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Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*					
AY 2023-24					
Course Information					
Programme	B.Tech. (Information Technology)				
Class, Semester	Third Year B. Tech., Sem V				
Course Code	6IT301				
Course Name	Database Engineering				
Desired Requisites:					

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
	-	**Credits: 3**			

Course Objectives	
1	To introduce basic concepts of database management systems
2	To impart conceptual designs for databases
3	To describe issues associated with transaction management

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Manipulate the relational databases	III	Applying
CO2	Inspect databases using Query languages	V	Evaluating
CO3	Evaluate transaction processing techniques	V	Evaluating

Module	Module Contents	Hours
I	**Introduction:** Database Systems, Types of Database Systems, Data abstraction, Data Models, Architecture of Database Systems.	6
II	**Relational Model:** Structure of Relational Databases, database schema, keys, Relational Algebra, Tuple Relational Calculus, Domain Relational Calculus **Integrity Constraints and Design:** Domain Constraints, Referential Integrity, Triggers, Normal forms, Functional Dependencies, Decomposition.	7
III	**Query Processing:** Query processing, Query Cost, measures of query cost, Evaluation of expression, Equivalence of Expressions. Structured Query Language (SQL), Unstructured Query Language (MongoDB, MariaDB, NoSQL)	7
IV	**Indexing and Hashing:** Ordered and secondary Indices, B+ Tree Index Files, Static Hashing, Dynamic hashing, Comparison of Indexing, Grid files, Bitmap indices.	6
V	**Transactions:** Properties and states, Concurrent execution, Serializability. **Concurrency Control:** Lock-Based Protocols, 2 phase locking protocol, Graph based protocols, Time stamp based protocols, Dead lock handling	6
VI	**Crash Recovery:** Failure Classification, storage Structure, Log-Based Recovery, Shadow Paging, recovery with concurrent transactions, buffer management, backups.	7

Text Books

1	Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, "*Database System Concepts*", McGraw-Hill Education, 6th Edition, 2010.

2	Raghu Ramakrishnan, "*Database Management Systems*", McGraw-Hill Education, 3rd Edition, 2003.

References	
1	J.D. Ullman, "*Principles of Database Systems*", Galgotia Publications, 2nd Edition, 1999
2	Wiederhold, "*Database Design*", McGraw Hill Inc, 2nd Edition, 1983
3	C.J.Date, A.Kannan, S.Swamynathan, "*An Introduction to Database Systems*", Pearson Education, 8th Edition, 2006.

Useful Links	
1	https://nptel.ac.in/courses/106/105/106105175/
2	http://www.nptelvideos.in/2012/11/database-management-system.html
3	https://www.tutorialspoint.com/mongodb/mongodb_overview.htm
4	https://www.tutorialspoint.com/mariadb/mariadb_introduction.htm

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3											1		
CO2		1		1	2								3	
CO3	1	2		3										2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli
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AY 2023-24

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., Sem V
Course Code	6IT302
Course Name	Operating System
Desired Requisites:	Computer Architecture

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
	-	**Credits: 3**			

Course Objectives

1	To introduce various system calls and system programs
2	To describe OS functionalities
3	To comprehend the services provided by operating system

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Distinguish between different types of OS	II	Understanding
CO2	Illustrate the concept of process and synchronization	III	Applying
CO3	Analyse deadlocks and memory management challenges in system	IV	Analysing

Module	Module Contents	Hours
I	**Introduction :** Notion of operating systems, Computer system organization, Computer System architecture, Computer System Structure, Operating System Operations, Process Management, Memory Management, Storage Management, protection and security. **System Structure:** Operating system services, user operating system interface, system calls, types of system calls, system programs, operating system design and implementation, operating system structure.	5
II	**Process** Process Concept, Process Scheduling, Operation on process, Cooperating process, Threads, Inter-process Communication (Algorithms evaluation). **Process Scheduling:** Basic concept, Scheduling Criteria, Scheduling Algorithms, Multiple processor scheduling, Real time scheduling.	8
III	**Inter-process Synchronization** Background, Classical problems of synchronization, Critical Region, The critical section problem, Synchronization Hardware, Monitors, Semaphores.	6
IV	**Deadlocks** System modes, Deadlock characterization, Methods for handling deadlocks Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.	5

V	**Memory Management** Background, Logical Versus Physical Address space, Swapping Contiguous Allocation, Paging, Segmentation, Segmentation with paging. **Virtual Memory:** Background, Demand paging, Page replacement, Page replacement algorithms, Allocation of frames, thrashing (Only concept), Demand segmentation. Virtualization concept and case studies	8
VI	**File System Management** File concept, access methods, directory and disk structure, file-system mounting, file sharing, protection. **Implementing File System :** File system structure, file-system implementation, directory implementation, allocation methods, free-space management	6

	Text Books
1	James. L. Peterson and A. Silberchatz ,"*Operating System Concepts*", Addison Westley Publication, 9th Edition,2018
2	Milan Milenkovic ,"*Operating System – Concept and Design*", TMGH,1st Edition,2001

