

Course Code BCA 301

Course Name: Operating System & Linux Programming

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INSTRUCTIONSTOPAPERSETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each Question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:-

1. Working and functionalities of operating system
2. Understand the concept of process scheduling, memory management, deadlock and file system
3. Understand basic commands of Linux and shell scripts.

PRE-REQUISITES:

1. Basic understanding of hardware and software of computer organization.

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the basic concept of Operating System with the help of Unix and Linux Architecture.	BTL2	PO1, PO4
CO2	Understand the concept of Processes, Process Scheduling, Process Synchronization and applying process commands in Linux environment.	BTL3	PO1, PO2, PO4, PO5
CO3	Understand the concept of memory management and deadlock.	BTL2	PO1, PO2, PO4, PO5
CO4	Understand the concept of file Systems, Types and Access Methods by using Linux commands.	BTL3	PO1, PO2, PO4

UNIT-I

No. of Hours: 12

Chapter/Book Reference: TB1 [Chapter 1]; TB2 [Chapters 1, 2, 3, 4, 5]

Introduction: What is an Operating System, Functions of Operating System, Simple Batch Systems; Multi programmed Batch systems, Time-Sharing Systems, Personal-computer systems, Parallel systems, Distributed Systems, Real-Time Systems.

Introduction to Linux: Architecture of Linux OS, Basic directory structure of Linux, Basic commands of Linux:- man, info, help, whatis, apropos, basic directory navigation commands like cat, mkdir, rmdir, cd, mv, cp, rm, file, pwd, date, cal, echo, bc, ls, who, whoami, hostname, uname, tty, alias

Vi Editor: vi basics, Three modes of vi Editor, how to write, save, execute a shell script in vi editor

UNIT-II

No. of Hours: 12

Chapter/Book Reference: TB1 [Chapters 3, 5, 6]; TB2 [Chapter 9]

Processes: Process Concept, Process Scheduling, Operation on Processes

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms

Process Synchronization: Background, The Critical-Section Problem, Semaphores solution to critical section problem

Process related commands in Linux: ps, top, pstree, nice, renice and system calls

UNIT-III

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters 7, 8, 9]

Memory Management: Background, Logical versus Physical Address space, swapping, Contiguous allocation, Segmentation, Paging

Virtual Memory: Demand Paging, Performance of Demand Paging, Page Replacement, Page-replacement Algorithms, Allocation of Frames, Thrashing

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT-IV

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter 10]; TB2 [Chapter 6]

Information Management: Introduction, File Concept, Access methods, Directory and Disk structure, File Protection

Linux File Security: Permission types, Examining permissions, changing permissions (symbolic method numeric method)

TEXT BOOKS:

TB1. Silberschatz and Galvin, “Operating System Concepts”, John Wiley & Sons, 10 th Ed. 2018

TB2. Sumitabha Das, “Unix Concepts and Application”, TMH

REFERENCE BOOKS:

RB1. Madnick E., Donovan J., “Operating Systems”, Tata McGraw Hill, 2011

RB2. Tannenbaum, “Operating Systems”, PHI, 4th Edition, 2015

RB3. Sivaselvan, Gopalan, “A Beginner’s Guide to UNIX”, PHI Learning

Course Code: BCA 303
Course Name: Computer Graphics

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INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Concept of Computer graphics, types of display devices and their techniques.
2. Methods of drawing of graphic objects on the display devices.
3. Concepts of viewport, mapping of real world objects to display device, clipping
4. Knowledge of projection concepts and their types

PRE-REQUISITES:

1. Programming in C/C++

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Develop basic knowledge of computer generated graphics, their applications, display devices and drawing of graphic objects on display devices.	BTL2	PO1, PO6
CO2	To develop knowledge of various graphics 2D transformation operation, their mathematical calculations.	BTL4	PO4, PO8
CO3	To learn about the surfaces and curves, properties of curves and shading of surfaces	BTL2	PO4
CO4	To give basic knowledge of 3D projection and identifying hidden surfaces to be removed.	BTL2	PO1

UNIT – I

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2**

Introduction: Introduction to computer graphics, Applications of Computer Graphics, Non Interactive and interactive graphics, Conceptual Framework for Interactive Graphics. Introduction to Raster and Random scan display, Characteristics of display devices, Aliasing and Antialiasing, Introduction to latest display technologies (LED, OLED, Curved LED display)

Scan Conversion

Scan Converting Lines using DDA & Bresenham's Algorithm, Scan Converting Circles using Bresenham's algorithm.

