स्वामी राम हिमालयन विश्वविद्यालय
Swami Rama Himalayan University

Criterion 1 - Curricular Aspects

1.1.1 Outcome Analysis of POs, COs
Bachelor of Computer Applications (BCA)
(2019-2022)

Himalayan School of Science and Technology

Swami Rama Nagar, Jolly Grant, Dehradun 248016, Uttarakhand, India

A. Program Outcomes

After successful completion of the program, graduating students/graduates will able to:

PO1	**Domain Expertise:** Apply knowledge of computing and mathematics appropriate to the discipline.
PO2	**Problem analysis:** Analyse a problem, and identify and define the computing requirements appropriate to its solution
PO3	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO4	**Modern Tool Usage:** Use current techniques, skills, and tools necessary for computing practices.
PO5	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO6	**Professional ethics:** Understand professional ethics and Cyber regulations and develop the youth with social commitments.
PO7	**Communication Efficacy**: Communicate effectively with computing society in both verbal and written form
PO8	**Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Course-wise CO-PO Mapping

Mapping factor or Correlational level between Course Outcome (CO) and Program Outcomes (PO) indicates to what extent the teaching and assessment method of CO correlates/contributes the PO at the level defined below:

Corelation Level	Particulars
3	Substantial/high contribution of CO towards PO
2	Moderate contribution of CO towards PO
1	Slight/low contribution of CO towards PO

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA101	Computer Fundamentals and Information Technology								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA101.01	Define computers and classify computer systems.	3	-	1	-	-	-	-	-
BCA101.02	Discuss and apply various commands of operating systems.	2	-	1	-	-	-	-	-
BCA101.03	Use MS Windows operating system and experiment with command.	2	2	1	2	-	-	-	-
BCA101.04	Utilize editors and word processors and inspect their results.	2	2	1	2	-	-	-	-
BCA101.05	Demonstrate and experiment with Internet and their services.	2	2	1	2	-	-	-	-
	COURSE-WISE AVERAGE OF POs	2.200	1.200	1.00	1.200	-	-	-	-

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA102	Digital Electronics								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA102.01	Describe the fundamental concepts and techniques used in digital electronics.	3	2	1	-	-	-	-	2
BCA102.02	Describe and examine the structure of various number systems, design the circuits using logic gates.	3	3	1	1	-	-	-	2
BCA102.03	Analyze and design various combinational and sequential circuits	3	3	1	1	-	-	-	1
BCA102.04	Identify basic requirements for a design application and propose a cost effective solution	3	3	1	2	-		-	
BCA102.05	Identify and prevent various hazards and timing problems in a digital design and create hazard free circuits.	3	3	1	2	-	-	-	
	COURSE-WISE AVERAGE OF POs	3.000	2.800	1	1.2	-	-	-	

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA103	**English Language & Communication Skills**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA103.01	Demonstrate the knowledge of four language learning skills i.e. LSRW for effective communication	-	-	2	-	-	-	3	1
BCA103.02	Build upon their vocabulary and exhibit fluency in English	-	-	1	-	-	-	2	3
BCA103.03	Construct grammatically correct sentence and thereby minimize errors in writing and speaking	-	-	1	-	-	-	2	3
BCA103.04	Interpret and infer the meaning of what they listen	-	-	1	-	-	-	3	3
BCA103.05	Interpret and evaluate different kinds of texts.	-	-	1	-	-	-	3	3
BCA103.06	Recognize the Mother Tongue Influence , if any, on their language and apply the knowledge of phonetics towards better pronunciation skills	-	-	1	-	-	-	3	3
BCA103.07	Compose different kinds of texts– Expository, Argumentative, Deductive , Narrative, creative,etc	-	-	1	-	-	-	3	3
COURSE-WISE AVERAGE OF POs		-	-	1.143	-	-	-	2.714	2.714

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA104	**Environmental Studies**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA104.01	To live responsibly, demonstrate awareness in society, and appreciate the environmental assets of the places they inhabit.	-	-	-	-	3			
BCA104.02	To describe and analyze the current local, national and global environmental issues and look at the science behind them.	-	-	-	-	3	-		

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA104.03	Apply the concept of reduce, reuse and recycle for the conservation of natural resources and environment.	-	-	-	-	3	-	-	2
BCA104.04	To distinguish between eco-friendly and environmental destructive practices/approaches and communicate appropriately.	-	-	-	-	3	-	1	2
	COURSE-WISE AVERAGE OF POs	-	-	-	-	**3**	-	**0.25**	**1.5**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA105	**Foundation Course in Mathematics-I**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA105.01	Define determinant and matrix, apply properties of determinant and solve linear equations.	3	1	-	-	-	-	-	1
BCA105.02	Examine a function for limit, continuity and differentiability; find nth derivative, apply Leibnitz's theorem	3	3	-	-	-	-	-	1
BCA105.03	Apply differentiation for finding maxima, minima, expansion of functions, Indeterminate forms. Apply Rolle's and Lagrange's mean value theorems. Also, analyze and sketch the curves	3	3	-	-	-	-	-	1
BCA105.04	Solve integration and apply it to find area.	3	1	-	-	-	-	-	1
BCA105.05	Define Vectors and find scalar and vector products	3	1	-	-	-	-	-	1
	COURSE-WISE AVERAGE OF POs	**3**	**1.8**	-	-	-	-	-	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA106	**Principles and Practices of Management**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA106.01	Explain management principles required for effective functioning of an organization	3	-	-	-	-	1	-	1
BCA106.02	Apply the basic concepts of management related to Business.	3	-	-	-	1	1	-	1
BCA106.03	Demonstrate the roles, skills and functions of a manager.	3	-	-	-	-	-	3	1
BCA106.04	Analyze the environment of the organization for better decision making.	3	3	-	-	-	1	-	1
BCA106.05	Demonstrate the ability to work in diverse teams	3	-	3	-	-	-	3	1
COURSE-WISE AVERAGE OF POs		**3**	**0.6**	**0.6**	**-**	**0.2**	**0.6**	**1.2**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA107	**Programming Concepts Using C Language**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA107.01	Develop an algorithm and draw flowchart for a given problem.	3	1	-	-	-	-	-	1
BCA107.02	Acquire the knowledge of basic concepts and control statements to write C programs.	3	2	-	2	-	-	-	2
BCA107.03	Solve real time problems by exercising user defined functions	3	2	-	2	-		-	2
BCA107.04	Write and evaluate C programs that use Pointers to access arrays, strings and functions.	3	3	-	2	-	-	-	
BCA107.05	Solve problems by exercising user defined data types including structures and unions.	3	3	-	2	-	-		

