ST. PHILOMENA'S COLLEGE(AUTONOMOUS)

Affiliated to University of Mysore
Accredited by NAAC with 'B^{++}' Grade
Bannimantap, Mysore, Karnataka,
India-570015

DEPARTMENT OF COMPUTER APPLICATION

The Board of Studies in COMPUTER SCIENCE which met on-31.08.2024 has

approved the syllabus and pattern of examination for

Semesters V and VI for the

Academic Year 2024-25

BOS COMMITTEE MEMBERS

Sl. No.	Name	Designation
1.	Ms. Gloriya Priyadarshini	Chairperson
2.	Mr. Nagendra Swamy	Member
3.	Mr.Chandraiah T	Member
4.	Mr.Anil Kumar R.J	Member
5.	Ms.Nalina kumari DM	Member
6.	H.S Mr. Amos R	Member
7.	Mr.Dharmendar Gajra	Member
8.	Ms.Harinakshi	Member
9.	Ms.Syeda Masarath	Member
10.	Ms.Archana A	Member
11.	Ms.Sandra Agnes J	Member
12.	Ms.Manasa E	Member
13.	Ms.Lydiya Anjali A	Member
14.	Mr. Manikantha Ganesh	Member
15.	Ms.Amulya.S	Member

Model Curriculum Structure

Program: B.C.A Subject: Computer Science

Course No.	Theory/ Practical	Credits	Paper Title	Marks	
S.A.			**I.A.**		
DSC13	Theory	4	Design & Analysis of Algorithms	60	40
DSC13-Lab	Practical	2	Design & Analysis of Algorithms Lab	25	25
DSC14	Theory	4	Statistical Computing and R Programming	60	40
DSC14-Lab	Practical	2	R Programming Lab	25	25
DSC15	Theory	4	Software Engineering	60	40
	Theory	3	A. Cloud Computing B. Business Intelligence	60	40
Voc-1	Theory	3	Digital Marketing	60	40
SEC-4	Theory/Practical	2	Cyber Security	25	25
VI SEM					
DSC16	Theory	4	Artificial Intelligence and Applications	60	40
DSC16 - Lab	Practical	2	Artificial Intelligence and Applications Lab	25	25
DSC17	Theory	4	PHP and MySQL	60	40
DSC17-Lab	Practical	2	PHP and MySQL Lab	25	25
Project Work		4	Project Work	60	40
DSE-E2	Theory	3	A. Fundamentals of Data Science B. Mobile Application Development	60	40
Voc-2	Theory	3	Web Content Management System	60	40
SEC-5		2	Internship	50	50

Semester V <mark>BCA (</mark>Software Engineering<mark>)</mark>
Core Course Content

Course Title: **Software Engineering(Theory)**	Course Credits: **4**
Course Code: **DSC15**	L-T-P per week: <mark>4-0-0</mark>
Total Contact Hours**: 52Hrs**	
Formative Assessment Marks:40	Summative Assessment Marks:60

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

Note: Any two different activities for C2 First component and C2 Second component can be selected from the below
Quiz/Project/Class room exercise/Practice exercise/Educational (industry/ institutes/ NGOs) visit/ field trip/ Field work/Viva voce/Role Play/Charts/ Models/Case study/Group discussion/Crosswords/
Presentation/seminar/Review – movie / Book/Research articles/e – content preparation

Course Objectives:
1. Decompose the given project in various phases of a lifecycle.

2. Choose appropriate process model depending on the user requirements.

3. Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.

4. Know various processes used in all the phases of the product.

5. Apply the knowledge, techniques, and skills in the development of a software product.

Course Learning Outcomes
 On completion of the course the student will learn to

1. How to apply the software engineering life cycle by demonstrating competence in Communication, planning, analysis, design, construction, and deployment.
2. An ability to working one or more significant application domains.
3. Work as an individual and as part of a multi disciplinary team to develop and deliver quality software.
4. Demonstrate an understanding of and apply current theories, models, and techniques that.
5. Provide a basis for the software lifecycle.

COURSE CONTENT

Contents	52Hrs
OVERVIEW: Introduction, Software product and characteristics, software engineering applications ,software engineering ethics; Software process models- water fall model,spiral model, prototyping model,RAD model,Agile software development	10
REQUIREMENTS ENGINEERING: Functional and non-functional requirements; Software requirements document; feasibility studies; Requirements engineering processes; Requirement's elicitation and analysis; Requirements management.	10
SYSTEM MODELING: Context models; Interaction models- Use case modeling, Sequence diagrams; Structural models- Class diagrams, Generalization, Aggregation; Behavioral models Data-driven modeling,DFD's.	10
Software DESIGN: software design process ; Architectural design; modularity , coupling, cohesion and its types ; Client–server architecture Pipe and filter architecture. Object oriented design-object and classes, design process; user interface design analysis, interface design steps; UML	12
Verification and validation :software Testing strategies, types of testing, System testing ,test cases . Software management: project management –activities, planning, project scheduling Risk management-introduction to software risk, types of software risk , risk refinement Software cost estimation-estimation techniques, COCOMO model, project duration and staffing, Introduction to software quality management	10

Semester V <mark>BCA (</mark>Design and Analysis of Algorithm(Theory)<mark>)</mark>

Core Course Content

Course Title: **Design and Analysis of Algorithm(Theory)**	Course Credits: **4**
Course Code: **DSC13**	L-T-P per week: <mark>4-0-0</mark>
Total Contact Hours**: 52Hrs**	
Formative Assessment Marks:40	Summative Assessment Marks:60