	References
1	William Stallings," *Operating Systems : Internals and Design Principles*",Peterson Publication,7th Edition,2013
2	Crowley Charles ," *Operating Systems : A Design-Oriented Approach*",Mc Graw Hill Publication,1st Edition,2017

	Useful Links
1	https://www.gatevidyalay.com/operating-system/
2	https://www.javatpoint.com/os-tutorial
3	https://www.geeksforgeeks.org/operating-systems/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2											2	2	
CO2			2	3										
CO3		3			1									

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
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For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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AY 2023-24

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., Sem V
Course Code	6IT303
Course Name	Computer Algorithm
Desired Requisites:	Data Structures

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
	-	**Credits: 3**			

Course Objectives

1	To comprehend the logic of algorithm and its complexity
2	To introduce parallel algorithms
3	To familiarized standard algorithms for parallelism

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Apply appropriate logic for solving the problem	III	Applying
CO2	Analyse the algorithmic solution and apply parallelism	IV	Analysing
CO3	Design the appropriate algorithm for real-life problem	VI	Creating

Module	**Module Contents**	**Hours**
I	**Introduction:** Design and Analysis of Algorithm Greedy Algorithms: Knapsack problem, Huffman codes, Dynamic Programming: Matrix-chain multiplication, Longest common sub-sequence.	7
II	**Principles of parallel algorithm design:** Preliminaries, Decomposition techniques, characteristics of task and interaction, Mapping techniques, overhead, parallel algorithm model **Programming using MPI:** MPI basics, send, receive, overlapping computation and communication, collective communication	6
III	**Single-Source Shortest Path (SSSP)** Shortest paths and relaxation, Bellman-Ford algorithm, Single-source shortest paths in directed Acyclic graphs, Topological sort, Dijkstra's algorithm	6
IV	**All-Pairs Shortest Paths (APSP) and Maxflow** Shortest paths and matrix multiplication, The Floyd-Warshall algorithm, Flow Networks, Ford Fulkerson method, Maximum Bipartite matching	6
V	**String Matching:** The Rabin-Karp algorithm, Knuth-Morris-Pratt algorithm. Computational Geometry: Determining whether any pair of segments intersects, Finding the convex hull, Finding the closest pair of points.	7

VI	**Complexity class and Approximation Algorithm** NP-Completeness: NP completeness and reducibility, NP-complete problem. Approximation Algorithms: The vertex-cover problem, The travelling-salesman problem, The set-covering problem	7

	Text Books
1	Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, *"Introduction to Algorithms"*, Third Edition the MIT Press Cambridge, London, England, 2009
2	Anath Grama, Ansul Gupta, George Karypis, Vipin Kumar, *"Introduction to parallel computing"*, Second Edition, Pearson Education, 2003 (For mdule IV)

	References
1	Horrowitz, Sahni Rajasekaran, *"Computer Algorithms"*, Computer Science, W. H. Freeman and company Press, New york, 1997
2	

	Useful Links
1	https://nptel.ac.in/courses/106/104/106104019/
2	https://nptel.ac.in/courses/106/101/106101060/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3				3							1		
CO2		1		3	2								2	
CO3	1	2												2

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

21/9/23

Walchand College of Engineering, Sangli
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AY 2023-24

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., Sem V
Course Code	6IT341
Course Name	Mini Project - 2
Desired Requisites:	Java programming

Teaching Scheme		Examination Scheme (Marks)			
Practical	2 Hrs/Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To plan for various activities of the project and distribute the work amongst team members.
2	To develop student's abilities to transmit technical information through seminar
3	To introduce importance of document design by compiling Technical Report

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Understand, plan and execute a Mini Project with team	III	Applying
CO2	Prepare a technical report based on the Mini project	I	Remembering
CO3	Deliver technical seminar based on the Mini Project work carried out	IV	Analysing

List of Experiments / Lab Activities

List of Experiments:

Mini-project is to be carried out in a group of maximum 5 to 6 students.
Each group will carry out a mini-project by developing any application software based on the following areas.

1. Design and develop application using any one or more programming languages: Java with concepts swing, AWS, threading, APIs, etc.
2. Industry based problem / Sponsored application /Game/ Interdisciplinary application /socially useful application / Problem solving of previously learned complex concepts.
3. Project group should achieve all the proposed objectives of the problem statement.
4. The work should be completed in all aspects of design, implementation and testing and follow software engineering practices.
5. Project reports should be prepared and submitted in soft and hard form along with the code and other dependency documents. Preferable use online code repositories (github/bitbucket)
6. Project will be evaluated continuously by the guide/panel as per assessment plan.
7. Presentation and report should use standard templates provided by department.

Project report (pre-defined template) should be prepared using Latex/Word and submitted along with soft copy on CD/DVD (with code, PPT, PDF, Text report document & reference material) or on an online repository.
Students should maintain a project log book containing weekly progress of the project.

