FACULTY OF COMPUTER SCIENCE & IT

SYLLABUS

of

Bachelor of Computer Applications

(Semester I-VI)

(Under Continuous Evaluation System)

(12+3 System of Education)

Session: 2022-23

The Heritage Institution

KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)

PROGRAMME SPECIFIC OUTCOMES

Bachelor of Computer Applications
(Session 2022-23)

Program Specific Outcomes

PSO1: Apply skills for development of software and websites for providing efficient solution to IT based problems

PSO2: Comprehend development process in IT industry through ethical, defined and innovative techniques.

PS03: Achieve leadership role and team player role to be able to work in multidisciplinary areas at various job roles.

PSO4: Identify and demonstrate the implementation of various tools and technologies involved in the field of Information Technology.

PSO5: Demonstrate proficiency in the field of Programming, Web development and IT enabled services.

Bachelor of Computer Applications Semester – I
(Session 2022-23)
COURSE CODE: BCAL–1031
BASIC PUNJABI

In lieu of Punjabi(Compulsory)

Course outcomes

CO1:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨੂੰ ਸਿਖਾਉਣ ਦੀ ਪ੍ਰਕਿਰਿਆ ਵਿਚ ਪਾ ਕੇ ਇਕ ਹੋਰ ਭਾਸ਼ਾ ਸਿੱਖਣ ਦਾ ਮੌਕਾ ਪ੍ਰਦਾਨ ਕਰਨਾ ਹੈ।

CO2:ਇਸ ਵਿਚ ਵਿਦਿਆਰਥੀ ਨੂੰ ਬਾਰੀਕਬੀਨੀ ਨਾਲ ਭਾਸ਼ਾ ਦਾ ਅਧਿਐਨ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO3:ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ ਤੋਂ ਜਾਣੂ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO4:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ ਬਾਰੇ ਦੱਸਣਾ ਹੈ।

CO5:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦਾ ਸ਼ਬਦ ਘੇਰਾ ਵਿਸ਼ਾਲ ਕਰਨਾ ਹੈ।

CO6:ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਵਿਚ ਹਫ਼ਤੇ ਦੇ ਸੱਤ ਦਿਨਾਂ ਦੇ ਨਾਂ, ਬਾਰ੍ਹਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਂ, ਰੁੱਤਾਂ ਦੇ ਨਾਂ, ਇਕ ਤੋਂ ਸੌ ਤੱਕ ਗਿਣਤੀ ਸ਼ਬਦਾਂ ਵਿਚ ਸਿਖਾਉਣਾ ਹੈ।

Bachelor of Computer Applications Semester – I
(Session 2022-23)
COURSE CODE: BCAL–1431

Punjab History and Culture (From Earliest Times to C 320)
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

COURSE OUTCOMES

After completing Semester I and course on Punjab History and Culture students of History will be able to identify and have a complete grasp on the sources & writings of Ancient Indian History of Punjab.

CO1: Identify and understand the sources and physical features of Punjab

CO2:- To study the earliest civilization (Indus Valley Civilization) and original home of Aryans

CO3:- To examine the Social, Religious and Economic life during Early and Later Vedic Age

CO4: To comprehend the Buddhist, Jain and Hindu faith and their relevance in the modern times

Bachelor of Computer Applications Semester – I
(Session 2022-23)
COURSE CODE: BCAL–1102
COMMUNICATION SKILLS IN ENGLISH

COURSE OUTCOMES:

At the end of this course, the students will develop the following Skills:

CO1: Reading skills that will facilitate them to become an efficient reader

CO2: Through reading skills, the students will have an ability to have a comprehensive understanding of the ideas in the text and enhance their critical thinking

CO3: Writing skills of students which will make them proficient enough to express ideas in clear and grammatically correct English

CO4: The skill to use an appropriate style and format in writing letters (formal and informal) and resume, memo, notices, agenda, minutes

Bachelor of Computer Applications Semester – I
(Session 2022-23)
COURSE CODE: BCAL–1333
APPLIED AND DISCRETE MATHEMATICS

Course Outcomes:

After passing this course the student will be able to:

CO1: Apply various operations on sets and relations

CO2: Represents world knowledge in symbolic notation through propositional calculus

CO3: Apply Boolean algebra to solve problems like minimization, standard form etc.