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

Note: Any two different activities for C2 First component and C2 Second component can be selected from the below
Quiz/Project/Class room exercise/Practice exercise/Educational (industry/ institutes/ NGOs) visit/ field trip/ Field work/Viva voce/Role Play/Charts/ Models/Case study/Group discussion/Crosswords/
Presentation/seminar/Review – movie / Book/Research articles/e – content preparation

Course Objectives:

1. Discuss the fundamentals of the algorithms.

2. Describe the analysis of algorithm efficiency using different notations.

3. Discuss various problems using Brute force technique.

4. Describe various problems using Divide and- Conquer Technique.

Course Learning Outcomes
After the successful completion of the course, the student will be able to:
1. Understand the fundamental concepts of algorithms and their complexity, including time and space complexity, worst-case and average-case analysis, and Big- Onotation. BL(L1,L2)
2.Design algorithms for solving various types of problems, such as Sorting, Searching, Graph traversal, Decrease-and-Conquer, Divide-and-Conquer and Greedy Techniques. BL (L1,L2,L3)
CO3. Analyze and compare the time and space complexity of algorithms with other algorithm techniques. BL(L1,L2,L3,L4)

CO4. Evaluate the performance of Sorting, Searching, Graph traversal, Decrease-and-Conquer, Divide-and-Conquer
and Greedy Techniques using empirical testing and bench marking, and identify their limitations
and potential improvements. BL(L1,L2, L3,L4)
CO5. Apply various algorithm design to real-world problems and evaluate their effectiveness and
efficiency in solving them. BL(L1, L2, L3)
Note: Blooms Level(BL): L1=Remember, L2=Understand, L3=Apply, L4=Analyze,
L5= Evaluate,L6= Create

COURSE CONTENT

Contents	52Hrs
Introduction: What is an Algorithm? Fundamentals of Algorithmic problem solving, Fundamentals of the Analysis of Algorithm Efficiency, Analysis Framework, Measuring the input size, Units form ensuring Running time, Orders of Growth, Worst-case, Best-case and Average-case efficiencies.	10
Asymptotic Notations and Basic Efficiency classes, Inform all Introduction, O-notation, Ω-notation, θ-notation, mathematical analysis of non-recursive algorithms, mathematical analysis of recursive algorithms.	10
Brute Force & Exhaustive Search: Introduction to Brute Force approach, Selection Sort and Bubble Sort, Sequential search, Exhaustive Search- Travelling Salesman Problem and Knapsack Problem, Depth First Search, Breadth First Search	11
Decrease-and-Conquer: Introduction, Insertion Sort, Topological Sorting Divide-and-Conquer: Introduction, Merge Sort, Quick Sort, Binary Search, Binary Tree traversals and related properties.	11
Greedy Technique: Introduction, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Lower-Bound Arguments, Decision Trees, P Problems, NP Problems, NPComplete Problems, Challenges of Numerical Algorithms	10

Semester V <mark>BCA</mark> (Design and Analysis of Algorithms Laboratory (Practical))
Core Course Content

Course Title: **Design and Analysis of Algorithms Laboratory (Practical)**	Course Credits: **2**
Course Code: **DSC13-Lab**	L-T-P per week: 4-0-0
Total Contact Hours**: 4Hours/wk**	
Formative Assessment Marks: **25Marks**	Summative Assessment Marks: **25Marks**

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

Course Objectives:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.

Course Learning Outcomes

On completion of the course the student will learn to

1. Discuss the fundamentals of the algorithms.

2. Describe the analysis ofalgorithm efficiency using different notations.

3. Discuss various problems using Brute force technique.

4, Describe various problems using Divide and-Conquer Technique.

4. Describe various problems using Decrease-and-Conquer.

5. Discuss Greedy Techniques.
6. Devise an algorithm using appropriate design strategies for problem solving.
7. Estimate the computational complexity of different algorithms.

8. Demonstrate the hardness of simple NP-complete problems.

Practical Content

1. Write a program to sort a list of N elements using Selection Sort Technique.
2. Write a program to perform Travelling Salesman Problem
3. Write program to implement Dynamic Programming algorithm for the 0/1 Knapsack problem.
4. Write a program to perform Knapsack Problem using Greedy Solution
5. Write program to implement the DFS and BFS algorithm for a graph.
6. Write a program to find minimum and maximum value in an array using divide and conquer.
7. Write a test program to implement Divide and Conquer Strategy .Eg: Quick sort algorithm for sorting list of integers i
ascending order.
8. Write a program to implement Merge sort algorithm for sorting a list of integers in ascending order.
9. Sort a given set of n integer elements using Merge Sort method and compute its time
complexity. Run the program or varied values of n>5000, and record the time taken to
sort.
10. Sort a given set of n integer elements using Quick Sort method and compute its time
complexity. Run the program for varied values of n>5000 and record the time taken to
sort.
11. Write a test program to sort the elements of the array in ascending using quick sort.
12. Write a program to check the given array is unique or not
13. Write a program to sort the array elements in ascending order using bubble sort.
14. Write a program to calculate roots of the quadratic expression.
15. Write a program to search the key element in the list of N Array elements using Linear search
16. Write a program to search the key element in the list of N Array elements using Binary search
17. Write a recursive function to solve tower of hanoi puzzle.
18. Write a test program to sort the elements of the array in ascending using insertion sort.
19. Write C program that accepts the vertices and edges for a graph and stores it as an adjacency matrix.
20. Implement function to print In-Degree, Out-Degree and to display that adjacency matrix.
21. Write program to implement back tracking algorithm for solving problems like N queens.
22. Write a program to implement the back tracking algorithm for the sum of subsets problem
23. Write program to implement greedy algorithm for job sequencing with deadlines.
24. Write program to implement Dynamic Programming algorithm for the Optimal Binary Search Tree Problem.
25. Write a program that implements Prim's algorithm to generate minimum cost spanning Tree.
26. Write a program that implements Kruskal's algorithm to generate minimum cost spanning tree
27. Write a test program to implement DFS algorithm in graph.
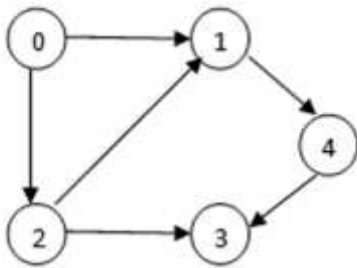
28. Write a test program to demonstrate knapsack problem using dynamic programming.
Weights={3,4,6,5}   profits={2,3,1,4} with capacity = 8 and number of objects=4.