	Text Books
1	Rajendra Kumbhar , "*How to Write Project Reports, Ph. D. Thesis and Research Articles*", Universal Prakashan, 2015
2	Marilyn Deegan, " *Academic Book of the Future Project Report*", A Report to the AHRC & the British Library, 2017

	References
1	https://www.youtube.com/watch?v=0oSDa2kf518 (report writing)

	Useful Links
1	https://pats.cs.cf.ac.uk/wiki/lib/exe/fetch.php?media=project-report.pdf
2	http://users.iems.northwestern.edu/~hazen/Writing%20Project%20Reports%202004a.pdf
3	https://www.upgrad.com/blog/java-project-ideas-topics-for-beginners/
4	https://www.geeksforgeeks.org/computer-science-projects/

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		1			2							3		
CO2										2	3		3	
CO3							3		3		2	1		2

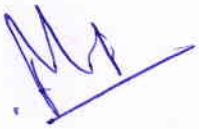
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**

LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				



Walchand College of Engineering, Sangli
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AY 2023-24

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., Sem V
Course Code	6IT351
Course Name	Database Engineering Lab
Desired Requisites:	Programming Lab

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
	-	**Credits: 1**			

Course Objectives

1	To demonstrate basic concepts of conceptual database design
2	To introduce database schemas in DBMS
3	To illustrate between various transaction management protocols

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Summarize real world problems into relational databases	III	Applying
CO2	Execute Query languages on databases	III	Applying
CO3	Analyse transaction processing techniques	IV	Analysing

List of Experiments / Lab Activities

List of Experiments:

1. Implement SELECT and PROJECT operation Assignment, Implement INSERT, DELETE and UPDATE operation database
2. Perform String operations and Aggregate functions on database
3. Perform Inner and Outer Join operations on database Assignment, Domain constraints & Referential Integrity Assignment
4. Program for sparse index and dense index Assignment
5. Program for static hashing Assignment, Program for Dynamic hashing Assignment
6. Program for log based protocol for transaction Assignment
7. Implementation of JDBC/ODBC driver for database connectivity
8. Program for Time Stamp protocol for transaction Assignment
9. Program for Deadlock Detection Assignment
10. perform CRUD (Create, Read, Update, Delete) operations on MongoDB databases
11. filtering for data efficiently on MongoDB databases
12. Working with command prompts and create database and tables on MariaDB.
13. Perform CRUD (Create, Read, Update, Delete) operations on MariaDB.

Text Books

1	Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, "*Database System Concepts*", McGraw-Hill Education, 6th Edition, 2010.
2	Raghu Ramakrishnan, "*Database Management Systems*", McGraw-Hill Education, 3rd Edition, 2003.

References

1	J.D. Ullman, "*Principles of Database Systems*", Galgotia Publications, 2nd Edition, 1999
2	Wiederhold, "*Database Design*", McGraw Hill Inc, 2nd Edition, 1983
3.	C.J.Date, A.Kannan, S.Swamynathan, "*An Introduction to Database Systems*", Pearson Education, 8th Edition, 2006.

	Useful Links
1	https://nptel.ac.in/courses/106/105/106105175/
2	http://www.nptelvideos.in/2012/11/database-management-system.html

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1					2									
CO2				3									2	
CO3		3			2									1

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

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AY 2023-24

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., Sem VI
Course Code	6IT352
Course Name	Web Technology lab
Desired Requisites:	Basic Programming Concepts

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	1 Hr/week	30	30	40	100
		Credits: 2			

Course Objectives

1	To introduce web techniques for solving client/server problems
2	To demonstrate design of web pages
3	To discuss about client-side or server-side applications

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Identify the principles of coherent coding and interactive web page	III	Applying
CO2	Demonstrate the incorporation of CSS and Java script in an HTML	IV	Analysing
CO3	Create web pages using Django and connect using MySQL	VI	Creating

Module	Module Contents	Hours
I	**HTML and CSS** HTML introduction, HTML editors, elements, attributes, headings, paragraphs, styles, formatting, lists, tables, layout, forms CSS Introduction, syntax, selectors, colors, backgrounds, borders, margins, padding, outline, text family, font family, navigation bar, dropdowns, forms, website layout and components	2
II	**Java script** Introduction to Java script, syntax, variables, operators, data types, functions, objects, events, date formats, math, control flow statements, forms, objects and its properties, object classes, components, Introduction to server-side and client-side scripting language	2
III	**PHP** Basics of PHP, installation of PHP, comments, variables, echo/print, data types, strings, numbers, math, constants, operators, control flow statements, arrays, Form handling, form validation, form required, from URL, form complete, date and time, file handling, open, read, write, upload, cookies, session,	3

IV	**Object oriented PHP** What is OOP?, classes and objects, constructor, destructor, access modifiers, inheritance, interfaces, abstract classes, static keyword	2
V	**Database Handling –** MySQL database connectivity, MySQL connect, creating database, inserting data, prepared statements, various queries used in PHP	2
VI	**Bootstrap and responsive web design** Introduction to Bootstrap, installation of bootstrap, grid system, buttons, tables, vertical forms, horizontal forms, dropdowns, responsive tabs, progress bar, alerts, pagination, badges, labels, page headers, tooltips, responsive web design: nodejs, angular js, angular, react, etc.	2