CO4: Apply various operations like addition, subtraction, multiplication, inverse etc. on matrices

Bachelor of Computer Applications Semester – I
(Session 2022-23)
COURSE CODE: BCAM–1114
INTRODUCTION TO PROGRAMMING – C

Course Outcome:

After passing course the student will be able to:

CO1: Comprehend the working of various programming constructs involved in C Programming
CO2: Design C program and control its sequence using various control statements
CO3: Apply programming concepts such as arrays, functions and strings to provide solution in different problem domains
CO4: Work with pointers, structures and union

Bachelor of Computer Applications Semester – I
(Session 2022-23)
COURSE CODE: BCAM–1115
INTRODUCTION TO COMPUTERS AND INFORMATION TECHNOLOGY

Course Outcome:

After passing course the student will be able to:

CO1: Comprehend about computer hardware, operating system concepts and various system software

CO2: Identify various input, output and memory devices

CO3: Apply office automation software to create professional and academic documents and presentations

CO4: Manage data in a spreadsheet along with its representation through graphs

Bachelor of Computer Applications Semester – I
(Session 2022-23)
COURSE CODE: AECD - 1161
DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION (COMPULSORY)

Course Outcomes

After completing the course, the students will be able to:

CO1. Learn how to include factual data about what substance abuse is; warning signs of addiction; information about how alcohol and specific drugs affect the mind and body

CO2. Learn how to be supportive during the detoxification and rehabilitation process

CO3. Focus on substance abuse education- is teaching individuals about drug and alcohol abuse and how to avoid, stop, or get help for substance use disorders

CO4. Understand that substance abuse education is important for students alike; there are many misconceptions about commonly used legal and illegal substances, such as alcohol and marijuana

Bachelor of Computer Applications Semester – II
(Session 2022-23)
COURSE CODE: BCAL–2421
PUNJABI (COMPULSORY)

COURSE OUTCOMES

CO1: ਆਤਮ ਅਨਾਤਮ ਪੁਸਤਕ ਦੇ ਕਹਾਣੀ ਭਾਗ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਕਹਾਣੀ ਨੂੰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਕਹਾਣੀ ਜਗਤ ਨਾਲ ਜੋੜਣਾ ਹੈ।

CO2:ਗੱਦ ਪ੍ਰਵਾਹ (ਰੇਖਾ ਚਿਤ੍ਰ ਤੇ ਹਲਕੇ ਲੇਖ) ਪੁਸਤਕ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਮੁੱਲਵਾਨ ਇਤਿਹਾਸ ਤੋਂ ਜਾਣੂ ਕਰਵਾਉਣਾ ਹੈ।

CO3:ਸੰਖੇਪ ਰਚਨਾ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਸਮੇਂ ਅਤੇ ਮਿਹਨਤ ਦੀ ਬੱਚਤ ਕਰਨ ਬਾਰੇ ਦੱਸਣਾ ਹੈ।

CO4:ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਦਾ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ -ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ।

CO5:ਮੁਹਾਵਰਿਆਂ ਦੀ ਵਰਤੋਂ ਨਾਲ ਗੱਲਬਾਤ ਵਿਚ ਪਰਪੱਕਤਾ ਆਉਂਦੀ ਹੈ।ਇਹ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਗੱਲਬਾਤ ਵਿਚ ਨਿਖਾਰ ਲਿਆਉਣ ਦਾ ਕੰਮ ਕਰਨਗੇ।

Bachelor of Computer Applications Semester – II
(Session 2022-23)
COURSE CODE: BCAL–2031
BASIC PUNJABI

In lieu of Punjabi(Compulsory)