29. Write a test program to demonstrate knapsack problem using greedy method.

Objects	1	2	3	4	5	6	7
Profit	5	10	15	7	8	9	4
Weight	1	3	5	4	1	3	2

Semester V BCA (Statistical Computing & R Programming (Theory))
Core Course Content

Course Title: **Statistical Computing & R Programming (Theory)**	Course Credits: **4**
Course Code: **DSC14**	L-T-P per week: 4-0-0
Total Contact Hours**: 52Hrs**	
Formative Assessment Marks:40	Summative Assessment Marks:60

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

Note: Any two different activities for C2 First component and C2 Second component can be selected from the below
Quiz/Project/Class room exercise/Practice exercise/Educational (industry/ institutes/ NGOs) visit/ field trip/ Field work/Viva voce/Role Play/Charts/ Models/Case study/Group discussion/Crosswords/
Presentation/seminar/Review – movie / Book/Research articles/e – content preparation

Course Objectives:

1. Explain critical R programming concepts.

2. Demonstrate how to install and configure R Studio.

3. Apply OOP concepts in R programming.

4. Explain the use of data structure and loop functions.

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

CO1. Explore fundamentals of statistical analysis in R environment.

CO2. Describe key terminologies, concepts and techniques employed in Statistical Analysis.

CO3. Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.

CO4. Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.

CO5. Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables.

COURSE CONTENT

Contents	52Hrs
Introduction of the language, numeric, arithmetic, assignment, and vectors, Matrices andArrays, Non-numeric Values, Lists and Data Frames, Special Values, Classes, and Coercion, Strings in R and its functions –R Vectors, basics of R List, operations performed on R list R Arrays, R Factors, definition of Data Frames, various data frame functions	10
Reading and writing files, Programming, Calling Functions, Conditions and Loops: stand-alone statement with illustrations in exercise 10.1,stacking statements, coding loops, R-Functions : function definition, Built in functions, user-defined function, calling a function, calling a function without an argument, calling a function with argument. Exceptions, Timings, and Visibility.	10
Statistics And Probability, basic data visualisation, probability, common probability distributions: common probability mass functions, bernoulli, binomial, poisson distributions, common probability density functions, uniform, normal, student's t-distribution.	11
Statistical testing and modelling, sampling distributions, hypothesis testing, components of hypothesis test, testing means, testing proportions, testing categorical variables, errors and power, Analysis of variance. Simple linear regression, multiple linear regression, linear model selection and diagnostics.	10
Advanced graphics: plot customization, plotting regions and margins, point and click coordinate interaction, customizing traditional R plots, specialized text and label notation. Defining colors and plotting in higher dimensions, representing and using color, 3D scatter plots.	11

Semester V BCA (RProgrammingLab)
Core Course Content

Course Title **R Programming Lab**	Course Credits: **2**
Course Code: **DSC14-Lab**	L-T-P per week: 4-0-0
Total Contact Hours**: 04Hoursperweek**	
Formative Assessment Marks:25	Summative Assessment Marks:25

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

Course Objectives:

1. The objective of this Laboratory to make students exercise the fundamentals of statistical analysis in R environment.
2. They would be able to analysis data for the purpose of exploration using Descriptive and Inferential Statistics. Students will understand Probability and Sampling Distributions and learn the creative application of Linear Regression in multi variate context for predictive purpose.

Course Learning Outcomes

On completion of the course the student will learn to

- Install, Code and Use R Programming Language in R Studio IDE to perform basic tasks on Vectors, Matrices and Data frames. Explore fundamentals of statistical analysis in R environment.
- Describe key terminologies, concepts and techniques employed in Statistical Analysis.
- Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.
- Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.
- Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables.

1. WAP in R to illustrate operations on vectors.
2. WAP in R to
   (i) find the current working directory
   (ii) set working directory
   (iii) create a file
   (iv) write data into the file (txt).
3. WAP in R to create & access lists.
4. WAP in R to read data from Excel file.

5.   WAP in R to illustrate error handling.
6.   WAP in R to illustrate operations on vectors.
7.   Write an R program to find the range and co-efficient of Range from the CSV file
        (Note: create a CSV file with your own data)
8.   WAP to find transpose of a matrix.
9.   WAP to create & access data frames.
10. Write a R program for calculating cumulative sums, and

    products minima maxima and calculus.
11. Write a R program for with any dataset containing data frame objects,
     indexing and subsetting data frames, and employ manipulating and
     analyzing data.
12.   Write a R program that include linear algebra operations on vectors and matrices.
13.   Write a program in R to find mean, median and mode
      X=C(12,8,3,7,2,8,1,4,9,15,19)
14.

Part B

1.   Write a R program that include different operators, control structures,
     default values for arguments, returning complex objects.
2.   Write a R program for quick sort
3.   stationary distribution of markanov implementation, binary search tree.
4.   Write a R program for finding chains.
5.   Write a program to create an any application of Linear Regression in
     multivariate context for predictive purpose.