List of Experiments / Lab Activities

List of Experiments:

1. Program on HTML basic tags for text formatting.
2. Program on HTML tag to handle multimedia elements on web page.
3. Program on HTML tag to create forms and UI elements.
4. Program on CSS properties for HTML web page.
5. Program on applying event handling on HTML web page using JavaScript.
6. Program on applying layout to HTML webpage.
7. Program on PHP controls statements.
8. Program on PHP string operations.
9. Program on PHP form creation and data handling.
10. Program on session management using PHP.
11. Program on Cookies management using PHP.
12. Program on PHP to connect MySQL database for CURD operations.
13. Program on Bootstrap/ responsive web design using different components.

Text Books

1	P.J. Deitel & H.M. Deitel Pearson, "Internet and World Wide Web How to program", Pearson Education India, 4th Edition, 2009
2	Jon Duckett,"HTML and CSS: Design and Build Websites", John Wiley & Sons, Inc, 1st Edition, 2011

References

1	Steven M. Schafer, "HTML, XHTML and CSS", Wiley India Edition, 5th Edition, 2010
2	Ivan Bayross ,"Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP", BPB Publications, 4th Edition , 2006

Useful Links

1	https://www.coursera.org/learn/web-app#syllabus
2	https://www.coursera.org/specializations/web-applications
3	https://www.udemy.com/course/foundations-of-front-end-development/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		2		1										
CO2				2					2				2	
CO3					2									2

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

Walchand College of Engineering, Sangli
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AY 2023-24

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., Sem V
Course Code	6IT353
Course Name	Computer Algorithm Lab
Desired Requisites:	Programming Language

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To recognize the logic of algorithm and its complexity
2	To impart standard algorithms and their parallel counterparts
3	To categorize the algorithms based on complexity

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Implement appropriate algorithms for solving the problem	III .	Applying
CO2	Analyse the problem statement for algorithmic approach	IV	Analysing
CO3	Design the appropriate algorithm for problem statement	VI	Creating

List of Experiments / Lab Activities

List of Experiments:

1. Design of Algorithm and Analysis with gprof profiler
2. Problem of paragraph alignment and justification
3. Implementation of Optimal Binary Search Tree
4. MPI communication Assignment.
5. MPI performance analysis
6. Implementation of gift box packaging using SSSP algorithm
7. Application of APSP algorithm
8. Graph algorithms implementations
9. Implementation of approximate algorithm

Text Books

1	Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, *"Introduction to Algorithms"*,Third Edition the MIT Press Cambridge, London, England, 2009
2	Anath Grama, Ansul Gupta, George Karypis, Vipin Kumar, *"Introduction to parallel computing"*, Second Edition, Pearson Education, 2003 (For mdule IV)

References

1	Horrowitz, Sahni Rajasekaran, *"Computer Algorithms"*, Computer Science, W. H. Freeman and company Press, New york, 1997

Useful Links	
1	https://nptel.ac.in/courses/106/104/106104019/
2	https://nptel.ac.in/courses/106/101/106101060/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		1			2								2	
CO2	1	2		2										2
CO3			2		3									

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli
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AY 2023-24

Course Information

Programme	B.Tech. Information Technology
Class, Semester	Third Year B. Tech., Sem V
Course Code	6IT311
Course Name	Professional Elective 1: Graph Theory
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
	-	**Credits: 3**			

Course Objectives

1	To discuss basics of graph theory
2	To explain various properties of graphs to its applications
3	To illustrate relevant algorithms in graph theory to solve complex problems

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Summarize graph types and their properties	II	Understanding
CO2	Demonstrate real life problems by appropriate representations and operations on the graphs	III	Applying
CO3	Compare the performances of various graphs theory algorithms	IV	Analysing

Module	**Module Contents**	**Hours**
I	**Introduction to Graphs, Paths and Trees:** Introduction to graphs, Basic properties of graphs, Complete and bi-partite graphs, Isomorphism of graphs, Paths and circuits	6
II	**Cut Set and Planar Graph:** Cut sets, connectivity and separability, network flows, isomorphism, Planner graphs, Kuratowski's two graphs, representation of planner graphs, detection of Planarity, Vertex Colouring of graphs, Edge Colouring of graphs,The four-colour and five-colour theorems	7
III	**Weighted Graph and Matrix representation:** Eulerian Graphs, Hamiltonian cycles, Matrix representation of graphs, Chordal graphs, Weighted graphs, Matching's in graphs, Hall's 'marriage' theorem and its application	6
IV	**Graph Algorithm:** Travelling salesman's problem & Chinese postman problem, Distances in graphs, Shortest path and Dijkstra's algorithm, Floyd – Warshall Algorithm, Bellman-Ford Algorithm	7
V	**Spanning Tree:** Trees, Spanning tree in graphs, Minimum spanning tree algorithms, Kruskal's algorithm, Independence sets and covering in graphs	7
VI	**Applications of Graph Thory:** Perfect Graphs, Applications of graphs in switching theory, Directed Graphs (or Digraphs)	6