UNIT – II

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2, RB3**

Clipping

Cohen-Sutherland Algorithm, Cyrus-Beck Algorithm

Geometrical Transformations

2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Composition of 2D Transformations, Window-to-Viewport Transformation, Introduction of Matrix Representation of 3D Transformations of translation, scaling and rotation (without derivation).

UNIT – III

No. of Hours: 11

Chapter/Book Reference: TB1, TB2

Representing Curves

Introduction to Polygon Meshes and its types, Parametric Cubic Curves: parametric and geometric continuity, Hermite, Bezier & B-Spline.

Surfaces

Surface rendering- Basic Illumination, Effect of ambient lighting and distances, Shading models- Gourard Shading, phong model.

UNIT – IV

No. of Hours: 11

Chapter/Book Reference: TB1, TB2

Three Dimensional Viewing: Introduction, Representation of Three-dimensional objects, Projections, Parallel projections: Orthographic Projections, Oblique Projections. Perspective Projection,

Hidden Surface Removal: Depth-Buffer (z-buffer) method, Depth-sorting Method (Painter's algorithm)

TEXT BOOKS:

TB1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles & Practice, 2000, Pearson

TB2. Chennakesava R. Alavla "Computer Graphics", PHI Learning Pvt. Limited

REFERENCES BOOKS:

RB1. D. Hearn & Baker: Computer Graphics with OpenGL, Pearson Education, Third Edition, 2009.

RB2. Foley, J.D. & Van Dam, A: Fundamentals of Interactive Computer Graphics.

RB3. Rogers & Adams, "Mathematical Elements for Computer Graphics", McGraw Hill, 1989.

Course Code: BCA 305
Course Name: Cloud Computing

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INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Understand current cloud computing technologies, including technologies for different cloud services.
2. Analyze the components of cloud computing
3. Perform Large data processing in the cloud

PRE-REQUISITES:

1. Basics of Computer Network
2. Knowledge of Operating System and Databases.

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Overview of Cloud Computing	BTL1	PO1, PO2, PO3, PO7
CO2	Understanding Cloud Computing Architecture	BTL2	PO1, PO2, PO3, PO4, PO7,
CO3	Working with Parallel and Distributed Computing	BTL3	PO1, PO2, PO3, PO4, PO5
CO4	Understanding the Concept of Virtualization	BTL4	PO1, PO2, PO3, PO6, PO7

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 1, 10], TB2 [Chapters - 1, 2]

Cloud Computing Overview –Services of Internet, Origins of Cloud computing – Cloud components – Essential characteristics – On-demand self-service, The vision of cloud computing – Characteristics, benefits, and Challenges ahead

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 4], TB2 [Chapters - 5, 6, 17, 18]

Cloud Computing Architecture-Introduction – Internet as a Platform, The cloud reference model - Types of clouds - Economics of the cloud, Computing platforms and technologies, Cloud computing economics, Cloud infrastructure - Economics of private clouds - Software productivity in the cloud - Economics of scale: public vs. private clouds.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 2], TB2 [Chapter - 11]

Principles of Parallel and Distributed Computing: Parallel vs. distributed computing - Elements of parallel computing - Hardware architectures for parallel processing, Approaches to parallel programming - Laws of caution.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 3], TB2 [Chapter - 8]

Virtualization: Introduction - Characteristics of virtualized environments - Taxonomy of virtualization techniques - Virtualization and cloud computing - Pros and cons of virtualization - Technology example: VMware: full virtualization, Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization

TEXT BOOKS:

TB1. Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, “Mastering Cloud Computing” - Foundations and Applications Programming, MK publications, 2013.

TB2. Gautam Shroff, “Enterprise Cloud Computing: Technology, Architecture, Applications” by Cambridge University Press, 2010.

REFERENCE BOOKS:

RB1. Michael J.Kavis, “Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)”, John Wiley & Sons Inc., Jan 2014.

Course Code: BCA 307
Course Name: Minor Project

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PROJECT REPORT

All the students are required to submit a report based on the project work done by them during the sixth semester.

SYNOPSIS (SUMMARY/ABSTRACT) :

All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of theProject
- Statement about theProblem
- Why is the particular topicchosen?
- Objective and scope of theProject
- Methodology (including a summary of theproject)
- Hardware & Software to beused
- Testing Technologiesused
- What contribution would the projectmake?