6.   Draw the line plot for the following data
     X=c(5,7,8,22,9,4,11)
     Y=c(99,89,87,88,111,103,87,94,75,77,85)
7.   Draw a bar graph for the following
      x=c(A,B,C,D)
       y=c(2,4,6,8)
8.   Draw the histogram for the following data
       c(2,33,4,4,4,4,5)
9.   Draw the boxplot for the following
       Data=(10,15,20,5,30)
10.
11. Draw the pie-chart for the following data
      budget=C(66,5,55,216.4,18.8,19,100.6,2.4)
14.   Write a Program in R to demonstrate scatter plot for the following data
      x= c(5,7,8,2,2,9,4,11,12,9,6)
      y=c(99,89,87,88,111,103,87,94,75,77,85)
15. Draw a bar chart for the following
      X=c(26,24,16,16,6,5,3,2,2)
      names(x)=c("orange","black","white","grey","red","blue","brown","green","others")

Semester V <mark>BCA (</mark>Cloud Computing (Theory)<mark>)</mark>

Core Course Content

Course Title: **Cloud Computing**(Theory)	Course Credits: **3**
Course Code: **DSE-E1**	L-T-P per week: <mark>3-0-0</mark>
Total Contact Hours**: 42Hrs**	
Formative Assessment Marks:40	Summative Assessment Marks:60

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

Note: Any two different activities for C2 First component and C2 Second component can be selected from the below
Quiz/Project/Class room exercise/Practice exercise/Educational (industry/ institutes/ NGOs) visit/ field trip/ Field work/Viva voce/Role Play/Charts/ Models/Case study/Group discussion/Crosswords/
Presentation/seminar/Review – movie / Book/Research articles/e – content preparation

Course Objectives:

a. the fundamental ideas behind Cloud Computing, the evolution of the paradigm, itsapplicability; benefits, as well as current and future challenges;
b. the basic ideas and principles in data center design; cloud management techniques andcloud software deployment considerations
c. different CPU, memory and I/O virtualization techniques that serve in offering software, computation and storage services on the cloud; Software Defined Networks(SDN) and Software Defined Storage (SDS)
d. cloud storage technologies and relevant distributed file systems, No SQL databases andobject storage
e. the variety of programming models and develop working experience in several ofthem.

Course Learning Outcomes

C01 : Explain the core concepts of the cloud computing paradigm such as how and why this
paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing

C02: Apply the fundamental concepts in data centres to understand the trade-offs in power, efficiency and cost.

C03: Identify resource management fundamentals like resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.

C04: Analyze various cloud programming models and apply them to solve problems on the cloud.

COURSE CONTENT

Contents	42 Hrs
Introduction: Different Computing Paradigms- Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing etc., Comparison of various Computing Technologies; Cloud Computing Basics- What is Cloud Computing? History, Characteristic Features, Advantagesand Disadvantages, and Applications ofCloudComputing; Trends in Cloud Computing; Leading Cloud Platform Service Providers.	**8**
Cloud Architecture: Cloud Service Models- Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS), Comparison of different Service Models; Cloud Deployment Models- Public Cloud; Private Cloud, Hybrid Cloud, Community Cloud; Cloud Computing Architecture- Layered Architecture of Cloud. Virtualization- Definition, Features of Virtualization; Types of Virtualizations- Hardware Virtualization, Server Virtualization, Application Virtualization, Storage Virtualization, Operating System Virtualization; Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples- Xen: Paravirtualization, VMware: Full Virtualization, Microsoft Hyper-V.	**10**
Cloud Application Programming and the Aneka Platform: Aneka Cloud Application Platform- Framework Overview, Anatomy of the Aneka Container; Building Aneka Clouds (Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode); Cloud Programming and Management- Aneka SDK (Application Model and Service Model); Management Tools (Infrastructure, Platform and Application management).	**8**
Cloud Applications: Scientific Applications- Healthcare (ECG Analysis in the Cloud) Biology (Protein Structure Prediction and Gene Expression Data Analysis for Cancer Diagnosis), Geoscience (Satellite Image Processing); Business and Consumer Applications- CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.	**8**

Semester V BCA (Digital Marketing (Theory))
Core Course Content

Course Title: **Digital Marketing(Theory)**	Course Credits: **3**
Course Code: **Voc-2**	L-T-P per week: 3-0-0
Total Contact Hours**: 42Hrs**	
Formative Assessment Marks:40	Summative Assessment Marks:60

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

 Note: Any two different activities for C2 First component and C2 Second component can be selected from the below
Quiz/Project/Class room exercise/Practice exercise/Educational (industry/ institutes/ NGOs) visit/ field trip/ Field work/Viva voce/Role Play/Charts/ Models/Case study/Group discussion/Crosswords/
Presentation/seminar/Review – movie / Book/Research articles/e – content preparation

Course Objectives:

1. This course aims to familiarize students with the concept of digital marketing and its current and future evolutions.
2. It further aims to be able to equip students with the ability to understand and subsequently create strategic and targeted campaigns using digital media tools

Course Learning Outcomes

Course Outcomes (COs): After the successful completion of the course, the student will be able to:
1. Understand the fundamental concepts and principles of digital marketing.
2. Develop practical skills to implement various digital marketing strategies and techniques.
3. Analyze and evaluate the effectiveness of digital marketing campaigns.
4. Apply critical thinking and problem-solving skills to real-world digital marketing scenarios.
5. Create comprehensive digital marketing plans and strategies.

