Detailed Syllabus
Lecture-wise Breakup

Course Code	17M17CS121	**Semester** Odd **(specify Odd/Even)**	**Semester** III **Session** 2022 -2023 **Month** August to December 2022
Course Name	Project Based Learning-II (Software Development Automation)		
Credits	4	**Contact Hours**	0-0-8
Faculty (Names)	**Coordinator(s)**	Dr. Vivek Kumar Singh	
	Teacher(s) (Alphabetically)	Dr. Archana Purwar, Dr. Shikha Jain, Dr. Vivek Kumar Singh	

	COURSE OUTCOMES At the completion of the course, Students will be able to	**COGNITIVE LEVELS**
C210.1	Develop a project on live problems by applying automated software development process.	Create Level (C6)
C210.2	Confront the issues related to development of project which includes team work, test driven design, data collections etc.	Analyze Level (C4)
C210.3	Develop oral communication skill and prepare technical report.	Apply Level (C3)
C210.4	Critically review the projects developed by peers.	Evaluate Level (C5)

CO-PO Mapping:

COs	PO1	PO2	PO3	PSO1	PSO2
C210.1	3	1	3	2	3
C210.2	3	1	2	2	2
C210.3	2	3	2`	2	2
C210.4	2	1	3	1	3
Avg.	3	2	3	2	3

		Lab Plan ODD 2022	
SN	**Activity**	**Details**	**Date**
1	Group Allocation and Literature Survey	a) 3 – 6 students in a batch and a maximum of 5 – 6 batches b) average CGPA of the batches should be roughly same	**1 Aug - 6 Aug**
2	Literature Survey & Problem Identification	a) Automation Problems (live problem relevant to the Indian society) b) Economic considerations c) Aim d) Scope e) Open Source Automation Building & Testing Tools: E.g.: JUnit is an open source unit testing tool for Java programming language	**8 - 13 Aug**
3	Reviews-1		**15 - 20 Aug**
4	Problem Formulation and Gantt Chart	a) Design and Implementation Constraints b) Assumptions and Dependencies c) Functional Requirements d) Non-functional Requirements	**22 – 27 Aug**
5	Reviews -2		**29 Aug-3 Sep**
6	Lab Class	Implementation, Testing and Analysis	**5 – 10 Sep**
7	Reviews -3		**19-24 Sep**
8	Lab Class	Implementation, Testing and Analysis	**26 Sep-1 Oct**
9	Mid Term Viva	a) Presentation by Students b) Viva	**3 Oct- 8 Oct**
10	Lab Class	Implementation, Testing and Analysis	**10-15 Oct**
11	Reviews -4		**17- 22 Oct**
12	Lab Class	Implementation, Testing and Analysis	**24 -29 Oct**
13	Reviews -5		**7-12 Nov**

14	Lab Class	Testing, Analysis, and Report Preparation	**14 -19 Nov**
15	Reviews -6		**21 Nov-26 Nov**
16	End Term	a) Presentation by Students b) Viva c) Report Submission d) Self-Assessment Report Submission e) Peer Evaluation	**28 Nov-3 Dec**

Evaluation Scheme:

Parameters	Marks
6-Reviews (8 Marks each)	48
Report	10
Presentation	10
Viva	16
Peer Assessment	8
Self-Assessment	8

Total Marks	**100**

ORDINANCE

3.3A **Project Based Learning**

(a) In PBL (Project Based Learning) Courses, students will learn a new subject through execution of project(s).

(b) Students will be divided into batches ranging from **3 – 6 students in a batch** and a **maximum of 5 – 6 batches** for the whole class. The students in batches will be decided by the instructor. Choice of batch formation shall not be given to the students. The **average CGPA of the batches should be roughly same** meaning thereby that each batch will consist of students with high average and low CGPA.

(c) The projects to be given shall be decided by the instructor in such a manner that it involves gaining knowledge of the subject and additionally forces students to demonstrate skill acquisition at least in the following areas:

(i) Problem solving
(ii) Team working
(iii) Communication skills (both oral and written)
(iv) Economic considerations
(v) Acquisition of knowledge in allied areas as required by the Project

The Project should preferably be a **live problem relevant to Indian society**.

(d) The instructor shall help the students in developing the project by giving hints and suggestions, but normally should refrain from giving ready-made solutions. If need be, the instructor may deliver short lectures.

(e) In order to force the students to work consistently throughout the semester, an assessment-cum-assistance session should be carried out on a fortnightly basis or more frequently, if felt necessary by the instructor.