BCA107.06	Write and evaluate C programs using pointers and to allocate memory using dynamic memory management functions.	3	3	-	2	-	-	-	2
	COURSE-WISE AVERAGE OF POs	**3**	**2.333**	**-**	**1.667**	**-**	**-**	**-**	**1.833**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP101	**Computer Fundamentals and Information Technology Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP101.01	Define computers and classify computer systems.	3	-	1	-	-	-	-	-
BCP101.02	Discuss and apply various commands of operating systems.	2	-	1	-	-	-	-	-
BCP101.03	Use MS Windows operating system and experiment with command.	2	2	1	2	-	-	-	-
BCP101.04	Utilize editors and word processors and inspect their results.	2	2	1	2	-	-	-	-
BCP101.05	Demonstrate and experiment with Internet and their services.	2	2	1	2	-	-	-	-
	COURSE-WISE AVERAGE OF POs	**2.2**	**1.2**	**1**	**1.2**	**-**	**-**	**-**	**-**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP103	**English Language & Communication Skills Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP103.01	Demonstrate the knowledge of four language learning skills i.e. LSRW for effective communication	-	-	2	-	-	-	3	

BCP103.02	Build upon their vocabulary and exhibit fluency in English	-	-	1	-	-	-	2	3
BCP103.03	Construct grammatically correct sentence and thereby minimize errors in writing and speaking	-	-	1	-	-	-	2	3
BCP103.04	Interpret and infer the meaning of what they listen	-	-	1	-	-	-	3	3
BCP103.05	Interpret and evaluate different kinds of texts.	-	-	1	-	-	-	3	3
BCP103.06	Recognize the Mother Tongue Influence , if any, on their language and apply the knowledge of phonetics towards better pronunciation skills	-	-	1	-	-	-	3	3
BCP103.07	Compose different kinds of texts– Expository, Argumentative, Deductive , Narrative, creative,etc	-	-	1	-	-	-	3	3
COURSE-WISE AVERAGE OF POs		-	-	**1.143**	-	-	-	**2.714**	**2.714**

| Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP107	**Programming Concetps Using C Language Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP107.01	Develop an algorithm and draw flowchart for a given problem.	3	1	-	-	-	-	-	1
BCP107.02	Acquire the knowledge of basic concepts and control statements to write C programs.	3	2	-	2	-	-	-	2
BCP107.03	Solve real time problems by exercising user defined functions	3	2	-	2	-	-	-	2
BCP107.04	Write and evaluate C programs that use Pointers to access arrays, strings and functions.	3	3	-	2		-	-	2
BCP107.05	Solve problems by exercising user defined data types including structures and unions.	3	3	-	2				2

BCP107.06	Write and evaluate C programs using pointers and to allocate memory using dynamic memory management functions.	3	3	-	2	-	-	-	2
COURSE-WISE AVERAGE OF POs		**3**	**2.333**	**-**	**1.667**	**-**	**-**	**-**	**1.833**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA108	**Advanced Concepts of C Programming**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA108.01	Explain array and function along with its implementation.	2	1	-	1	-	-	-	1
BCA108.02	Explain bit masking and bit functions along with its implementations.	2	2	-	1	-	-	-	1
BCA108.03	Write and evaluate C programs that use arrays, functions and pointers.	2	2	-	1	-	-	-	1
BCA108.04	Write and evaluate C programs for user defined data types and basic programming for graphics	2	2	-	1	-	-	-	1
BCA108.05	Write and evaluate C programs to implement the concept of file handling.	2	2	-	1	-	-	-	1
COURSE-WISE AVERAGE OF POs		**2**	**1.8**	**-**	**1**	**-**	**-**	**-**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA109	**Data Communication and Computer Networks**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA109.01	Understand physical layer and OSI model.	3	-	1	1	-			-
BCA109.02	Understand switching technique and working of data link layer	3	1	1	1	-	-		
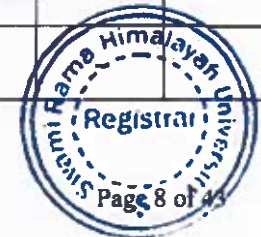
BCA109.03	Review and use of network layer and routing protocols	3	-	1	-	-	-	-	-
BCA109.04	Identify and review the working of transport layer and socket programming.	3	1	1	-	-	-	-	-
BCA109.05	Understand application layer and use of network protocols.	3	1	1	1	-	-	-	-
	COURSE-WISE AVERAGE OF POs	**3**	**0.6**	**1**	**0.6**	**-**	**-**	**-**	**-**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA110	**Data Structures**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA110.01	Write and discuss fundamentals of Data Structures.	3	-	-	-	-	-	-	1
BCA110.02	Discuss and apply stacks and queues data structures and their applications.	2	1	1	-	-	-	-	1
BCA110.03	Use and analyze applications of linked lists	2	2	1	-	-	-	-	1
BCA110.04	Utilize and analyze applications of Tree and Graphs data structures.	2	2	1	-	-	-	-	2
BCA110.05	Construct and evaluate sorting and searching techniques.	3	2	1	-	-	-	-	2
	COURSE-WISE AVERAGE OF POs	**2.4**	**1.4**	**0.8**	-	-	-	-	**1.4**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA111	**English Language and Composition Skills**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA111.01	Construct grammatically correct sentence and thereby minimize errors in writing and speaking.	-	-	1	-	-	-	2	3
BCA111.02	Demonstrate the knowledge of style of technical communication.	-	-	1	-	-	-	3	3
BCA111.03	Draft different kinds of technical documents.	-	-	1	-	-	-	3	3
BCA111.04	Exhibit proficiency in public speech, presentations and group discussions.	-	-	2	-	-	-	3	3
BCA111.05	Interpret and evaluate different kinds of texts.	-	-	-	-	-	-	3	3
BCA111.06	Interpret and infer the meaning of what they listen.	-	-	1	-	-	-	3	3
COURSE-WISE AVERAGE OF POs		-	-	**1**	-	-	-	**2.833**	**3**

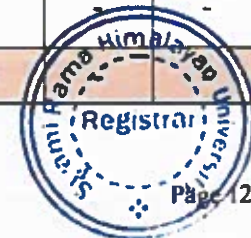| Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA112	**Foundation Course in Mathematics-II**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA112.01	Explain the complex number and apply the algebraic operations on complex numbers. Also, be able to calculate the roots of a complex number	3	2	-	-	-	-	-	1
BCA112.02	Calculate the direction cosines and explain the equations of plane, line and spheres in three dimensions.	3	2	-	-	-	-	-	1
BCA112.03	Categorize and solve the first order and first degree ordinary differential equation.	3	3	-	-	-	-	-	1