1. **Note: Blooms Level(BL): L1=Remember, L2=Understand, L3=Apply, L4=Analyse, L5= Evaluate, L6= Create**

Contents	42 Hrs
Introduction to Digital Marketing: Overview of digital marketing, Evolution of digital marketing, Importance and benefits of digital marketing, Digital marketing channels and platforms **Digital Marketing Strategy and Planning:** Developing a digital marketing strategy, Setting goals and objectives, Budgeting and resource allocation.	**8**
Campaign planning and execution, Monitoring and adjusting digital marketing campaigns**Social Media Marketing:** Overview of social media marketing, Social media platforms andtheir features, Creating and optimizing social media profiles, Social media content strategy, Social media advertising and analytics	**8**
Email Marketing: Introduction to email marketing, Building an email list, Creating effective email campaigns, Email automation and segmentation, Email marketing metrics and analytics **Content Marketing:** Understanding content marketing, Content strategy and planning,	**8**
Content creation and distribution, Content promotion and amplification, Content marketing metrics and analytics. **Mobile Marketing:** Mobile marketing overview, Mobile advertising strategies, Mobileapp marketing, Location-based marketing, Mobile marketing analytics	**8**
Analytics and Reporting: Importance of analytics in digital marketing, Setting up web analytics tools (e.g., Google Analytics), Tracking and measuring key performance indicators (KPIs), Conversion tracking and optimization, Reporting and data visualization	**10**

UNIVERSITY ⚜ OF MYSORE
Estd. 1916

VishwavidyanilayaKaryasoudha
Crawford Hall, Mysuru- 570 005

No.AC2(S)/151/2020-21

Dated: 06.10.2023

Notification

Sub:- Syllabus and Scheme of Examinations of Cyber Security Skill Enhancement course- with effect from the Academic year 2023-24.

Ref:- 1. This office letter No: AC6/303/2022-23 dated: 28-07-2023.

2. Decision of BOS in Computer Science (CB) meeting held On 07-08-2023.

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The Board of Studies in Computer Science (CB) which met on 07-08-2023 has resolved to recommended and approved the syllabus and scheme of Examinations of Cyber Security with effect from the Academic year 2023-24.

Pending approval of the Faculty of Science & Technology and Academic Council meetings the above said syllabus and scheme of examinations are hereby notified.

The syllabus and scheme of Examinations contents may be downloaded from the University website i.e., www.uni-mysore.ac.in.

Draft Approved by the Registrar

Deputy Registrar (Academic)
Deputy Registrar (Academic)
University of Mysore
Mysore-570 005

To:-

1. All the Principal of affiliated Colleges of University of Mysore, Mysore.
2. The Registrar (Evaluation), University of Mysore, Mysuru.
3. The Chairman, BOS/DOS, in Computer Science (CB), Manasagangothri, Mysore.
4. The Director, Distance Education Programme, Moulya Bhavan, Manasagangotri, Mysuru.
5. The Director, PMEB, Manasagangothri, Mysore.
6. Director, College Development Council , Manasagangothri, Mysore.
7. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative Branch and Examination Branch, University of Mysore, Mysuru.
8. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
9. Office Copy.

Course Title	Cyber Security (Theory)			
Course Code:	SEC-4		No. of Credits	03
Contact hours	42 Hours		Duration of SEA/Exam	02hrs
Formative Assessment Marks		40	Summative Assessment Marks	60

Course Outcomes(COs): After the successful completion of the course, the student will be able to:

CO1	After completion of this course, students would be able to understand the concept of Cyber security and issues and challenges associated with it.
CO2	Students, at the end of this course, should be able to understand the cybercrimes, Their nature, legal remedies and as to how report the crimes through available platforms andprocedures.
CO3	On completion of this course, students should be able to appreciate various privacy and security concerns on online social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms.

Module IV. Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Advantage of e-commerce, Survey of popular e-commerce sites. Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorized banking transactions. Relevant provisions of Payment Settlement Act,2007.		08
Module V. End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third-party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.		11

Contents	45Hrs
Module-I. Introduction to Cyber security: Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.	09
Module-II. Cyber-crime and Cyber law: Classification of cybercrimes, Common cyber-crimes- cyber-crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi, Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber-crime and offences, Organisations dealing with Cyber-crime and Cyber security in India, Case studies.	09
Module III. Social Media Overview and Security: Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.	08

Pedagogy: Lecture/ PPT/Problem Solving/ etc.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Internal Assessment Test 1	10%
Internal Assessment Test 2	10%
Quiz/ Assignment/ Small Project	10%
Seminar	10%
Total	**40 Marks**
Formative Assessment as per guidelines.	

Text/References
1 Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010
2 Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
3 Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)
4 Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
5 Fundamentals of Network Security by E. Maiwald, McGraw Hill.
6 Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.

Semester V1BCA (Artificial Intelligence and Applications **(Theory))**
Core Course Content

Course Title: Artificial Intelligence and Applications **(Theory)**	Course Credits: **4**
Course Code: **DSC16**	L-T-P per week: 3-0-0
Total Contact Hours**: 52Hrs**	
Formative Assessment Marks:40	Summative Assessment Marks:60

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

Note: Any two different activities for C2 First component and C2 Second component can be selected from the below
Quiz/Project/Class room exercise/Practice exercise/Educational (industry/ institutes/ NGOs) visit/ field trip/ Field work/Viva voce/Role Play/Charts/ Models/Case study/Group

discussion/Crosswords/
Presentation/seminar/Review – movie / Book/Research articles/e – content preparation

Course Objectives:

1. The goal is to acquire knowledge on intelligent systems and agents, formalization of knowledge, reasoning with and without uncertainty, machine learning and applications at a basic level.

