of Bachelor of Computer Application (BCA)
(Effective from academic session 2019-20)

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)	**5*2=10**	
On Spot Experiment(one for each group consisting 5 students)	**10**	
Viva voce	**5**	