Text Books

1	Deo Narsing , *"Graph Theory With Applications To Engineering And Computer Science"*, 2nd Edition, PHI Publication, 2011
2	Wilson Robin J, *"Introduction to Graph Theory"*, 5th Edition, Longman Publication", 2012
References	
1	Parthasarathy K. R., *" Basic Graph Theory"*, McGraw-Hill Professional Publishing,3rd Edition, 1994
Useful Links	
1	https://onlinecourses.swayam2.ac.in/cec20_ma03/preview
2	https://archive.nptel.ac.in/courses/111/106/111106050/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3									1			2	
CO2			3	2										1
CO3	1	3			2									

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2023-24

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., Sem V
Course Code	6IT312
Course Name	Professional Elective -1: Blockchain Technology and Applications
Desired Requisites:	Data Communication

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives

1	To introduce blockchain technology over decentralized network
2	To explain use of various blockchain tools
3	To discuss applications of blockchains to the required security

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Explain the concepts and framework of blockchains	II	Understanding
CO2	Apply blockchain consensus algorithms using various tools	III	Applying
CO3	Identify suitable blockchain mechanisms with security permissions to the domain applications	IV	Analysing

Module	**Module Contents**	**Hours**
I	Elements of a Blockchain, Digital Money to Distributed Ledgers, Overall Blockchain Architecture, permissions, Types of blockchain	6
II	Security Primitives, Hashing, Digital Signatures in Blockchain, Blockchain Consensus Mechanism and its types, Permissions	7
III	Blockchain Interoperability, Proof of Work (PoW)-Scalability aspects Blockchain Consensus I – Permissionless Models Blockchain Consensus II – Permissioned Models	7
IV	Smart Contract, Decomposing the consensus process Ethereum Smart Contracts (Permissionless Model) Hyperledger Fabric (Permissioned Model)	6
V	Block chain in Financial Software and Systems (FSS), Settlements- KYC-Capital Markets-Insurance Popular Blockchain tools- Study and Comparison	7
VI	Block chain in trade/supply chain: Provenance of goods, visibility, trade/supply chain finance, invoice management/discounting Block chain for Government: Digital identity, land records and other kinds of record keeping between government entities, public distribution system / social welfare systems	6

Textbooks

24/8/2023

1	Mark Gates, "*Block chain: Ultimate guide to understanding block chain, bit coin, crypto currencies, smart contracts and the future of money*", Wise Fox Publishing and Mark Gates 2017
2	Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "*Hands-On Block chain with Hyper ledger: Building decentralized applications with Hyperledger Fabric and Composer*", 2018
3	Bahga, Vijay Madisetti, "*Block chain Applications: A Hands-On Approach*", Arshdeep Bahga, Vijay Madisetti publishers 2017
References	
1	Andreas Antonopoulos, "*Mastering Bitcoin: Unlocking Digital Crypto currencies*", O'Reilly Media, Inc. 2014
2	Melanie Swa, "*Block chain* ",O'Reilly Media 2014
Useful Links	
1	blockgeeks.comguide/what-is-block-chain-technology https://nptel.ac.in/courses/106105184/
2	https://www.coursera.org/specializations/blockchain
3	https://www.blockchain-council.org/blockchain/?utm_source=GoogleAds&utm_medium

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1											3	
CO2	1			2	3									
CO3		3	2											1

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli

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AY 2023-24

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Final Year B.Tech., Sem VIII
Course Code	6IT313
Course Name	Professional Elective 1 :Wireless Networks
Desired Requisites:	Computer Networks

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objective

1	To introduce wireless network standards, technologies, and operations
2	To elaborate the concepts of wireless network
3	To compare physical layer protocols in wireless network

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Understand basics of wireless network systems	Understand
CO2	Compare the transmission of voice and data through various networks	Analyze
CO3	Distinguish multipath propagation and advanced wireless networks	Analyze

Module	**Module Contents**	**Hours**
I	**WLAN Introduction and Basics** 802.11 protocol stack basics, RF spectrum of operations, unlicensed band usage, Types of networks and their usage, Role of Wi-Fi alliance. Exercises: Survey of WLAN products in consumer appliances.	7
II	**Data Link Layer services** Overview of Circuit and Packet switches, ARP, Data link control: HDLC & PPP, Multiple access protocols, Wireless LAN, Comparison wired and wireless LAN.	6
III	**MAC Layer** CSMA/CA principles used for WLAN MAC, Details of MAC protocol, Medium reservation and hidden nodes, MAC Frame Aggregation and QoS in WLAN, Roaming, Throughput calculation.	7
IV	**Network Layer** Network Entry Process in WLAN, Security Evolution, Power save concepts, Throughput and performance of WLAN, Network tracking operations.	7
V	**WLAN data transmission** Sniffing WLAN Frames and analysis using open source tools, Inferring capabilities of APs and clients, Analysing network entry steps and debugging connection problems, Analysing Data transmission and debugging performance issues, Analysis of Roaming performance.	6
VI	**4G Technologies** Introduction – 4G vision – 4G features and challenges - Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, IMS Architecture, LTE, Advanced Broadband Wireless Access and Services, MVNO.	6