2. Identify problems where artificial intelligence techniques are applicable. Apply selected basic AI techniques; judge applicability of more advanced techniques.

Course Learning Outcomes

Gain a historical perspective of AI and its foundations.
Become familiar with basic principles and strategies of AI towards problem solving
Understand and apply approaches of inference, perception, knowledge representation, and learning.
Understand the various applications of AI

Contents	52Hrs
Introduction- What is Artificial Intelligence, Foundations of AI, History, AI - Past, Present and Future. Intelligent Agents- Environments- Specifying the task environment, Properties of task environments, Agent based programs-Structure of Agents , Types of agents- Simple reflex agents, Model-based reflex agents, Goal-based agents; and Utility-based agents.	10
Problem Solving by Searching-Problem-Solving Agents, Well-defined problems and solutions, examples Problems, Searching for Solutions, Uninformed Search Strategies-Breadth-first search, Uniform-cost search, Depth-first search, Depth-limited search, Iterative deepening depth-first search, Bidirectional search, Greedy best-first search, A* Search, AO* search Informed (Heuristic) Search Strategies, Heuristic Functions	10
Knowledge Representation - Knowledge-Based Agents, The Wumpus World , Logic, Propositional Logic, Propositional Theorem Proving, Effective Propositional Model Checking, Agents Based on Propositional Logic, First-Order Logic-Syntax and Semantics of First-Order Logic, Using First-Order Logic, Unification and Lifting Forward Chaining, Backward Chaining	12
Learning– Forms of Learning, Supervised Learning, Machine Learning - Decision Trees, Regression and Classification with Linear Models, Artificial Neural Networks, Support Vector Machines	10
Applications of AI - Natural Language Processing, Text Classification and Information Retrieval, Speech Recognition , Image processing and computer vision, Robotics	10

Semester V1 BCA (PHP & MySQL (Theory))
Core Course Content

Course Title: **PHP & MySQL(Theory)**	Course Credits: **4**
Course Code: **DSC17**	L-T-P per week: 3-0-0
Total Contact Hours**: 52Hrs**	
Formative Assessment Marks:40	Summative Assessment Marks:60

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

 Note: Any two different activities for C2 First component and C2 Second component can be
 selected from the below
**Quiz/Project/Class room exercise/Practice exercise/Educational (industry/ institutes/
NGOs) visit/ field trip/ Field work/Viva voce/Role Play/Charts/ Models/Case study/Group
discussion/Crosswords/
Presentation/seminar/Review – movie / Book/Research articles/e – content preparation**

Course Objectives:
1. Start learning web development today to become a web developer
   tomorrow. Learn to create your own apps using PHP & MySQL from
   scratch with practical examples.
2. Become a PHP/MySQL web developer to create small applications
3. Create a dynamic website using PHP and MySQL in no time

Course Learning Outcomes

 After the successful completion of the course, the student will be able to:

 1. Design dynamic and interactive web pages and websites.

 2. Run PHP scripts on the server and retrieve results

 3. Handle data bases like MySQL using PHP in websites

Contents	52Hrs
Introduction to PHP: Introduction to PHP, History and Features of PHP, Installation &Configuration of PHP, Embedding PHP code in Your Web Pages, Understanding PHP,HTML and White Space, Writing Comments in PHP, Sending Data to the Web Browser,Data types in PHP, Keywords in PHP, Using Variables, Constants in PHP, Expressions in PHP, Operators in PHP.	**10**
Programming with PHP: Conditional statements: if, if-else, switch, The ? Operator**,** Looping statements: while Loop, do-while Loop, for Loop **Arrays in PHP:** Introduction- What is Array?, Creating Arrays, Accessing Array elements, Types of Arrays: Indexed v/s Associative arrays, Multidimensional arrays, Creating Array, Accessing Array, Manipulating Arrays, Displaying array, Using Array Functions, Including and Requiring Files- use of Include() and Require(), Implicit and Explicit Casting in PHP.	**12**
Using Functions , Class- Objects, Forms in PHP: Functions in PHP, Function definition, Creating and invoking user-defined functions, Formal parameters versusactualparameters, Function and variable scope, Recursion, Library functions, Date and Time Functions **Strings in PHP:** What is String?, Creating and Declaring String, String Functions	**10**
Class &Objects in PHP: What is Class & Object, Creating and accessing a Class &Object, Object properties, object methods, Overloading, inheritance, Constructor and Destructor **Form Handling:** Creating HTML Form, Handling HTML Form data in PHP **Database Handling Using PHP with MySQL: I**ntroduction to MySQL: Database terms,Data Types.	**10**
Accessing MySQL –Using MySQL Client and Using php MyAdmin, MySQL Commands, Using **PHP with MySQL:** PHP MySQL Functions, Connecting to MySQLand Selecting the Database, Executing Simple Queries, Retrieving Query Results, Counting Returned Records, Updating Records with PHP	**10**

Semester VIBCA (PHP and MySQL Lab))
Core Course Content

Course Title: **PHP and MySQL Lab**	Course Credits: **2**
Course Code: **DSC17-Lab**	L-T-P per week: 3-0-0
Total Contact Hours**: 04Hoursperweek**	
Formative Assessment Marks:25	Summative Assessment Marks:25

Course Objectives:

1. The objective of this course is to provide the necessary knowledge to design and develop dynamic, database-driven web applications using PHP .
2. Students will learn how to connect to any ODBC-compliant database, and perform hands on practice with a MySQL database to create database-driven HTML forms and reports etc. Students also learn how to configure PHP and Apache Web Server