TOPIC OF THE PROJECT- This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE: This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

PROCESS DISCRIPTION: The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS: The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION: The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature that makes the system stand out from the rest.

The following suggested guidelines must be followed in preparing the Minor Project Report:

Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

Page Specification: (Written paper and source code)

- Left margin - 3.0 cms
- Right margin- 2.0cms
- Top margin 2.54cms
- Bottom margin 2.54cms
- Page numbers - All text pages as well as Program source code listing should be numbered at the bottom center of the pages.

Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below paraspacing

Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.

Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing. **Coding Font size :** 10, Courier New, Normal

Submission of Project Report to the University : The student will submit his/her project report in the prescribed format. The Project Report should include:

1. One copy of the summary/abstract.
2. One hard Copy of the Project Report.
3. The Project Report may be about 75 pages (excluding coding).

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT

- I. Cover Page as per format
- II. Acknowledgement
- III. Certificate of the project guide
- IV. Synopsis of the Project
- V. Main Report
 - i. Objective & Scope of the Project
 - ii. Theoretical Background Definition of Problem
 - iii. System Analysis & Design vis-a-vis User Requirements
 - iv. System Planning (PERT Chart)
 - v. Methodology adopted, System Implementation & Details of Hardware & Software used
System Maintenance & Evaluation
 - vi. Detailed Life Cycle of the Project
 - a. ERD, DFD
 - b. Input and Output Screen Design
 - c. Process involved
 - d. Methodology used testing
 - e. Test Report, Printout of the Report & Code Sheet
- VI. Coding and Screenshots of the project
- VII. Conclusion and Future Scope
- VIII. References

Formats of various certificates and formatting styles are as:

1. Certificate from theGuide

CERTIFICATE

This is to certify that this project entitled “ xxxxxx xxxxx xxxxx xxxxx xxx” submitted in partial fulfillment of the degree of Bachelor of Computer Applications to the “xxxxxxxxxxxxxxxxxxxxxxxxxxxxx” through xxxxxx xxxxx doneby Mr./Ms. _____, RollNo. _____ is an is an authentic work carried out by him/herat _____ under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge andbelief.

Signature of the student

Signature of the Guide

2. Project Report Cover PageFormat:

Title of the Project/report
(Times New Roman, Italic, Font size = 24)

Submitted in partial fulfilment of the requirements for the award of the
degree of
Bachelor of Computer Applications
(Bookman Old Style, 16 point, centre)

Submitted to:
(GuideName)

Submitted by:
(Student's name)
Roll No
College Name

3. Self-Certificate by the students

SELF CERTIFICATE

This is to certify that the dissertation/project report entitled “.....” is done by me is an authentic work carried out for the partial fulfilment of the requirements for the award of the degree of Bachelor of Computer Applications under the guidance of__. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student

Name of the Student

Roll No.

4. ACKNOWLEDGEMENTS

In the “Acknowledgements” page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognize specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.

Course Code: BCAT 311
Course Name: Machine Learning with Python

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INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To make student able to learn mathematical concepts, and algorithms used in machine learning techniques for solving real world problems and developing new applications based on machine learning.
2. To introduce students to the state-of-the-art concepts and techniques of Machine Learning using Python.

PRE-REQUISITES:

1. Basics of Python Programming

COURSE OUTCOMES(COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO#
CO1	Explain machine learning concepts on real world applications and problems.	BTL2	PO1, PO2, PO8
CO2	Analyze and Implement Regression techniques.	BTL2, BTL3	PO1, PO4, PO5, PO7
CO3	Solve and design solution of Classification problem	BTL3, BTL6	PO2, PO3, PO4, PO8
CO4	Understand and implement Unsupervised learning algorithms	BTL2, BTL3	PO4, PO5, PO6, PO8
CO5	Interpret various machine learning algorithms in a range of real world applications.	BTL3	PO2, PO6, PO7

UNIT-I

No. of Hours: 11 Chapter / Book Reference: TB1 [Chapters - 1, 3, 4, 8, 9], TB2 [Chapters - 1, 4]

Introduction to Machine Learning, Why Machine learning, Types of Machine Learning Problems, Applications of Machine Learning. Supervised Machine Learning- Regression and Classification. Binary Classifier, Multiclass Classification, Multilabel Classification. Performance Measures- Confusion Matrix, Accuracy, Precision & recall, ROC Curve. Advanced Python- NumPy, Pandas. Python Machine Learning Library Scikit-Learn, Linear Regression with one Variable, Linear Regression with Multiple Variables, Logistic Regression.