Text Books	
1	Eldad Perahia and Robert Stacey,"*Next Generation wireless LANS 802.11n and 802.11ac*", 2nd edition, Cambridge University Press, 2013
2	Mathew Gast, 802.11 '*Wireless Networks: The Definitive Guide*', 2nd Edition, OReily, 2009
References	
1	Mathew Gast, *"802.11n: A Survival Guide: Wi-Fi Above 100 Mbps"*, OReilly, 2012
2	Mathew Gast, *"802.11ac: A Survival Guide: Wi-Fi at Gigabit and Beyond"*, OReilly, 2012
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc19_ee48/preview
2	https://onlinecourses.swayam2.ac.in/ugc19_cs10/preview

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2		2										2	
CO2		2			3									
CO3		1												2

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Bharat
Mrs. B.S. Shetty

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*					
AY 2023-24					
Course Information					
Programme	B.Tech. (Information Technology)				
Class, Semester	Third Year B. Tech., Sem V				
Course Code	6IT314				
Course Name	Professional Elective -1:Natural Language Processing				
Desired Requisites:	Artificial Intelligence				
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
	-	**Credits: 3**			

Course Objectives	
1	To introduce the field of Language Computing and its applications
2	To provide NLP abstractions and concept of syntactic parsing
3	To deliver knowledge of different algorithms of NLP

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Distinguish between NL language and Computer Language	II	Understanding
CO2	Illustrate the concept of POS tagging	III	Applying
CO3	Analyse the NLP algorithms using small datasets.	IV	Analysing

Module	Module Contents	Hours
I	Introduction to NLP, brief history, NLP applications: Speech to Text(STT), Text to Speech(TTS), Story Understanding, NL Generation, QA system, Machine Translation, Text Summarization, Text classification, Sentiment Analysis, Grammar/Spell Checkers etc., challenges/Open Problems, NLP abstraction levels, Natural Language (NL) Characteristics and NL computing approaches/techniques and steps, NL tasks: Segmentation, Chunking, tagging, NER, Parsing, Word Sense Disambiguation, NL Generation.	6
II	Text Processing Challenges, Overview of Language Scripts and their representation on Machines using Character Sets, Language, Corpus and Application Dependence issues, Segmentation: word level(Tokenization), Sentence level.	7
III	Regular Expression and Automata Morphology, Types, Survey of English and Indian Languages Morphology, Morphological parsing FSA and FST, Porter stemmer, Rule based and Paradigm based Morphology, Human Morphological Processing, Machine Learning approaches.	6
IV	Word Classes ad Part-of-Speech tagging(POS), survey of POS tagsets, Rule based approaches (ENGTOWL), Stochastic approaches(Probabilistic, N-gram and HMM), TBL morphology, unknown word handling, evaluation metrics: Precision/Recall/F-measure,error analysis.	6
V	NL parsing basics, approaches: TopDown, BottomUp, Overview of Grammar Formalisms: constituency and dependency school, Grammar notations CFG, LFG, PCFG, LTAG, Feature- Unification, overview of English CFG, Indian Language Parsing in Paninian Karaka Theory, CFG parsing using Earley's and CYK algorithms.	7

VI	Concepts and issues in NL, Theories and approaches for Semantic Analysis, Meaning Representation, word similarity, Lexical Semantics, word senses and relationships, WordNet (English and IndoWordnet), Word Sense Disambiguation: Lesk Algorithm Walker's algorithm, Coreferences Resolution:Anaphora,Cataphora.	6

	Text Books
1	Indurkhya, N., & Damerau, F. J. "*Handbook of Natural Language Processing*" CRC Press Taylor and Francis Group,2nd edition,2010.
2	Steven Bird, Edward Loper "*Natural Language Processing With Python*" O'Reilly Media, 2nd edition,2016.

	References
1	Martin, J. H., & Jurafsky, D. "*Speech and Language Processing*" Pearson Education India, 2013.
2	Manning, Christopher and Heinrich, Schutze," *Foundations of Statistical Natural Language Processing*", MIT Press,1st Edition,1997.