BCA112.04	Demonstrate the understanding of Frequency distribution, graphical representation, histogram, measure of central tendency, standard deviation, variance, correlation and regression and calculate these.	3	1	-	-	-	-	-	1
BCA112.05	Explain the probability and Binomial, Poisson and Normal distributions. Also apply these concepts for calculating probabilities.	3	2	-	-	-	-	-	1
	COURSE-WISE AVERAGE OF POs	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA113	**Fundamentals of Accounting and Finance**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA113.01	Explain the concept of accounting, financial accounting, prepare ledgers.	-	-	-	-	-	2	2	1
BCA113.02	Apply ratio analysis, explain liquidity, capital structure, profitability ratio.	-	-	-	-	-	1	2	1
BCA113.03	Explain cost-volume profit analysis, margin of safety, decision making involving marginal costing.	-	-	-	-	-	-	2	1
BCA113.04	Describe the function of finance managers and objective of financial management, profit vs. wealth maximization.	-	-	-	-	-	1	2	1
	COURSE-WISE AVERAGE OF POs	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA114	**Human Values & Professional Ethics**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA114.01	1. Define the concept of values and the need of value in day to day life.	-	3	-	-	-	3	-	1
BCA114.02	2. Examine the process of self-exploration by establishing harmony between body and mind.	-	2	-	-	-	3	-	1
BCA114.03	3. Analyze the need for a holistic perspective towards life, profession and happiness and understand its implications.	-	2	-	-	-	2	-	1
BCA114.04	4. Describe the concept of professionalism and the roles of codes of professional ethics.	-	2	-	-	-	2	-	1
	COURSE-WISE AVERAGE OF POs	**-**	**2.25**	**-**	**-**	**-**	**2.5**	**-**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP108	**Advanced Concepts of C Programming Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP108.01	Explain array and function along with its implementation.	2	1	-	1	-	-	-	1
BCP108.02	Explain bit masking and bit functions along with its implementations.	2	2	-	1	-	-	-	1
BCP108.03	Write and evaluate C programs that use arrays, functions and pointers.	2	2	-	1	-	-	-	1
BCP108.04	Write and evaluate C programs for user defined data types and basic programming for graphics	2	2	-	1	-	-	-	1
BCP108.05	Write and evaluate C programs to implement the concept of file handling.	2	2	-	1	-	-	-	1
	COURSE-WISE AVERAGE OF POs	**2**	**1.8**	**-**	**1**	**-**			**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP110	**Data Structures Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA110.01	Write and discuss fundamentals of Data Structures.	3	-	-	-	-	-	-	1
BCA110.02	Discuss and apply stacks and queues data structures and their applications.	2	1	1	-	-	-	-	1
BCA110.03	Use and analyze applications of linked lists	2	2	1	-	-	-	-	1
BCA110.04	Utilize and analyze applications of Tree and Graphs data structures.	2	2	1	-	-	-	-	2
BCA110.05	Construct and evaluate sorting and searching techniques.	3	2	1	-	-	-	-	2
COURSE-WISE AVERAGE OF POs		2.4	1.4	0.8	-	-	-	-	1.4

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP111	**English Language and Composition Skills Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP111.01	Construct grammatically correct sentence and thereby minimize errors in writing and speaking.	-	-	1	-	-	-	2	3
BCP111.02	Demonstrate the knowledge of style of technical communication.	-	-	1	-	-	-	3	3
BCP111.03	Draft different kinds of technical documents.	-	-	1	-	-	-	3	3
BCP111.04	Exhibit proficiency in public speech, presentations and group discussions.	-	-	2	-	-	-	3	3

BCP111.05	Interpret and evaluate different kinds of texts.	-	-	-	-	-	-	3	3
BCP111.06	Interpret and infer the meaning of what they listen.	-	-	1	-	-	-	3	3
	COURSE-WISE AVERAGE OF POs	-	-	1	-	-	-	2.833	3

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA201	**Computer Organization & Architecture**								
CO #	At the end of the course the students will be able to:	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
BCA201.01	Discuss the similarities and differences between different computer architecture.	3	-	-	-	-	-	-	-
BCA201.02	Assess programs in various languages.	3	2	-	-	-	-	-	-
BCA201.03	Describe the fundamentals of interfacing CPU with the peripheral devices.	3	-	-	-	-	-	-	-
BCA201.04	Explain the working of various memories available for the computer.	3	2	1	-	-	-	-	-
BCA201.05	Appraise the concepts like pipeline and parallel processing the multiprocessors.	3	2	1	-	-	-	-	-
	COURSE-WISE AVERAGE OF POs	**3**	**1.2**	**0.4**	-	-			

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA202	Discrete Mathematical Structures								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA202.01	Apply the set theory and set operations to develop mathematical concepts and structures.	3	2	-	-	-	-	-	1
BCA202.02	Analyze the properties of relations, Compare/differentiate between the function and a relation	3	3	-	-	-	-	-	1
BCA202.03	Apply the methods of reasoning and logic which will enable them to analyze and determine the validity of the given argument	3	3	-	-	-	-	-	1
BCA202.04	Identify and solve the problems of permutation and combination and be able to solve the recurrence relations.	3	2	-	-	-	-	-	1
BCA202.05	Differentiate and classify various graphs including Euler graph/circuit and Hamiltonian graph/circuit.	3	1	-	-	-	-	-	1
COURSE-WISE AVERAGE OF POs		3	2.2	-	-	-	-	-	1

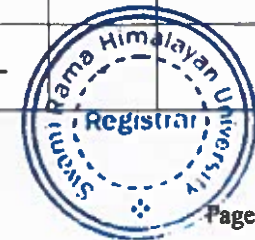| Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA203	Object Oriented Programming and Design								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA203.01	Identify the basic difference between the programming approaches like procedural and object oriented.	1	1	-	-	-	-	-	1
BCA203.02	Use the basic object-oriented design principles in computer problem solving.	1	2	-	-	-	-	-	1
BCA203.03	Construct appropriate diagrams and textual descriptions to communicate the static structure and dynamic behavior of an object oriented solution using UML.	2	2	-	-	-	-	-	1

Course Code	Course Title								
BCA203.04	Illustrate the concept of OOP paradigm using class, object, data and functions.	3	3	-	2	-	-	-	2
BCA203.05	Use an object oriented programming language, and associated class libraries, to develop object oriented programs demonstrating usage of data abstraction, encapsulation. Inheritance and polymorphism.	3	3	-	2	-	-	-	2
	COURSE-WISE AVERAGE OF POs	**2**	**2.2**	**-**	**0.8**	**-**	**-**	**-**	**1.4**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA204	**Operating System**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA204.01	An ability to understand basic concepts about operating systems, and its structure.	3	2	1	1	-	-	-	2
BCA204.02	An ability to describe & apply process management, scheduling and concurrency control mechanisms and analyze how deadlock can be avoided among the processes.	3	2	1	1	-	-	-	2
BCA204.03	An ability to analyze memory management	3	2	1	1	-	-	-	2
BCA204.04	An ability to describe & apply Disk Management, Files System, Page Replacement mechanisms and ability to describe about security	3	2	1	1	-	-	-	2
BCA204.05	Understand the Compare Unix and other operating system	3	2	1	1	-	-		2
	COURSE-WISE AVERAGE OF POs	**3**	**2**	**1**	**1**	**-**			**2**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA205	**Organizational Behaviour & Personal Management**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA205.01	Explain the concept of growth and development of personal management, role and functions of personnel officer, welfare officer, Recruitment, Job Evaluation, Job Analysis, Selection procedure and methods. Placement.	-	-	-	-	-	2	3	1
BCA205.02	Describe the concept and methods of training and development, also differentiate these. Explain Performance Appraisal, Communication, Worker's Participation in Management, Grievances and procedure to remove them	-	-	-	-	-	1	3	1
BCA205.03	Demonstrate the understanding of concept of organization behavior and its individual determinants. Also explain, Work Motivation, Job satisfaction and stress management	-	-	-	-	-	2	3	1
BCA205.04	Describe the groups and their types and dynamics of a group and its functions, Decision Making and Problem Solving, Organizational Change: Overcoming Resistance to Change, Organizational culture & Ethics, Organizational Development: Model of O.D.	-	-	-	-	-	3	2	1
	COURSE-WISE AVERAGE OF POs	-	-	-	-	-	**2**	**2.75**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP203	**Object Oriented Programming and Design Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP203.01	Identify the basic difference between the programming approaches like procedural and object oriented.	1	1	-				-	1
BCP203.02	Use the basic object-oriented design principles in computer problem solving.	1	2	-	-	-			1