UNIT-II

No. of Hours: 11 Chapter / Book Reference: TB1 [Chapters - 5, 6, 7], TB2 [Chapter - 6]

Supervised learning Algorithms: Decision Trees, Tree pruning, Rule-base Classification, Naïve Bayes, Bayesian Network. Support Vector Machines, k-Nearest Neighbor, Ensemble Learning and Random Forest algorithm.

UNIT - III

No. of Hours: 11 Chapter / Book Reference: TB1 [Chapter - 10], TB3 [Chapters - 2, 6]

Artificial Neural Networks, HebbNet, Perceptron, Adaline, Multilayer Neural Network, Architecture, Activation Functions, Loss Function, Hyper parameters, Gradient Descent, Backpropagation, Variants of Backpropagation, Avoiding overfitting through Regularization, Applications of Neural Networks.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 8], TB2 [Chapter - 7], TB3 [Chapter - 4]

Unsupervised learning algorithms: Introduction to Clustering, K-means Clustering, Hierarchical Clustering, Kohonen Self-Organizing Maps. Implementation of Unsupervised algorithms. Feature selection and Dimensionality reduction, Principal Component Analysis.

TEXT BOOKS:

TB1. GeronAurelien, “Hands-On Machine Learning with Scikit-Learn & TensorFlow”, O’REILLY, First Edition, 2017.

TB2. U Dinesh Kumar and Manaranjan Pradhan, “Machine Learning using Python”, Wiley, 2019.

TB3. Fausett Laurence, “Fundamentals of Neural Networks”, Pearson, Ninth Edition, 2012.

REFERENCE BOOKS:

RB1. Tom Mitchell, “Machine Learning”, First Edition, McGraw- Hill, 1997.

RB2. Budd T A, "Exploring Python", McGraw-Hill Education, 1st Edition, 2011.

RB3. Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 1st Edition, 2017.

Course Code: BCAP 311

Course Name: Machine Learning with Python Lab

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This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

List of Practical

S.No.	Problem Statement	Mapping to CO#
1.	Extract the data from the database using python.	CO1
2.	Write a program to implement linear and logistic regression	CO2
3.	Write a program to 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.	CO3
4.	Write a program to implement k-nearest neighbors (KNN) and Support Vector Machine (SVM) Algorithm for classification	CO3
5.	Implement classification of a given dataset using random forest.	CO3
6.	Build an Artificial Neural Network (ANN) by implementing the Back propagation algorithm and test the same using appropriate data sets.	CO3
7.	Apply k-Means algorithm k-Means algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using the k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Python ML library classes in the program.	CO4
8.	Write a program to implement Self - Organizing Map (SOM)	CO4
9.	Write a program for empirical comparison of different supervised learning algorithms	CO4
10.	Write a program for empirical comparison of different unsupervised learning algorithms	CO4

Note:

1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.

2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Course Code: BCAT 313
Course Name: Web Security

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INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Students will be able to learn the techniques needed for providing protection and security to our data and information resources over internet.
2. To understand and learn web application and its Architecture.
3. Students will be able to develop awareness regarding Cyber laws and crimes.
4. Students will be able to understand the internet and web application security issues.
5. Students will be able to learn and understand wireless network security issues.
6. To learn and understand the concept of web services, ajax and other technology which are helpful.

PRE-REQUISITES:

1. Computer Network
2. C/C++/HTML (Programming Knowledge of C/C++/HTML/JS)

COURSE OUTCOMES(COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Define overall web security infrastructure, components, issues and basic concept etc.	BTL1	PO1, PO4, PO7
CO2	Describe briefly various types of security like social media security, email security, web application and web services security etc. Explain Web related services.	BTL2	PO1, PO2, PO4, PO5, PO7
CO3	Apply and implementing various vulnerabilities for Ethically hacking a websites / Web Applications.	BTL3	PO1, PO4, PO6, PO8
CO4	Focusing Penetration Testing, Computer Forensics.	BTL4	PO1, PO2, PO7
CO5	Evaluate different web security algorithms with the help of program.	BTL5	PO1, PO3, PO4, PO6, PO7, PO8
CO6	Design and implement XSS attacks, SQL Injection attack, password hashing and cracking.	BTL6	PO1, PO3, PO4, PO7, PO8

UNIT-I

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapter - 1], TB2 [Chapters - 1, 3]

Components of Internet, Weak points of Internet, HTTP vs HTTPS, Overview of web authentication technologies, Web application architecture, Recent attack trends, Types of Web Security, Web infrastructure security/Web application firewalls, managing configurations for web apps, Techniques of Web Hacking, Methods of Attacking users, Importance of Web Application Security, Web Application Security vs Network Security. Social Media security - What is Online Social Networks, data collection from social networks, challenges, opportunities, and pitfalls in online social networks, APIs Collecting data from Online social media. Trust, credibility, and reputations in social systems.