	Useful Links
1	http://www.nptelvideos.in/2012/11/natural-language-processing.html
2	https://www.javatpoint.com/nlp
3	https://www.geeksforgeeks.org/natural-language-processing-overview/

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2												2	
CO2			2	3										
CO3	2				1									

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Bharati
Mrs. B. S. Shetty

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2023-24

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Final Year, B. Tech. , Sem-V
Course Code	6IT315
Course Name	Professional Elective -1: Geographical Information System
Desired Requisites:	-

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
	-	**Credits: 3**			

Course Objectives

1	To introduce Geographical Information System(GIS).
2	To familiarize GIS data structures, data capture, storage and analysis
3	To impart typical uses of GIS in business, government, and resource management

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Distinguish spatial and non-spatial characteristics of GIS data	II	Understanding
CO2	Examine the data quality issues and performance for GIS data	III	Applying
CO3	Design a GIS application for real time system	VI	Creating

Module	Module Contents	Hours
I	**Module 1: Introduction to GIS** Introduction to GIS, components of GIS, Real World to Digital World through GIS, GIS data and structures, representing the Real World.	7
II	**Module 2: Georeferencing and Map Projections** Georeferencing, Relative and Discrete Referencing, levation models, Coordinate Systems, Maps and Numbering, Map Projections.	6
III	**Module 3: Data Quality and Measures** Positional Accuracy and Source of Errors, Classification Accuracy and Pixel Errors, Spatial Data Editing and Transformations, data model and comparisons.	6
IV	**Module 4: Remote Sensing and GPS and Database systems:** Introduction to Remote Sensing, RS-working, satellites, and GPS, GPS: Working and Signals , GPS errors Introduction to database, Database Management System - Introduction, DBMS models, Normalization forms, Creating and Maintaining a database, Spatial Database systems.	7
V	**Module 5: Spatial Query and analysis** Spatial Query - Introduction, Spatial analysis, Raster and vector data analysis, Overlay operations, Basic spatial analysis, advanced spatial analysis.	6
VI	**Module 6: GIS Data Standard and Infrastructure** Open Source GIS Softwares- Introduction, PROS & CONS of open source, GIS Data Standards, Open Geospatial Consortium (OGC), National Spatial Data Infrastructure (NSDI), Introduction to Web GIS and Geoserver.	7

Text Books

1	Ian HeyWood, Sarah Cornelius and Steve Carver, "*An Introduction to Geographical Information Systems*", Pearson Education, 2nd Edition, 2006

R R Rathod

2	Kang-tsung Chang , "*Introduction to Geographic Information Systems*", Tata McGrawHill, 4th Edition, 2007

	References
1	Peter A. Burrough, Rachael A. McDonnell and Christopher D. Lloyd "*Principles of Geographical Information System*", Oxford University Press, 2016
2	Keith C. Clarke, Bradley O. Parks, and Michael P. Crane, "*Geographical Information Systems and Environmental Modeling*", Prentice-Hall India, 2001
3	Michael N. Demers , "*Fundamentals of Geographic Information Systems*", 4th Edition, Wiley Publication 2008,
4	Chor Pang Lo , "*Concepts and Techniques of Geographic Information Systems*", Pearson Prentice Hall, 2007

	Useful Links
1	https://nptel.ac.in/courses/107/105/107105088/
2	https://nptel.ac.in/courses/105/107/105107206/
3	https://nptel.ac.in/courses/105/107/105107155/
4	

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3												2	
CO2		1			2									
CO3	2		2											1

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

RR Rathod

Walchand College of Engineering, Sangli
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AY 2023-24

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., Sem V
Course Code	6OE385
Course Name	Open Elective - 1: Cloud Computing System
Desired Requisites:	Computer Networks

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
	-	**Credits: 3**			

Course Objectives

1	To introduce fundamentals of virtualization
2	To impart various service and deployment model in cloud computing
3	To acquaint the significance of virtualization in data centre

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Comprehend the fundamentals of cloud computation	II	Understanding
CO2	Choose virtualization techniques to deploy the service on cloud infrastructure	III	Applying
CO3	Analyze service models for data centre applications	IV	Analysing

Module	**Module Contents**	**Hours**
I	**Introduction to Cloud Computing** Virtualization and Cloud Computing, Cloud Reference Model: IAAS, PAAS, SAAS, Cloud Deployment Model: Public Cloud, Private Cloud and Hybrid Cloud, Cloud Platforms in Industry	7
II	**Virtualization** Hosted and Bare-Meta, Server Virtualization, Desktop Virtualization, Application Virtualization, Storage Virtualization	6
III	**Network Functions** Public Cloud Networking: Route53, Content Delivery Networks, Resilience Infrastructure, Virtual Network Functions: Cloud Firewall, DNS, Load Balancers, Intrusion Detection Systems	6
IV	**Virtual Private Clouds (VPC)** VPC fundamentals, Public and Private Subnets, Security Groups, Network Access Control List, Network Address Translation.	7
V	**Cloud Management** Service Management in Cloud Computing, Data Management in Cloud Computing, Resource Management in Cloud	7
VI	Open Source and Commercial Clouds, Cloud Simulator, Research trend in Cloud Computing, Fog Computing	6

Text Books

1	Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, *"Mastering cloud computing"*, Mc Graw Hill Education, 3rd Edition, 2011
2	Thomas Erl, Zaigham Mahmood and Ricardo Puttini, *"Cloud Computing: Concepts, Technology & Architecture"*, Pearson, 1st Edition, 2010