Course Learning Outcomes

Sl.No	Title of the Experiment
1	Write a PHP script to print "hello world".
2	Write a PHP script to find odd or even number from given number.
3	Write a PHP script to find maximum of three numbers.
4	Write a PHP script to swap two numbers.
5	Write a PHP script to find the factorial of a number.
6	Write a PHP script to check whether given number is palindrome or not.
7	Write a PHP script to reverse a given number and calculate its sum
8	Write a PHP script to to generate a Fibonacci series using Recursive function
9	Write a PHP script to implement atleast seven string functions.
10	Write a PHP program to insert new item in array on any position in PHP.
11	Write a PHP script to implement constructor and destructor
12	Write a PHP script to implement form handling using get method
13	Write a PHP script to implement form handling using post method.
14	Write a PHP script that receive form input by the method post to check the number is primeor not
15	Write a PHP script that receive string as a form input
16	Write a PHP script to compute addition of two matrices as a form input.
17	Write a PHP script to show the functionality of date and time function.
18	Write a PHP program to upload a file
19	Write a PHP script to implement database creation
20	Write a PHP script to create table
21	Develop a PHP program to design a college admission form using MYSQL database.

Semester VI BCA (Fundamentals of Data Science (Theory)
Core Course Content

Course Title: **Fundamentals of Data Science (Theory)**	Course Credits: **3**
Course Code: **DSE-E2**	L-T-P per week: 3-0-0
Total Contact Hours**: 42Hrs**	
Formative Assessment Marks:40	Summative Assessment Marks:60

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

 Note: Any two different activities for C2 First component and C2 Second component can be selected from the below
Quiz/Project/Class room exercise/Practice exercise/Educational (industry/ institutes/ NGOs) visit/ field trip/ Field work/Viva voce/Role Play/Charts/ Models/Case study/Group discussion/Crosswords/
Presentation/seminar/Review – movie / Book/Research articles/e – content preparation

Course Objectives:
1. To provide the students with the basic knowledge of Data Science.
2. To make the students develop solutions using Data Science tools.
3. To introduce them to Python packages and their usability.

Course Learning Outcomes

CO1	Understand the concepts of data and pre-processing of data.
CO2	Know simple pattern recognition methods
CO3	Understand the basic concepts of Clustering and Classification
CO4	Know the recent trends in Data Science

Contents	**42Hrs**
Unit I: Data Mining: Introduction, Data Mining Definitions, Knowledge Discovery in Databases (KDD) Vs Data Mining, DBMS Vs Data Mining, DM techniques, Problems,Issues and Challenges in DM, DM applications.	**8**
Data Warehouse: Introduction, Definition, Multidimensional Data Model, Data Cleaning, Data Integration and transformation, Data reduction, Discretization	**8**
Mining Frequent Patterns: Basic Concept – Frequent Item Set Mining Methods -Aprioriand Frequent Pattern Growth (FPGrowth) algorithms -Mining Association Rules	**8**
Classification: Basic Concepts, Issues, Algorithms: Decision Tree Induction. Bayes Classification Methods, Rule-Based Classification, Lazy Learners (or Learning from yourNeighbours), k Nearest Neighbour. Prediction - Accuracy- Precision and Recall	**10**
Clustering: Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering	**8**

Program Name	**B.C.A**	Semester	**VI**
Course Title		Artificial Intelligence and Applications LAB	
Course Code:	DSC-C27	No. of Credits	**02**
Contact hours		**04 Hours per week**	
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

Course Outcomes:
- **Identify and apply Artificial Intelligence concepts to solve real world problems.**
- **Design and develop solutions for informed and uninformed search problems in AI.**

Programs:
1.Write a program to implement breadth first search using python.
2.Write a program to implement depth first search using python.
3.Write a program to implement 8-puzzle problem using python
4.Write a program to implement n-queens problem using python.
5.Write a program to implement alpha-beta pruning using python.
6.Write a program to implement forward chaining algorithm.
7.Write a program to implement backward chaining algorithm.
8.Write a program to implement k-Nearest Neighbour algorithm to classify the Iris data set.
 Print both correct and wrong predictions.
9.Train a random sample data using linear regression model and plot the graph
10.Implement the naïve Bayesian classifier for a sample training data set stored as a .csv file.
Compute the accuracy of the classifier, considering few test data sets.
11.Demonstrate the working of SVM classifier for a suitable data set(e.g., Iris dataset)
12.Build a sample binary image classification model (cat and dog)

Evaluation Scheme for Lab Examination
Note: The programs can be implemented using Jupyter notebook IDE with scikit-learn library or native Phyton IDLE with required packages.
Packages can be downloaded and installed separately without any internet connection.

Assessment Criteria Mark	Marks
Writing the Program	**10**
Execution and Formatting	**10**
Viva Voce	**5**
Total	**25**

Semester VI BCA (Mobile Application Development (Theory))
Core Course Content

Course Title: **Mobile Application Development (Theory)**	Course Credits: **3**
Course Code: **DSE-E2**	L-T-P per week: 3-0-0
Total Contact Hours**: 42Hrs**	
Formative Assessment Marks:40	Summative Assessment Marks:60

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

Note: Any two different activities for C2 First component and C2 Second component can be selected from the below
Quiz/Project/Class room exercise/Practice exercise/Educational (industry/ institutes/ NGOs) visit/ field trip/ Field work/Viva voce/Role Play/Charts/ Models/Case study/Group discussion/Crosswords/
Presentation/seminar/Review – movie / Book/Research articles/e – content preparation

Course Objectives:
  1. Develop mobile applications using Databases.
  2. Analyse and discover own mobile app for simple needs.