BCP203.03	Construct appropriate diagrams and textual descriptions to communicate the static structure and dynamic behavior of an object oriented solution using UML.	2	2	-	-	-	-	-	1
BCP203.04	Illustrate the concept of OOP paradigm using class, object, data and functions.	3	3	-	2	-	-	-	2
BCP203.05	Use an object oriented programming language, and associated class libraries, to develop object oriented programs demonstrating usage of data abstraction, encapsulation. Inheritance and polymorphism.	3	3	-	2	-	-	-	2
COURSE-WISE AVERAGE OF POs		**2**	**2.2**	**-**	**0.8**	**-**	**-**	**-**	**1.4**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP204	**Operating System Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP204.01	An ability to understand basic concepts about operating systems, and its structure.	3	2	1	1	-	-	-	2
BCP204.02	An ability to describe & apply process management, scheduling and concurrency control mechanisms and analyze how deadlock can be avoided among the processes.	3	2	1	1	-	-	-	2
BCP204.03	An ability to analyze memory management	3	2	1	1	-	-	-	2
BCP204.04	An ability to describe & apply Disk Management, Files System, Page Replacement mechanisms and ability to describe about security	3	2	1	1	-			2
BCP204.05	Understand the Compare Unix and other operating system	3	2	1	1	-			2
COURSE-WISE AVERAGE OF POs		**3**	**2**	**1**	**1**	**-**		**-**	**2**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA206	**Computer Based Numerical and Statistical Techniques**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA206.01	Explain the errors in computing and apply the Bisection, Regula-Falsi, Secant, Iteration and Newton Raphson method for solving the algebraic and transcendental	3	3	-	-	-	-	-	1
BCA206.02	Explain and apply the Jacobi and Gauss Seidal methods for solving systems of linear equations. Also, demonstrate the understanding of interpolation and apply the Newton's forward and backward interpolation formulas, Langrange's Interpolation formula and Newton's Divided difference formula.	3	2	-	-	-	-	-	1
BCA206.03	Solve the problems of finding derivatives by applying numerical techniques. Apply the Trapezoidal, Simpson's 1/3rd and Simpson's 3/8th rules, Boole and Weddle's Rule of numerical integration	3	3	-	-	-	-	-	1
BCA206.04	Use Picard, Euler, Taylor, Runge-Kutta and Predictor-corrector methods for finding numerical solution of differential equations.	3	2	-	-	-	-	-	1
BCA206.05	Apply the method of least squares for fitting the straight lines, polynomials and exponential curves. Also, apply the Chi-square test for sampling distribution.	3	2	-	-	-	-	-	1
	COURSE-WISE AVERAGE OF POs	**3**	**2.4**	**-**	**-**	**-**	**-**	**-**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA207	Data Base Management Systems								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA207.01	Explain the features of database management systems.	3	1	-	-	-	-	-	1
BCA207.02	Design conceptual models of a database using ER modelling for real life applications and also construct queries in Relational Algebra	3	2	-	2	-	-	-	1
BCA207.03	Create, populate and retrieve any type of information from a database by formulating complex queries in SQL.	3	3	-	2	-	-	-	1
BCA207.04	Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database	3	3	-	2	-	-	-	1
BCA207.05	Describe transaction and Identify different concurrency control mechanisms for data integrity	3	2	-	2	-	-	-	1
	COURSE-WISE AVERAGE OF POs	3	2.2	-	1.6	-	-	-	1

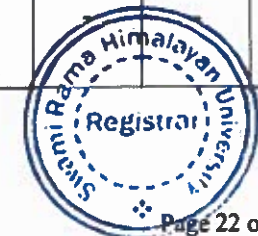| Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA208	Design and Analysis of Algorithm								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA208.01	Argue the correctness of algorithms using inductive proofs and invariants.	3	2	-	-			-	1
BCA208.02	Analyze worst-case running times of algorithms using asymptotic analysis.	3	3	-	-	-			1

BCA208.03	Define the divide-and-conquer strategy, dynamic-programming strategy, greedy strategy and examine when a problem qualifies for it.	3	3	-	-	-	-	-	1
BCA208.04	Explain the graph algorithms and their analyses. Employ graphs to model engineering problems, when applicable.	3	3	-	-	-	-	-	1
BCA208.05	Compare between different data structures and specify an appropriate data structure for different problems	3	3	-	-	-	-	-	1
COURSE-WISE AVERAGE OF POs		**3**	**2.8**	**-**	**-**	**-**	**-**	**-**	**1**

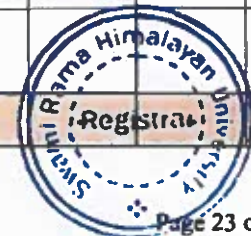| Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA209	**Programming in JAVA**								
CO #	At the end of the course the students will be able to:	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
BCA209.01	Identify the complete architecture of Java Platform and able to relate with OOPS concepts	2	1	-	1	-	-	-	1
BCA209.02	Describe and demonstrate the concepts of polymorphism, and inheritance.	2	2	-	1	-	-	-	1
BCA209.03	Describe the concepts of Exception handling, String handling and Input / Output Programming and apply it through the programs.	2	2	-	1	-	-	-	1
BCA209.04	Explain the concepts of inner classes and multithreading. Apply them in developing projects.	2	2	-	1	-	-	-	1
BCA209.05	Describe and Apply data base connectivity and dynamic programming through JSP and servlet.	2	2	-	1	-	-	-	1
COURSE-WISE AVERAGE OF POs		**2**	**1.8**	**-**	**1**	**-**	**-**	**-**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA210	**E-Commerce**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA210.01	Explain e-commerce and different business models of e-commerce	1	1	1	1	-	-	-	2
BCA210.02	Identify and choose the right Electronic Payment System	2	2	1	1	-	-	-	3
BCA210.03	Discuss the various encryption techniques used in e-commerce.	1	2	-	-	-	-	-	2
BCA210.04	Outline the concepts of EDI & CRM.	2	2	-	1	-	-	-	1
BCA210.05	Discuss M-Commerce & security issues associated with it.	1	2	1	1	-	-	-	3
	COURSE-WISE AVERAGE OF POs	**1.4**	**1.8**	**0.6**	**0.8**	**-**	**-**	**-**	**2.2**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP206	**Computer Based Numerical and Statistical Techniques Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP206.01	Explain the errors in computing and apply the Bisection, Regula-Falsi, Secant, Iteration and Newton Raphson method for solving the algebraic and transcendental	3	3	-	-	-	-	-	1
BCP206.02	Explain and apply the Jacobi and Gauss Seidal methods for solving systems of linear equations. Also, demonstrate the understanding of interpolation and apply the Newton's forward and backward interpolation formulas, Langrange's	3	2	-	-	-			1