Course outcomes

CO1: ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨੂੰ ਸਿਖਾਉਣ ਦੀ ਪ੍ਰਕਿਰਿਆ ਵਿਚ ਪਾ ਕੇ ਇਕ ਹੋਰ ਭਾਸ਼ਾ ਸਿੱਖਣ ਦੇ ਮੌਕੇ ਪ੍ਰਦਾਨ ਕਰਨਾ ਹੈ।

CO2: ਇਸ ਵਿਚ ਵਿਦਿਆਰਥੀ ਨੂੰ ਬਾਰੀਕਬੀਨੀ ਨਾਲ ਭਾਸ਼ਾ ਦਾ ਅਧਿਐਨ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO3: ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ ਤੋਂ ਜਾਣੂ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO4: ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਦਾ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ -ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ।

CO5: ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦਾ ਸ਼ਬਦ ਘੇਰਾ ਵਿਸ਼ਾਲ ਕਰਨਾ ਹੈ।

CO6: ਵਿਦਿਆਰਥੀ ਵਾਕ ਦੀ ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਇਸਦੀ ਬਣਤਰ ਤੋਂ ਜਾਣੂ ਹੋਣਗੇ ਅਤੇ ਭਾਸ਼ਾ ਤੇ ਪਕੜ ਮਜਬੂਤ ਹੋਵੇਗੀ।

CO7: ਪੈਰ੍ਹਾ ਰਚਨਾ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ।

CO8: ਘਰੇਲੂ ਅਤੇ ਦਫ਼ਤਰੀ ਚਿੱਠੀ ਪੱਤਰ ਲਿਖਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਇਸ ਕਲਾ ਵਿਚ ਨਿਪੁੰਨ ਕਰਨਾ ਹੈ।

CO9: ਮੁਹਾਵਰਿਆਂ ਦੀ ਵਰਤੋਂ ਨਾਲ ਗੱਲਬਾਤ ਵਿਚ ਪਰਪੱਕਤਾ ਆਉਂਦੀ ਹੈ।ਇਹ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਗੱਲਬਾਤ ਵਿਚ ਨਿਖਾਰ ਲਿਆਉਣ ਦਾ ਕੰਮ ਕਰਨਗੇ।

Bachelor of Computer Applications Semester – II
(Session 2022-23)
COURSE CODE: BCAL–2431

Punjab History and Culture (From Earliest Times to C 320)
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

COURSE OUTCOMES

After completing Semester II and course on Ancient History of Punjab students will be able to understand:

CO1: The reasons and impact of Alexander's invasions

CO1(a): To understand the various factors leading to rise and fall of empires and emergence of new dynasties and their administration specifically of Maurya rule in general and Ashok in particular

CO2: art and architecture of Gupta period and the Indo-Greek style of architecture under Gandhara School

CO3: To have an insight into the socio-cultural history under Harshvardhan and punjab under the stated period

CO4: To enable students to have thorough insight into the various forms/styles of Architecture and synthesis of Indo - Greek Art and Architecture in Punjab

Bachelor of Computer Applications Semester – II
(Session 2022-23)
COURSE CODE: BCAM–2102
COMMUNICATION SKILLS IN ENGLISH

Examination Time: (3+3) Hours **Max. Marks: 50**
Theory: 25
Practical: 15
CA: 10

COURSE OUTCOMES:

At the end of this course, the students will develop the following skills:

CO1: Enhancement of listening skills with the help of listening exercises based on conversation, news and TV reports

CO2: The ability of Note-Taking to be able to distinguish the main points from the supporting details and the irrelevant information from the relevant one using Listening Skills

CO3: Acquisition of knowledge of phonetics which will help them in learning about correct pronunciation as well as effective speaking

CO4: Speaking skills of the students enabling them to take active part in group discussion and present their own ideas

Bachelor of Computer Applications Semester – II
(Session 2022-23)
COURSE CODE: BCAL–2113
PRINCIPLES OF DIGITAL ELECTRONICS

Course Outcomes:
After the completion of this course, the student will be able to:

CO1: Comprehend and apply the number systems

CO2: Apply K-map for simplification of Boolean expressions and implement them with Logic Gates