Course Learning Outcomes

CO1	Create Servlets for server side programming Create, test and debug Android application by setting up Android development environment
CO2	Critique mobile applications on their design pros and cons,
CO3	Program mobile applications for the Android operating system and understand techniques for designing and developing sophisticated mobile interfaces
CO4	Deploy applications to the Android marketplace for distribution.

Contents	42 Hrs
Android OS design and Features: Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools, Building your First Android application.	**8**
Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and BroadcastingIntents, Android Manifest File and its common settings, Using Intent Filter, Permissions.	**8**
Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.	**8**
Testing Android applications, Publishing Android application, Using Android preferences,Managing Application resources in a hierarchy, working with different types of resources.	**8**
Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using AndroidNetworking APIs, Using Android Web APIs, Deploying Android Application to the World.	**10**

Semester V <mark>BCA (</mark>Web Content Management System (Theory)<mark>)</mark>
Core Course Content

Course Title: **Web Content Management System (Theory)**	Course Credits: **3**
Course Code: **Voc-1**	L-T-P per week: 3<mark>-0-0</mark>
Total Contact Hours**: 42Hrs**	
Formative Assessment Marks:40	Summative Assessment Marks:60

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

Note: Any two different activities for C2 First component and C2 Second component can be selected from the below
Quiz/Project/Class room exercise/Practice exercise/Educational (industry/ institutes/ NGOs) visit/ field trip/ Field work/Viva voce/Role Play/Charts/ Models/Case study/Group discussion/Crosswords/
Presentation/seminar/Review – movie / Book/Research articles/e – content preparation

Course Objectives:

1. Content development basics;

2. Tools for multimedia content development for audio/ video, graphics, animations, presentations, screen casting;

3. Hosting websites and developing content for social media platforms such aswiki and blog;

4. E-publications and virtual reality;

5. E-learning platform moodle and cms applications drupal and joomla.

Course Learning Outcomes

Afterthesuccessfulcompletionofthecourse, thestudentwillbeableto:

1. Understandcontentdevelopmentbasics;
2. GainKnowledgeoftoolsformultimediacontentdevelopmentforaudio/video,graphics,animations,pr
3. Hostwebsitesanddevelopcontentforsocialmediaplatformssuch aswikiandblog
4. Understande-publicationsandvirtualreality
5. Useofe-learningplatformMoodleandCMSapplicationsDrupalandJoomla

Contents	42Hrs
Web Content Development and Management, Content Types and Formats, Norms and Guide lines of Content Development, Creating Digital Graphics, Audio Production and Editing,	**8**
Web Hosting and Managing Multimedia Content, Creating and Maintaining a Web Site. Presentation Software Part I, Presentation Software Part II, Screen casting Tools and Techniques, Multilingual Content Development.	**8**
Planning and Developing Dynamic Web Content Sites, Website Design Using CSS Creating and Maintaining a Website Creating and Managing a Blog Site,	**8**
E- Publication Concept, E- Pub Tools, Simulation and Virtual Reality Applications,Creating2Dand3DAnimations.IntroductiontoMoodle,CreatingaNew CourseandUploading,	**10**
Create and Add Assessment ,Add and Enroll User and Discussion Forum, Content Management System: Joomla, Content Management System: Drupal	**8**

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar/Field studies

Note: Any two different activities for C2 First component can be selected from the below
**Quiz/Project/Class room exercise/Practice exercise/Educational (industry/ institutes/
NGOs) visit/ field trip/ Field work/Viva voce/Role Play/Charts/ Models/Case study/Group
discussion/Crosswords/
Presentation/seminar/Review – movie / Book/Research articles/e – content preparation**

Internal Assessment For Theory		
Assessment Occasion	**Assessment type**	**Weight age in Marks**
C1 First component	Test-40 marks test for 90 minutes	10
C1 Second Component	Assignment	10
C2 First component		10
C2 Second Component		10
Total		**40**

Components of continuous assessment activities for C1 and C2				
C1			**C2**	
	Max marks	To be reduced to		
Session test (for 90 minutes)	40	10	Any two different activities for C2 First component and C2 Second component.	Marks:
Assignment	10	10		
			Quiz	10
			Project	10
			Class room exercise/Practice exercise	10
			Educational (industry/ institutes/ NGOs) visit/ field trip/ Field work	10
			Viva voce	10
			Role Play	10
			Charts/ Models	10
			Case study	10
			Group discussion	10
			Crosswords	10
			Presentation/seminar	10
			Review – movie / Book/Research articles	10

			e – content preparation	10
Total	**20 marks**		**20 marks**	

Formative Assessment for Practical		
Assessment Occasion	Assessment type	Marks
C1 First component	Test-20 marks test for120 minutes	10
C2 Second Component	Test-20 marks test for120 minutes	10
Record		05
Total		25

program–1 from Part A	Flowchart/Algorithm	02
	Writing the program	04
	Execution and formatting	04
program-2 from Part B	Flowchart/Algorithm	02
	Writing the program	04
	Execution and formatting	04
Viva Voce based on programming		05
Total		**25**

Q.P CODE:		Blueprint of End semester examination BCA ------ -SEMESTER EXAMINATION :------- SUBJECT : TITLE:	
TIME : 2&1/2HRS			MAX MARKS : 60
	PART A :	ANSWER ANY TEN QUESTIONS	10x2 =20
1.	a)		
	b)		
	c)		
	d)		
	e)		
	f)		
	g)		
	h)		
	i)		
	j)		
	k)		
	l)		
	PART B :	ANSWER ANY FOUR QUESTIONS	10X5=40
2.		a1,a2	
3.		a1,a2	
4.		a1,a2	
5.		a1,a2	
6.		a1,a2	
7.		a1,a2	
8.		a1,a2	