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
	Interpolation formula and Newton's Divided difference formula.								
BCP206.03	Solve the problems of finding derivatives by applying numerical techniques. Apply the Trapezoidal, Simpson's 1/3rd and Simpson's 3/8th rules, Boole and Weddle's Rule of numerical integration	3	3	-	-	-	-	-	1
BCP206.04	Use Picard, Euler, Taylor, Runge-Kutta and Predictor-corrector methods for finding numerical solution of differential equations.	3	2	-	-	-	-	-	1
BCP206.05	Apply the method of least squares for fitting the straight lines, polynomials and exponential curves. Also, apply the Chi-square test for sampling distribution.	3	2	-	-	-	-	-	1
COURSE-WISE AVERAGE OF POs		**3**	**2.4**	**-**	**-**	**-**	**-**	**-**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP207	**Data Base Management Systems Lab**								
CO #	At the end of the course the students will be able to:	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
BCP207.01	Explain the features of database management systems.	3	1	-	-	-	-	-	1
BCP207.02	Design conceptual models of a database using ER modelling for real life applications and also construct queries in Relational Algebra	3	2	-	2	-	-	-	1
BCP207.03	Create, populate and retrieve any type of information from a database by formulating complex queries in SQL.	3	3	-	2	-	-	-	1
BCP207.04	Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database	3	3	-	2	-			1
BCP207.05	Describe transaction and Identify different concurrency control mechanisms for data integrity	3	2	-	2	-			1
COURSE-WISE AVERAGE OF POs		**3**	**2.2**	**-**	**1.6**	**-**			**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP208	**Design and Analysis of Algorithm Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP208.01	Argue the correctness of algorithms using inductive proofs and invariants.	3	2	-	-	-	-	-	1
BCP208.02	Analyze worst-case running times of algorithms using asymptotic analysis.	3	3	-	-	-	-	-	1
BCP208.03	Define the divide-and-conquer strategy, dynamic-programming strategy, greedy strategy and examine when a problem qualifies for it.	3	3	-	-	-	-	-	1
BCP208.04	Explain the graph algorithms and their analyses. Employ graphs to model engineering problems, when applicable.	3	3	-	-	-	-	-	1
BCP208.05	Compare between different data structures and specify an appropriate data structure for different problems	3	3	-	-	-	-	-	1
	COURSE-WISE AVERAGE OF POs	**3**	**2.8**	**-**	**-**	**-**	**-**	**-**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP209	**Programming in JAVA Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP209.01	Identify the complete architecture of Java Platform and able to relate with OOPS concepts	2	1	-	1	-	-	-	1
BCP209.02	Describe and demonstrate the concepts of polymorphism, and inheritance.	2	2	-	1	-			1
BCP209.03	Describe the concepts of Exception handling, String handling and Input / Output Programming and apply it through the programs.	2	2	-	1	-			1

BCP209.04	Explain the concepts of inner classes and multithreading. Apply them in developing projects.	2	2	-	1	-	-	-	1
BCP209.05	Describe and Apply data base connectivity and dynamic programming through JSP and servlet.	2	2	-	1	-	-	-	1
	COURSE-WISE AVERAGE OF POs	**2**	**1.8**	**-**	**1**	**-**	**-**	**-**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA301	**Software Engineering**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA301.01	1. Define fundamental principles, tools, techniques of Software Engineering applied in software development.	3	1	-	-	-	-	-	2
BCA301.02	2. Describe and use different software development life cycle (SDLC) models.	3	1	-	1	-	-	-	2
BCA301.03	3. Compare and contrast among software development life cycle (SDLC) models	2	2	1	2	-	-	1	1
BCA301.04	4. Estimate project size, cost, duration, and effort for software development.	2	2	2	2	-	-	1	1
BCA301.05	5. Inspect proper Software Quality standards are adhered in software development.	2	2	2	2	-	-	1	1
	COURSE-WISE AVERAGE OF POs	**2.4**	**1.6**	**1**	**1.4**	**-**	**-**	**0.6**	**1.4**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA302	**Programming in VB .Net Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA302.01	Design, create, build, and debug Visual Basic applications. VB.NET application.	3	1	-	1	-	-	-	-
BCA302.02	Write and apply decision statement, looping, procedures, sub-procedures, and functions to create manageable code.	3	2	-	2	-	-	-	1
BCA302.03	Analyze all the elements in the window forms.	3	2	-	2	-	1	-	1
BCA302.04	Write Windows applications using forms, controls, and events.	3	2	-	2	-	1	-	1
BCA302.05	Design, formulate, and construct applications with VB.NET.	3	2	-	2	-	1	-	1
	COURSE-WISE AVERAGE OF POs	**3**	**1.8**	**-**	**1.8**	**-**	**0.6**	**-**	**0.8**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA303	**Management Information Systems**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA303.01	1. Define and apply the fundamental concepts of information systems in context of an organization	2	1	-	-	-	-	-	1
BBA505.02	2. Interpret and recommend the use information technology to solve business problems.	2	2	-	2	-			1
BCA303.02	3. Apply a framework and process for aligning organization's IT objectives with business strategy.	2	2	-	2	-			1
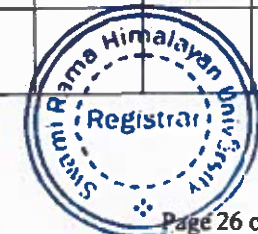
Course Code	Course Title								
BBA505.03	4. Illustrate redesigning the organization with information systems.	2	2	-	2	-	-	-	1
BCA303.03	5. Describe the types of information systems supporting the major functional areas of the business.	2	2	-	2	-	-	-	1
	COURSE-WISE AVERAGE OF POs	**2**	**1.8**	**-**	**1.6**	**-**	**-**	**-**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA304	**Optimization Techniques**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA304.01	Formulate linear programming problems (LPP), apply graphical method, simplex method. Further, explain and solve the degeneracy and duality by simplex method.	3	2	-	-	-	-	-	1
BCA304.02	Apply the algorithms/ methods for solving assignment models, transportation models and solve the job sequencing problems	3	2	-	-	-	-	-	1
BCA304.03	.Explain the two person-Zero sum games, apply maxmin property, dominance property and apply graphical method to solve a game. Also apply PERT-CPM techniques	3	2	-	-	-	-	-	1
BCA304.04	Explain queuing models and apply them to solve the related problems.	3	2	-	-	-	-	-	1
BCA304.05	Demonstrate the understanding of inventory models and apply them to solve the related problems.	3	2	-	-	-	-	-	1
	COURSE-WISE AVERAGE OF POs	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**1**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA305	Web Technology								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA305.01	Understand the working of internet and how to use it.	3	-	1	1	-	-	-	-
BCA305.02	Understand how to use HTML, DHTML and XML.	3	2	1	1	2	-	-	-
BCA305.03	Review and use web services.	3	-	1	-	-	-	-	-
BCA305.04	Identify and review the purpose and use of Web 2.0.	3	2	1	-	-	-	-	-
BCA305.05	Understand and use technology behind web 3.0	3	3	1	1	2	-	-	-
	COURSE-WISE AVERAGE OF POs	3	1.4	1	0.6	0.8	-	-	-