CO3: Design advanced and complex combinational and sequential circuits

CO4: Demonstrate the internal structure of semiconductor memory

Bachelor of Computer Applications Semester – II
(Session 2022-23)
COURSE CODE: BCAL–2114
NUMERICAL METHODS AND STATISTICAL TECHNIQUES

Course Outcomes:
After the completion of this course, the student will be able to:

CO1: Solve non-linear and linear equations using different methods

CO2: Comprehend interpolation and numerical integration

CO3: Calculate different means and deviations using statistical techniques

CO4: Comprehend correlation, curve fitting and regression for finding solutions to various statistical problems

Bachelor of Computer Applications Semester – II
(Session 2022-23)
COURSE CODE: BCAM–2115
INTRODUCTION TO OBJECT ORIENTED PROGRAMMING-I

Course Outcomes:
After the completion of this course, the student will be able to:

CO1: Comprehend the concepts of Object-Oriented Programming Paradigm

CO2: Identify the use of access specifiers and different types of constructors in class

CO3: Apply function and operator overloading

CO4: Comprehend different types of inheritance and polymorphism

Bachelor of Computer Applications Semester – III
(Session 2022-23)
COURSE CODE: BCAL-3111
FOUNDATION OF DATA SCIENCE

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend basic concepts of Data Science along with its components and process

CO2: Interpret various data collection tools

CO3: Analyze different application areas and challenges of data science

CO4: Work with Power BI for visualization of data

Bachelor of Computer Applications Semester – III
(Session 2022-23)
COURSE CODE: BCAL–3112
DATABASE MANAGEMENT SYSTEM

Course Outcomes:
After passing course the student will be able to:

CO1: Understand data, database and database models

CO2: Apply relational algebra and relational calculus for performing queries of different types

CO3: Gain knowledge of normalization and transaction control

CO4: Create, manage and access database using SQL and PL/SQL

Bachelor of Computer Applications Semester – III
(Session 2022-23)
COURSE CODE:BCAL–3113
COMPUTATIONAL PROBLEM SOLVING

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend basics of Python programming like operators, data types, control structures, etc.

CO2: Apply list and directories for handling and accessing data through iterations

CO3: Implement various built-in and user defined function to solve mathematical problems

CO4: Comprehend Object Oriented Programming and modules in Python

Bachelor of Computer Applications Semester – III
(Session 2022-23)
COURSE CODE: AECE-3221
ENVIRONMENTAL STUDIES
(COMPULSORY PAPER)

Course Outcomes:

CO1: Understand the concept and need of environmental education

CO2: Understand the role of an individual in conservation of natural resources

CO3: Learn about role of major Eco system and their conservation

CO4: Develop desirable attitude, value and respect for protection of Biodiversity

CO5: Learn about the control measure of pollution and solid waste management

CO6: Understand the role of different agencies in the protection of environment

CO7: Knowledge regarding welfare programmes and Human rights

CO8: Knowledge about the applied value of environmental studies

Bachelor of Computer Applications Semester – IV
(Session 2022-23)
COURSE CODE: BCAL–4111
DATA STRUCTURES

Course Outcomes:

After passing course the student will be able to:

CO1: Analyze complexity of algorithms to determine their efficiency

CO2: Comprehend various hashing method, sorting and searching algorithms

CO3: Comprehend various operations of stack and queue along with different scenarios

CO4: Comprehend advanced data structures such as tree and graph

Bachelor of Computer Applications Semester – IV
(Session 2022-23)
COURSE CODE: BCAL–4112
INFORMATION SYSTEMS

Course Outcomes:

After passing course the student will be able to:

CO1: Identify the importance of data and information management

CO2: Comprehend development lifecycle of information systems

CO3: Identify the components and applications of Management Information System and Decision Support System

CO4: Identify the role of Information System in organizations: Accounting Information systems, Inventory control systems and Marketing systems

Bachelor of Computer Applications Semester – IV
(Session 2022-23)
COURSE CODE: BCAL-4113
INTERNET APPLICATIONS