(f) The evaluation scheme for Project Based Learning courses shall be as under:

(i) Each fortnightly assessment - 8%
(First assessment should be at the end of 3rd week from the beginning of the semester and thereafter fortnightly assessment. A total of six assessments giving a total percentage 6 x 8 = 48%) - 48%
(ii) Report at the end of the semester - 10%
(iii) Semester end presentation by the students - 10%
(iv) Viva-voce at the end of the semester - 16%
(v) Peer group evaluation (i.e. evaluation by the fellow - 8% students not belonging to the same batch)
(vi) Self-assessment by the student concerned (can be - 8% moderated by the instructor by discussing with the student concerned)

RUBRICS for Evaluation

Assessment-1	Exemplary (>=80%)	Competent (>=50% & <80%)	Unsatisfactory (<50%)
Literature Survey	Insightful and in-depth background information is provided to illuminate the issues through inclusion of history relevant to the presentation, the "big picture" and a succinct description of the significance of the project.	Background information is provided, including references to the work of others and an explanation of why the project was undertaken, to help put the presentation in context.	Little or no background information is presented to help the audience understand the history and significance of the project.
Problem Identification	The problem has been shown (not just stated) to exist with supporting factual evidence.	The problem has stated but has weak support.	Problem has not been stated clearly and lacks supporting evidence.

Assessment-2	Exemplary (>=80%)	Competent (>=50% & <80%)	Unsatisfactory (<50%)
Literature Survey	Existing solutions to the problem, including their good and bad points, have been stated.	Existing solutions have been stated. Additional discussion may be warranted in places.	Connection between references and what is written is not clear. Little investigation has been done.
Problem Formulation	The project's objectives are clearly stated. Motivation for pursuing the project and its relevance are clearly established. There are clear expectations of the specific outputs or deliverables for the project. A set of measurable performance requirements has been created.	The project's objectives are presented. The motivation for pursuing the project and its relevance are addressed. Expectations have been stated. Some objectives may not be measurable.	The project's objectives are missing or incomplete. There is little or no discussion of motivation or relevance. Expectations have been stated but needs clarity. Most objectives are not measurable.
Gantt Chart	A plan stating the completion date, and required resources has been presented. Gantt chart has been generated.	Some aspects of the plan have not been fully developed.	Lack of planning is evident.

Assessment-3	Exemplary (>=80%)	Competent (>=50% & <80%)	Unsatisfactory (<50%)
Methodology	A system block diagram has been developed to assist the team in solving the design. All blocks have been broken down to a manageable level. ***For web/ mobile applications:*** Pages are attractive and consistent in style throughout the site. Site is well organized and is easily navigated from any page. Graphic elements are appropriate, of high quality, and are creatively used to enhance content.	A system block diagram has been developed to assist the team in solving the design. Not all blocks have been broken down to a manageable level. ***For web/ mobile applications:*** Pages are attractive, but not consistent in style throughout the site. Site is well organized. Graphic elements are appropriate and are of acceptable quality to enhance content.	A system block diagram has not been fully developed. Problem has not been broken down to manageable tasks and blocks. ***For web/ mobile applications:*** Pages are unattractive Site is not organized or consists of a single page. Graphic elements are not appropriate or not used, or are of such poor quality that they detract from content.
Coding/ Implementation	All major points of the project were completed as per planning.	Most points of the project were completed as per planning.	Little or none of the project was completed as per planning.

Assessment-4	Exemplary (>=80%)	Competent (>=50% & <80%)	Unsatisfactory (<50%)
Coding/ Implementation	All major points of the project were completed as per planning.	Most points of the project were completed as per planning.	Little or none of the project was completed as per planning.

Assessment-5	Exemplary (>=80%)	Competent (>=50% & <80%)	Unsatisfactory (<50%)
Coding/ Implementation	All major points of the project were completed as per planning.	Most points of the project were completed as per planning.	Little or none of the project was completed as per planning.
Presentation	Clearly heard and polished. Attitude indicates confidence and enthusiasm and audience attention is constantly maintained. Presenters demonstrate full knowledge of the material and can explain and elaborate on expected questions.	Clearly heard but not polished. Attitude indicates confidence but not enthusiasm and audience attention are mostly maintained. Presenters have sufficient knowledge of the material to answer expected questions.	Difficult to hear and/or moments of awkwardness. Attitude indicates some lack of confidence and/or disinterest in subject and audience attention is minimally maintained. Presenters cannot answer expected questions.
Peer Evaluation	To greatest extent	To great extent	To some extent or no contribution

Assessment-6	Exemplary (>=80%)	Competent (>=50% & <80%)	Unsatisfactory (<50%)
Coding/ Implementation	All major points of the project were completed as per planning.	Most points of the project were completed as per planning.	Little or none of the project was completed as per planning.