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA309	Disaster Management								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA309.01	1. Describe and distinguish different types of disasters.	-	-	-	-	2	-	-	2
BCA309.02	2. Analyze the relationship between development and disasters.	-	-	-	-	2			2
BCA309.03	3. Apply disaster management concepts during crisis.	-	-	-	-	2			2

BCA309.04	4. Communicate and participate responsibly in teams to contribute to society.	-	-	-	-	1	-	2	-
	COURSE-WISE AVERAGE OF POs	-	-	-	-	1.75	-	0.5	1.5

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP302	**Programming in VB .Net Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP302.01	Design, create, build, and debug Visual Basic applications. VB.NET application.	3	1	-	1	-	-	-	-
BCP302.02	Write and apply decision statement, looping, procedures, sub-procedures, and functions to create manageable code.	3	2	-	2	-	-	-	1
BCP302.03	Analyze all the elements in the window forms.	3	2	-	2	-	1	-	1
BCP302.04	Write Windows applications using forms, controls, and events.	3	2	-	2	-	1	-	1
BCP302.05	Design, formulate, and construct applications with VB.NET.	3	2	-	2	-	1	-	1
	COURSE-WISE AVERAGE OF POs	**3**	**1.8**	-	**1.8**	-	**0.6**	-	**0.8**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP305	Web Technology Lab								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP305.01	Understand the working of internet and how to use it.	3	-	1	1	-	-	-	-
BCP305.02	Understand how to use HTML, DHTML and XML.	3	2	1	1	2	-	-	-
BCP305.03	Review and use web services.	3	-	1	-	-	-	-	-
BCP305.04	Identify and review the purpose and use of Web 2.0.	3	2	1	-	-	-	-	-
BCP305.05	Understand and use technology behind web 3.0	3	3	1	1	2	-	-	-
	COURSE-WISE AVERAGE OF POs	3	1.4	1	0.6	0.8	-	-	-

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA306	Web Development Using PHP								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA306.01	Explain the basic concepts of web development using PHP.	3	2	1	1	-	-		2
BCA306.02	Describe & apply process of control structure using PHP.	3	2	1	1	-			2
BCA306.03	Describe the working with data in PHP.	3	2	1	1	-			2

BCA306.04	Explain the working of functions present in PHP	3	2	1	1	-	-	-	2
BCA306.05	Explain the basic concepts of mysql using PHP.	3	2	1	1	-	-	-	2
	COURSE-WISE AVERAGE OF POs	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**2**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA307	**Computer Graphics**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA307.01	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.	3	2	-	2	-	-	-	2
BCA307.02	Implementing the geometric transformations on graphics objects	3	2	-	2	-	-	-	2
BCA307.03	Extract scene with different clipping methods and its transformation to graphics display device.	3	2	-	2	-	-	-	2
BCA307.04	Implementing of visible surface detection techniques for display of 3D scene on 2D screen.	3	2	-	2	-	-	-	2
BCA307.05	Render projected objects to naturalize the scene in 2D view and use of illumination models.	3	2	-	2	-	-	-	2
	COURSE-WISE AVERAGE OF POs	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**2**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCA308	NETWORK SECURITY								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCA308.01	Explain OSI architecture, security attacks, various security services and security mechanisms.	2	1	-	1	-	-	-	1
BCA308.02	Describe and Apply knowledge of symmetric cryptography like data encryption standards and advanced encryption standards.	2	2	-	1	-	-	-	1
BCA308.03	Describe and Compute asymmetric cryptographic algorithms and key management algorithms.	2	2	-	1	-	-	-	1
BCA308.04	Explain the knowledge of authentication and email security through examples	2	2	-	1	-	-	-	1
BCA308.05	Explain the knowledge of IP security, Web Security and System Security through examples	2	2	-	1	-	-	-	1
	COURSE-WISE AVERAGE OF POs	2	1.8	-	1	-	-	-	1

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCE313	Cloud Computing								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCE313.01	Analyze the key dimensions of the challenge of Cloud Computing	3	1	-	-	-			1
BCE313.02	Use current techniques, skills, and tools necessary for computing practice	3	2	-	1	-			-
BCE313.03	Use the relevant tools necessary for engineering practice.	3	2	-	-	-		-	-

BCE313.04	Design assessment the ability to develop and assess alternative system designs based on technical and non-technical criteria	3	2	-	-	-	-	-	1
BCE313.05	Analyze case studies to derive the best practice model to apply when developing and deploying cloud based applications.	3	2	-	1	-	-	-	1
	COURSE-WISE AVERAGE OF POs	**3**	**1.8**	**-**	**0.4**	**-**	**-**	**-**	**0.6**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP306	**Web Development Using PHP Lab**								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP306.01	Explain the basic concepts of web development using PHP.	3	2	1	1	-	-	-	2
BCP306.02	Describe & apply process of control structure using PHP.	3	2	1	1	-	-	-	2
BCP306.03	Describe the working with data in PHP.	3	2	1	1	-	-	-	2
BCP306.04	Explain the working of functions present in PHP	3	2	1	1	-	-	-	2
BCP306.05	Explain the basic concepts of mysql using PHP.	3	2	1	1	-	-	-	2
	COURSE-WISE AVERAGE OF POs	**3**	**2**	**1**	**1**			**-**	**2**

| Course Code	Course Title	CO-PO Mapping (Articulation Matrix)							
BCP307	Computer Graphics								
CO #	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
BCP307.01	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.	3	2	-	2	-	-	-	2
BCP307.02	Implementing the geometric transformations on graphics objects	3	2	-	2	-	-	-	2
BCP307.03	Extract scene with different clipping methods and its transformation to graphics display device.	3	2	-	2	-	-	-	2
BCP307.04	Implementing of visible surface detection techniques for display of 3D scene on 2D screen.	3	2	-	2	-	-	-	2
BCP307.05	Render projected objects to naturalize the scene in 2D view and use of illumination models.	3	2	-	2	-	-	-	2
	COURSE-WISE AVERAGE OF POs	3	2	-	2	-	-	-	2

C. Program outcome Reference Value:

Following table calculates the overall average of all POs of the Courses and is referred as COURSE-WISE AVERAGE OF POs Reference values.