UNIT-II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 4, 6], TB2 [Chapters - 8, 11]

Internet and Web Application Security: Email security (PGP and SMIME), Web Security: Web authentication, Injection Flaws, Programming Bugs and Malicious code, XSS and SQL Injection, Memory corruption exploits, Web Browser Security, E-Commerce Security

UNIT-III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 5], TB2 [Chapters - 1, 10, 11]

Wireless Network Security: Components, Security issues, Securing a Wireless Network, Mobile Security Management: Disaster Recovery, Ethical Hacking, Penetration Testing, Computer Forensics, Cyber laws and crime, Security Audit and Investigation, Cyber Security Solutions

UNIT-IV

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter - 6], TB2[Chapters - 5, 10, 11]

Web services overview, Honeypot, XML security, AJAX attack trends and common attacks, REST security, Content Security Policy Serialization security, Clickjacking, DNS rebinding, HTML5 security, Logging collection and analysis for web apps, Security testing, IPv6 impact on web security

TEXT BOOKS:

TB1. Joel Scambray, Vincent Liu, Caleb Sima, "Hacking Exposed Web Applications, 3rd Edition", McGraw-Hill, October 2010

TB2. Baloch, R., Ethical Hacking and Penetration Testing Guide, CRC Press, 2015.

REFERENCE BOOKS:

RB1. Dafydd Stuttard, and Marcus Pinto, The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, 2nd Edition, John Wiley & Sons, 2011.

RB2. Council, Ec. , Computer Forensics: Investigating Network Intrusions and Cybercrime, Cengage Learning, Second Edition, 2010.

RB3. John W. Rittinghouse, William M. Hancock, "Cyber Security Operations Handbook", Elsevier Pub

RB4. Deborah G Johnson, "Computer Ethics", 4th Edition, Pearson Education Publication.

RB5. Earnest A. Kallman, J.P Grillo, "Ethical Decision making and IT: An Introduction with Cases", McGraw Hill Publication.

Course Code: BCAP 313
Course Name: Web Security Lab

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0 2 1

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

List of Practicals		
S.No.	Detailed Statement	Mapping to CO#
1.	Implement the Security in web browsers (Mozilla Firefox/Google Chrome/IE)	CO1, CO2
2.	Analysis of the security and privacy features and issues in Ecommerce & social media websites i.e., Facebook, Twitter and Google+	CO1, CO2
3.	Implement CAPTCHA to keep the website secure.	CO3, CO6
4.	Implement Password hashing and cracking technique	CO3, CO6
5.	Implement SQL Injection Attack	CO3, CO6
6.	Implement XSS attacks	CO3, CO6
7.	Implement Malicious Code & Memory Corruption Exploits	CO3, CO6
8.	Implement the process of SSL Certificate	CO4
9.	Implement Reconnaissance with the help of Google and Whois	CO5, CO6
10.	Implement Clickjacking, DNS rebinding & Ajax Attack	CO5, CO6
Note: 1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Course Code: BCAT 315

Course Name: Web Development with Java & JSP

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INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:-

1. Learn Web development using Java.
2. Understand the basics of J2EE and Web development.
3. Understand and implement Servlet
4. Creating and implementing JDBC application.
5. Implement JSP and JSF concepts.
6. Understand the fundamentals of Hibernate, Struts and springs.

PRE-REQUISITES:

1. Programming Knowledge of Java
2. HTML

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the concept of HTML, CSS and Java Script.	BTL2	PO3, PO4, PO5
CO2	Understand J2EE architecture, web application structure and web architecture models.	BTL2	PO3, PO4, PO5, PO8
CO3	Creating and configuring Servlets.	BTL6	PO3, PO4, PO5
CO4	Understand JDBC architecture and design database applications using JDBC.	BTL2	PO3, PO4, PO5, PO8
CO5	Design applications using JSP and JSF.	BTL3	PO3, PO4, PO5, PO8
CO6	Elaborate the functional programming concepts of Hibernate, Struts and Springs.	BTL1	PO3, PO4, PO5, PO7, PO8

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 1, 13, 31, 32, 33], TB2[Chapters - 1, 2, 18],TB3[Chapters - 2, 3, 4, 11, 14]

Introduction to HTML, CSS and Java Script: Content, layout, and styling of web page

J2EE and Web Development: Java Platform, J2EE Architecture Types, Types of Servers in J2EE Application, HTTP Protocols and API, Web Application Structure, Web Containers and Web Architecture Models.