References	
1	Richardo Puttini, Thomas Erl, and Zaigham Mahmood, *"Cloud Computing: Concepts, Technology & Architecture"*, Pearson Prentice Hall, 2nd edition, 2013
2	Srinivasan, J. Suresh, *"Cloud Computing: A practical approach for learning and implementation"*, Pearson, 2nd Edition, 2012

Useful Links	
1	Module: I, II, IV, V, VI https://nptel.ac.in/content/syllabus_pdf/106105167.pdf
2	https://aws.amazon.com/

CO-PO Mapping

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1		2										2		
CO2			3												
CO3	2				3									3	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High

Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*	
AY 2023-24	
Course Information	
Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., Sem V
Course Code	6OE386
Course Name	Open Elective - 1: Joy of Programming using Python
Desired Requisites:	Computer Programming

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
	-	**Credits: 3**			

Course Objectives	
1	To introduce the significance of Python in programming
2	To compare various programming paradigms in Python
3	To familiarize different libraries of Python

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Descriptio n**
CO1	Implement the programming concepts in Python	III	Applying
CO2	Examine the data using python programming libraries	V	Evaluating
CO3	Design application using Python libraries	VI	Creating

Module	**Module Contents**	**Hours**
I	**Introduction to Python:** The basic elements of python, Branching Programs, Control Structures, Strings and Input, Iteration, Functions and scoping, Specifications, Recursion, Global variables.	6
II	**Advanced features of Python:** Modules, Files, System Functions and Parameters, Strings, Tuples, Lists and Dictionaries, Lists and Mutability, Functions as Objects.	6
III	**Classes and Object-Oriented Programming:** Abstract Data Types and Classes, Inheritance, Encapsulation and Information Hiding.	7
IV	**Module:** Importing module, Math module, Random module, Packages Composition. **Data Visualization:** Matplot lib, Bar Graph, Pie Chart, Box plot, Histogram, Line chart, Sub plot	6
V	**Python-Numpy Library** **NumPy:** Introduction, Numpy array, Numpy array indexing, Numpy operations.	7
VI	**Pandas Library:** **Pandas:** Series, Data frames, managing missing data, groupby, merging & concatenation, operations, data input and data output.	7

Text Books

1. R. Nageswara Rao, "*Core Python Programming*", Dreamtech Press, 2nd Edition, 2017

2	Chun, J Wesley, "*Core Python Programming*", **Pearson,** 2nd Edition, 2007 Reprint 2010
	References
1	Barry, Paul, Head *First Python*, O Rielly,2nd Edition, 2010
2	Lutz, Mark, *Learning Python*, O Rielly, 4th Edition, 2009
	Useful Links
1	https://onlinecourses.nptel.ac.in/noc21_cs32/preview
2	https://docs.python.org/3/tutorial/
3	https://www.learnpython.org/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3		2										3	
CO2		1			2									2
CO3	2		1											

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*					
AY 2023-24					
Course Information					
Programme	B.Tech. (Information Technology)				
Class, Semester	Third Year B. Tech., Sem V				
Course Code	6OE387				
Course Name	Open Elective - 1: Data Science for Engineers				
Desired Requisites:					

Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives	
1	To Introduce R /Python a programming language
2	To Familiarize the mathematical foundations required for data science
3	To impart the first level data science algorithms

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Describe a flow process for data science problems	II	Ubderstanding
CO2	Develop R codes for data science solutions	III	applying
CO3	Construct use cases to validate approach and identify modifications	VI	Creating

Module	Module Contents	Hours
I	**Introduction to R:** Introduction to R, variables and data types in R, Data frames, Arithmetic and logical operations in R, Matrix operations in R, Functions in R, control structure, graphical visualization in R.	6
II	**Statistics in ML:** Statistics (descriptive statistics, notion of probability, distributions, mean, variance, covariance, covariance matrix, understanding univariate and multivariate normal distributions, introduction to hypothesis testing, confidence, interval for estimates).	6
III	**Optimization for data Science:** Unconstrained Multivariate optimization, Gradient Descent Learning Rules. Typology of data science problems and a solution framework, Multivariate optimization with Equality constraints, solving data analysis problems.	7
IV	**Predictive Modeling:** Simple linear regression and verifying assumptions used in linear regression r2. Multivariate linear regression, model assessment, assessing importance of different variables, subset selection	7
V	**Classification** classification using logistic regression, performance measurement, Logistic Regression in R	5

VI	**Clustering** Nearest Neighbors techniques, K-means clustering, KNN, KNN implementation in R, data science for Engineers - summary.	8

	Textbooks
1	Jeeva Jose," Data Analysis using R" Khanna Pub.
	References
1	Anuradha and Vincy,"Machine Learning", Wiley Pub
	Useful Links
1	https://archive.nptel.ac.in/courses/106/106/106106179/
2	https://archive.nptel.ac.in/courses/106/106/106106212/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2				1									
CO2		3											1	
CO3		1			2								1	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
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