SR. No.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
1	BCA101	Computer Fundamentals and Information Technology	2.200	1.200	1.000	1.200	-	-	-	-
2	BCA102	Digital Electronics	3.000	2.800	1.000	1.200	-	-	-	1.000
3	BCA103	English Language & Communication Skills	-	-	1.143	-	-	-	2.714	2.714
4	BCA104	Environmental Studies	-	-	-	-	3.000	-	0.250	1.500
5	BCA105	Foundation Course in Mathematics-I	3.000	1.800	-	-	-	-	-	1.000
6	BCA106	Principles and Practices of Management	3.000	0.600	0.600	-	0.200	0.600	1.200	1.000
7	BCA107	Programming COncepts Using C Language	3.000	2.333	-	1.667	-	-	-	1.833
8	BCP101	Computer Fundamentals and Information Technology Lab	2.200	1.200	1.000	1.200	-	-	-	-
9	BCP103	English Language & Communication Skills Lab	-	-	1.143	-	-	-	2.714	2.714
10	BCP107	Programming Concetps Using C Language Lab	3.000	2.333	-	1.667	-	-	-	1.833
11	BCA108	Advanced Concepts of C Programming	2.000	1.800	-	1.000	-	-	-	1.000
12	BCA109	Data Communication and Computer Networks	3.000	0.600	1.000	0.600	-	-	-	-

13	BCA110	Data Structures	2.400	1.400	0.800	-	-	-	-	1.400
14	BCA111	English Language and Composition Skills	-	-	1.000	-	-	-	2.833	3.000
15	BCA112	Foundation Course in Mathematics-II	3.000	2.000	-	-	-	-	-	1.000
16	BCA113	Fundamentals of Accounting and Finance	-	-	-	-	-	1.000	2.000	1.000
17	BCA114	Human Values & Professional Ethics	-	2.250	-	-	-	2.500	-	1.000
18	BCP108	Advanced Concepts of C Programming Lab	2.000	1.800	-	1.000	-	-	-	1.000
19	BCP110	Data Structures Lab	2.400	1.400	0.800	-	-	-	-	1.400
20	BCP111	English Language and Composition Skills Lab	-	-	1.000	-	-	-	2.833	3.000
21	BCA201	Computer Organization & Architecture	3.000	1.200	0.400	-	-	-	-	-
22	BCA202	Discrete Mathematical Structures	3.000	2.200	-	-	-	-	-	1.000
23	BCA203	Object Oriented Programming and Design	2.000	2.200	-	0.800	-	-	-	1.400
24	BCA204	Operating System	3.000	2.000	1.000	1.000	-	-	-	2.000
25	BCA205	Organizational Behaviour & Personal Management	-	-	-	-	-	2.000	2.750	1.000
26	BCP203	Object Oriented Programming and Design Lab	2.000	2.200	-	0.800				1.400
27	BCP204	Operating System Lab	3.000	2.000	1.000	1.000	-			2.000
28	BCA206	Computer Based Numerical and Statistical Techniques	3.000	2.400	-	-	-			.000
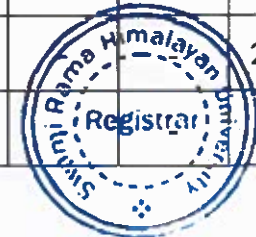
29	BCA207	Data Base Management Systems	3.000	2.200	-	1.600	-	-	-	1.000
30	BCA208	Design and Analysis of Algorithm	3.000	2.800	-	-	-	-	-	1.000
31	BCA209	Programming in JAVA	2.000	1.800	-	1.000	-	-	-	1.000
32	BCA210	E-Commerce	1.400	1.800	0.600	0.800	-	-	-	2.200
33	BCP206	Computer Based Numerical and Statistical Techniques Lab	3.000	2.400	-	-	-	-	-	1.000
34	BCP207	Data Base Management Systems Lab	3.000	2.200	-	1.600	-	-	-	1.000
35	BCP208	Design and Analysis of Algorithm Lab	3.000	2.800	-	-	-	-	-	1.000
36	BCP209	Programming in JAVA Lab	2.000	1.800	-	1.000	-	-	-	1.000
37	BCA301	Software Engineering	2.400	1.600	1.000	1.400	-	-	0.600	1.400
38	BCA302	Programming in VB .Net Lab	3.000	1.800	-	1.800	-	0.600	-	0.800
39	BCA303	Management Information Systems	2.000	1.800	-	1.600	-	-	-	1.000
40	BCA304	Optimization Techniques	3.000	2.000	-	-	-	-	-	1.000
41	BCA305	Web Technology	3.000	1.400	1.000	0.600	0.800	-	-	-
42	BCA309	Disaster Management	-	-	-	-	1.750	-	0.500	1.500
43	BCP302	Programming in VB .Net Lab	3.000	1.800	-	1.800	-	0.600	-	0.800
44	BCP305	Web Technology Lab	3.000	1.400	1.000	0.600	0.800	-	-	-
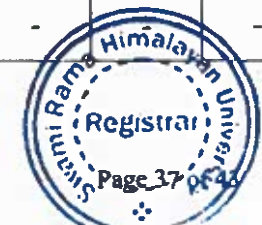
45	BCA306	Web Development Using PHP	3.000	2.000	1.000	1.000	-	-	-	2.000
46	BCA307	Computer Graphics	3.000	2.000	-	2.000	-	-	-	2.000
47	BCA308	NETWORK SECURITY	2.000	1.800	-	1.000	-	-	-	1.000
48	BCE313	Cloud Computing	3.000	1.800	-	0.400	-	-	-	0.600
49	BCP306	Web Development Using PHP Lab	3.000	2.000	1.000	1.000	-	-	-	2.000
50	BCP307	Computer Graphics	3.000	2.000	-	2.000	-	-	-	2.000
Combined COURSE-WISE AVERAGE OF POs Reference values			**2.200**	**1.578**	**0.370**	**0.687**	**0.131**	**0.146**	**0.368**	**1.250**

D. Assessment of CO and PO Attainment Value

The attainment of the course outcome is measured at the level of 3 as follows:

Attainment Levels	Criteria
3	If **80%** of student achieves marks **greater** than threshold percentage of the total score of assessment
2	If **70%** of student achieves marks **greater** than threshold percentage of the total score of assessment
1	If **60%** of student achieves marks **greater** than threshold percentage of the total score of assessment
0	If **60%** of student achieves marks **less** than threshold percentage of the total score of assessment

Attainment level of COs is measured through direct attainment of COs depending on the performance of the students in Internal Assessment (IA) and End Semester Examination (ESE) individually. For the BCA program the threshold percentage is set at 50% for ESE and 60% for IA. assessments. The weightage of attainments for IA and ESE is in proportion of 30:70.