Swings: Introduction and comparison with AWT controls.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 37], TB2[Chapters - 34, 41, 42]

Introduction to Java EE Web Component: Overview of Servlet, Servlet Life Cycle, Types of Servlet, HTTP Methods Structure and Deployment descriptor Servlet Context and Servlet Config interface, State Management: client and server side,

JDBC Programming: JDBC Architecture, Types of JDBC Drivers, Introduction to major JDBC Classes and Interface, Creating simple JDBC Application, Database operations using JDBC, Types of Statement (Statement Interface, Prepared Statement, Callable Statement), Exploring Result Set Operations.

UNIT-III

No. of Hours: 11 Chapter/Book Reference: TB2 [Chapters - 43, 44]

Java Server Pages: Introduction to JSP, Comparison with Servlet, JSP Architecture, JSP Life Cycle, JSP Directives, JSP Action, JSP Standard Tag Libraries, JSP Session Management.

Develop Web Applications with JSF: JavaServer Faces (JSF) framework, architecture of JSF web applications, development view of a JSF application.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 22, 37, 39], TB2[33, 36]

Java Beans, Java Web Frameworks: Spring MVC: Java Beans, Spring Introduction, Spring Architecture, Spring MVC Module, Bean life cycle, Spring API.

Hibernate and Struts: Java Beans, Introduction to Hibernate, Hibernate Architecture, Hibernate Mapping Types, Introduction to Struts, core components, architecture, Interceptors, validation.

Advance Networking: Networking Basics, Introduction of Socket, Types of Socket, Socket API, TCP/IP client sockets, URL, TCP/IP server sockets, Datagrams, java.net package Socket, ServerSocket, InetAddress, URL, URLConnection.

TEXTBOOKS:

TB1. Herbert Schildt, "Java - The Complete Reference", Oracle Press, 9th Edition, 2014

TB2. Y. Daniel Liang, "Introduction to Java Programming, Comprehensive Version, Pearson.

TB3. Sams Teach Yourself HTML, CSS & JavaScript Web Publishing in One Hour a Day by Laura Lemay, Rafe Colburn, Jennifer Kymin, 2015

REFERENCEBOOKS:

RB1. E.Balaguruswamy, "Programming with Java", Tata McGraw Hill, 4th Edition, 2009.

RB2. Cay Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley & Sons, 2nd Edition, 1999.

RB3. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson.

RB4. Jakarta Struts Cookbook, by Bill Siggelkow, O'Reilly Media, Inc. 2005

Course Code: BCAP 315

L T C

Course Name: Web Development with Java & JSP Lab

0 2 1

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

List of Practicals		
S. No.	Detailed Statement	Mapping to CO#
Core Practicals (Implement minimum 8 out of 10 practicals)		
1.	Create a webpage that prints your name to the screen, print your name in Tahoma font, print a definition list with 5 items, Create links to five different pages, etc.	CO1
2.	Program to demonstrate Swing components.	CO1
3.	Configure Apache Tomcat and write a hello world JSP page.	CO1
4.	Write a java program that connects to a database using JDBC and does add, delete and retrieve operations.	CO3
5.	Create and Develop a web application using JSF.	CO3
6.	Write a program to implement a Java Beans to set and get values.	CO2
7.	Create a Java application to demonstrate Socket Programming in Java.	CO5
8.	Write a program to retrieve hostname--using methods in InetAddress class	CO2
Application Based Practicals (Implement minimum 5 out of 10 practicals)		
9.	Write a client-server program which displays the server machine's date and time on the client machine.	CO1
10.	Create a table in the database containing the columns to store book details like: book name, authors, description, price and URL of the book's cover image. Using JSP and JDBC retrieve the details in the table and display them on the webpage	CO3
11.	Write a program to create a login page using Java Beans. Also validate the username and password from the database.	CO1
12.	Create a form for inputting text and uploading image using struts	CO4
13.	Create a Student Registration application using Hibernate.	CO4
14.	Write a program to implement MVC using Spring Framework	CO4
Note: 1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		