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend basics of internet and email along with their effective use

CO2: Apply HTML for development of static webpages

CO3: Implement styling and behavior in webpages through the use of CSS and JavaScript

CO4: Create and manage websites through the application of WordPress content management system

Bachelor of Computer Applications Semester – IV
(Session 2022-23)
COURSE CODE: BCAL–4114
COMPUTER ARCHITECTURE

Course Outcomes:
After passing course the student will be able to:

CO1: Comprehend various registers and its micro-operations, computer instructions and basic design of computer

CO2: Comprehend various instruction formats and addressing modes

CO3: Identify the hierarchy of computer memory and their organization

CO4: Comprehend I/O organization, Pipeline and vector processing

Bachelor of Computer Applications Semester – V
(Session 2022-23)
COURSE CODE: BCAL-5111
COMPUTER NETWORKS

Course Outcomes:
After passing course the student will be able to:

CO1: Describe the functions of each layer in OSI and TCP/IP model.

CO2: Identify various network devices and the layers on which it operates.

CO3: Describe the Data Link layer and Network layer design issues.

CO4: Comprehend the functioning of Transport layer and Application layer protocols.

Bachelor of Computer Applications Semester – V
(Session 2022-23)
COURSE CODE: BCAL-5112
WEB TECHNOLOGIES

Course Outcomes:
After passing course the student will be able to:

CO1: Develop user interface of single page website through React

CO2: Apply PHP as server side scripting language for control of flow, file handling, cookie and session handling, database interactions etc.

CO3: Comprehend the application of XML, AJAX, JQuery and REST

CO4: Comprehend the process of web hosting and incorporation of emerging web technologies

Bachelor of Computer Applications Semester – V
(Session 2022-23)
COURSE CODE: BCAL - 5113
OPERATING SYSTEM

Course Outcomes:

After passing course the student will be able to:

CO1: Describe, contrast and compare different types of Operating System

CO2: Understand the process synchronization policies and CPU scheduling

CO3: Describe and analyze the memory management and its allocation policies

CO4: Comprehend about the application of virtual memory and disk scheduling

Bachelor of Computer Applications Semester – V
(Session 2022-23)
COURSE CODE: BCAL-5114
OBJECT ORIENTED PROGRAMMING-II

Course Outcomes:
After passing this course the student will be able to:

CO1: Understand the basic fundamentals of Object-Oriented Programming using Java

CO2: Identify the use of inheritance, interfaces and packages in Java

CO3: Identify the utilization of multithreading and Exception handling

CO4: Connect Java application with an existing database and access it through JDBC

Bachelor of Computer Applications Semester – VI
(Session 2022-23)
COURSE CODE: BCAL - 6111
COMPUTER GRAPHICS

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend the background mechanism involved in display devices like CRT, LCD, LED etc.

CO2: Comprehend basic concepts involved in drawing basic shapes

CO3: Implement various algorithms and techniques to clip and transform various objects and viewports

CO4: Identify the importance of viewing and projections

Bachelor of Computer Applications Semester – VI
(Session 2022-23)
COURSE CODE: BCAL - 6112
SOFTWARE ENGINEERING

Course Outcomes:

After passing course the student will be able to:

CO1: Identify and evaluate various process model used for development of software

CO2: Analyze gathered data to form requirement specifications and formulate design from this requirement specifications

CO3: Comprehend activities involved in software project management

CO4: Apply testing techniques on basic building blocks and control structure of a software

Bachelor of Computer Applications Semester – VI
(Session 2022-23)
COURSE CODE: BCAD - 6114
PROJECT

Course Outcomes:
After passing this course the student will be able to:

CO1: Apply software engineering paradigms like Process Model, Analysis, Design, Testing etc.

CO2: Work within defined time and resource constraints while developing real world application

CO3: Address the Real-World Problems and find the required solution

CO4: Demonstrate an ability to work in teams and manage the conduct of the research study

CO5: Formulate and propose a plan for creating a solution