SR. No.	Course Code	Course Title	Attainment of COs	Derived Attainment of POs Course-wise							
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
1	BCA101	Computer Fundamentals and Information Technology	**3.000**	2.200	1.200	1.000	1.200	-	-	-	-
2	BCA102	Digital Electronics	**2.000**	2.000	1.867	0.667	0.800	-	-	-	0.667
3	BCA103	English Language & Communication Skills	**0.000**	-	-	-	-	-	-	-	-
4	BCA104	Environmental Studies	**1.000**	-	-	-	-	1.000	-	0.083	0.500
5	BCA105	Foundation Course in Mathematics-I	**0.000**	-	-	-	-	-	-	-	-
6	BCA106	Principles and Practices of Management	**0.000**	-	-	-	-	-		-	
7	BCA107	Programming COncepts Using C Language	**0.000**	-	-	-	-	-	-	-	
8	BCP101	Computer Fundamentals and Information Technology Lab	**1.500**	1.100	0.600	0.500	0.600	-	-	-	

9	BCP103	English Language & Communication Skills Lab	0.500	-	-	0.191	-	-	-	0.452	0.452
10	BCP107	Programming Concetps Using C Language Lab	2.000	2.000	1.555	-	1.111	-	-	-	1.222
11	BCA108	Advanced Concepts of C Programming	3.000	2.000	1.800	-	1.000	-	-	-	1.000
12	BCA109	Data Communication and Computer Networks	3.000	3.000	0.600	1.000	0.600	-	-	-	-
13	BCA110	Data Structures	3.000	2.400	1.400	0.800	-	-	-	-	1.400
14	BCA111	English Language and Composition Skills	1.000	-	-	0.333	-	-	-	0.944	1.000
15	BCA112	Foundation Course in Mathematics-II	3.000	3.000	2.000	-	-	-	-	-	1.000
16	BCA113	Fundamentals of Accounting and Finance	2.000	-	-	-	-	-	0.667	1.333	0.667
17	BCA114	Human Values & Professional Ethics	3.000	-	2.250	-	-	-	2.500	-	1.000
18	BCP108	Advanced Concepts of C Programming Lab	3.000	2.000	1.800	-	1.000	-	-	-	1.000
19	BCP110	Data Structures Lab	3.000	2.400	1.400	0.800	-	-	-	-	1.400
20	BCP111	English Language and Composition Skills Lab	2.000	-	-	0.667	-	-	-	1.889	2.000
21	BCA201	Computer Organization & Architecture	1.500	1.500	0.600	0.200	-	-	-	-	-
22	BCA202	Discrete Mathematical Structures	0.000	-	-	-	-	-	-	-	-
23	BCA203	Object Oriented Programming and Design	1.500	1.000	1.100	-	0.400	-			0.700
24	BCA204	Operating System	1.500	1.500	1.000	0.500	0.500	-			1.000

25	BCA205	Organizational Behaviour & Personal Management	1.500	-	-	-	-	-	1.000	1.375	0.500
26	BCP203	Object Oriented Programming and Design Lab	3.000	2.000	2.200	-	0.800	-	-	-	1.400
27	BCP204	Operating System Lab	3.000	3.000	2.000	1.000	1.000	-	-	-	2.000
28	BCA206	Computer Based Numerical and Statistical Techniques	1.500	1.500	1.200	-	-	-	-	-	0.500
29	BCA207	Data Base Management Systems	1.500	1.500	1.100	-	0.800	-	-	-	0.500
30	BCA208	Design and Analysis of Algorithm	1.500	1.500	1.400	-	-	-	-	-	0.500
31	BCA209	Programming in JAVA	1.500	1.000	0.900	-	0.500	-	-	-	0.500
32	BCA210	E-Commerce	1.500	0.700	0.900	0.300	0.400	-	-	-	1.100
33	BCP206	Computer Based Numerical and Statistical Techniques Lab	3.000	3.000	2.400	-	-	-	-	-	1.000
34	BCP207	Data Base Management Systems Lab	0.000	-	-	-	-	-	-	-	-
35	BCP208	Design and Analysis of Algorithm Lab	0.000	-	-	-	-	-	-	-	-
36	BCP209	Programming in JAVA Lab	3.000	2.000	1.800	-	1.000	-	-	-	1.000
37	BCA301	Software Engineering	1.000	0.800	0.533	0.333	0.467	-	-	0.200	0.467
38	BCA302	Programming in VB .Net Lab	0.000	-	-	-	-	-	-	-	-
39	BCA303	Management Information Systems	1.000	0.667	0.600	-	0.533	-			0.333
40	BCA304	Optimization Techniques	0.000	-	-	-	-	-			-

41	BCA305	Web Technology	1.000	1.000	0.467	0.333	0.200	0.267	-	-	-
42	BCA309	Disaster Management	2.000	-	-	-	-	1.167	-	0.333	1.000
43	BCP302	Programming in VB .Net Lab	3.000	3.000	1.800	-	1.800	-	0.600	-	0.800
44	BCP305	Web Technology Lab	3.000	3.000	1.400	1.000	0.600	0.800	-	-	-
45	BCA306	Web Development Using PHP	1.000	1.000	0.667	0.333	0.333	-	-	-	0.667
46	BCA307	Computer Graphics	0.000	-	-	-	-	-	-	-	-
47	BCA308	NETWORK SECURITY	1.500	1.000	0.900	-	0.500	-	-	-	0.500
48	BCE313	Cloud Computing	0.000	-	-	-	-	-	-	-	-
49	BCP306	Web Development Using PHP Lab	2.500	2.500	1.667	0.833	0.833	-	-	-	1.667
50	BCP307	Computer Graphics	3.000	3.000	2.000	-	2.000	-	-	-	2.000
COURSE-WISE AVERAGE OF POs Achievement Through Results				**1.165**	**0.862**	**0.216**	**0.380**	**0.065**	**0.095**	**0.132**	**0.629**
COURSE-WISE AVERAGE OF POs Reference values				**2.200**	**1.578**	**0.370**	**0.687**	**0.131**	**0.146**	**0.368**	**1.250**
Percentage Attainment of PO's				52.97%	54.62%	58.37%	55.27%	49.36%	65.30%	35.94%	50.31%

From the Attainment level of CO, the Derived PO's value for course is calculated as follows:

$$Derived\ PO\ Value = \frac{CO\ attaintment \times respective\ PO\ average}{3}$$

Depending on derived PO values of the courses, calculate the COURSE-WISE AVERAGE OF POs achievement for each PO.

Calculate the percentage attainment of PO's as follows:

$$Percentage\ attainment\ of\ PO's = \frac{Average\ PO\ Attainment\ through}{average\ PO\ refrenece\ value} \times 100$$