End Term Assessment	Exemplary (>=80%)	Competent (>=50% & <80%)	Unsatisfactory (<50%)
Viva	Answers the questions to greatest extent	Answers the questions to a great extent	Answers the questions to some extent
Report	Addresses all specified content areas. Material abundantly supports the topic. All items are labelled in accordance with engineering standards and are referred to in the text. Prior work is acknowledged by referring to sources for theories, assumptions, quotations, and findings. References are in IEEE format.	Addresses most of the specified content areas. Material minimally supports the topic. Use of engineering terms and jargon with some minor exceptions, references are in IEEE format.	Addresses few of the content areas. Material does not support the topic. There is no corresponding explanatory text for included items. Little attempt is made to acknowledge the work of others. Most references that are included are inaccurate or unclear.
Presentation	Clearly heard and polished. Attitude indicates confidence and enthusiasm and audience attention is constantly maintained. Presenters demonstrate full knowledge of the material and can explain and elaborate on expected questions.	Clearly heard but not polished. Attitude indicates confidence but not enthusiasm and audience attention are mostly maintained. Presenters have sufficient knowledge of the material to answer expected questions.	Difficult to hear and/or moments of awkwardness. Attitude indicates some lack of confidence and/or disinterest in subject and audience attention is minimally maintained. Presenters cannot answer expected questions.
Peer Evaluation	To greatest extent.	To great extent.	To some extent or no contribution.

Software development automation

The automated software development process is characterized by the following characteristics:

1. **A single common code repository** is put in place. All developers place the code they write in the repository. Currently, Git is the most popular version control system. The code in the repository is the sole source of software in the project.
2. **There is the so-called "build process"** in place. The build process is a standardized method for creating

and building subsequent software copies. Every developer, tester, testing script and mechanism uses the exact same process.

3. **The build process is automated**. Obtaining the current version of the software does not require anybody to perform a large number of manual actions. In an ideal situation, the build process is another script or a piece of software, which is also versioned in the code repository. A developer downloads the latest code from the repository, starts the build process (for example by starting a script) and obtains the current state of the application. The same script should be used by all the testing tools and testing environments, as well as for building demo versions.
4. **The build process is fast**. Building the software package does not last too long. This allows for testing results and implementing fixes multiple times.
5. The team commits changes often, every day or several times per day at best. The working code is pushed to the master branch in the version control system on an ongoing basis.
6. **The testing environment should resemble the production** environment as closely as possible. In an ideal situation, it would be a direct copy of a production environment.
7. **The process of pushing software to production is automated.** In a best-case scenario, pushing new changes to production should be done by clicking a single button or running a single script.

Detailed Syllabus
Lecture-wise Breakup

Course Code	17M17CS212	**Semester Odd 2022 (specify Odd/Even)**	**Semester 3rd Session** 2022 -2023 **Month from July, 2022 to Dec., 2022**
Course Name	Seminar and Term Paper		
Credits	4	**Contact Hours**	

Faculty (Names)	**Coordinator(s)**	Kavita Pandey
	Teacher(s) (Alphabetically)	Kavita Pandey

COURSE OUTCOMES		**COGNITIVE LEVELS**
C212.1	Identify the relevant research problem and its associated literature in the field of computer science.	Understand (level 2)
C212.2	Examine the research gaps by analyzing the research articles.	Analyze (level 4)
C212.3	Improve the communication and writing skills by compiling the findings in the form of report and seminar.	Evaluate (level 5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	…	…	…
2.	…	…	…
3.	…	…	…
4.	…	…	…
5.	…	…	…
6.	…	…	…
7.	…	…	…
...	…	…	…
***n*.**	…	…	…
			…

Evaluation Criteria

Components	**Maximum Marks**
Day to day work prior to Midterm	20
Mid term Seminar and Report	20
Day to day work after Midterm	20
End term Seminar	20
Term Paper	20
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books,

Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	…
2.	…
3.	…
4.	…
...	…
***m*.**	…

Course Description with COs

Detailed Syllabus

Subject Code	19M12CS111	**Semester Odd**	**Semester: 10th Session: 2022- 2023 Month from July to December**
Subject Name	Web Intelligence		
Credits	**3**	**Contact Hours**	**3**

Faculty (Names)	**Coordinator(s)**	1. Dr. Anuja Arora
	Teacher(s) (Alphabetically)	Dr. Anuja Arora

Course Outcomes:

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

CO#	CO Description	COGNITIVE LEVELS
C121.1	Outline the various web technologies, methods, and models used to design an intelligent web.	Understand (Level-2)
C121.2	Make use of web caching strategies at varied level: user, web server, and gateway server.	Apply Level (Level-3)
C121.3	Analyze and Model the users' browsing behavior on web.	Analyze (Level-4)
C121.4	Evaluate various Web content mining algorithms, Web language models and learning to rank models to handle complex Web.	Evaluate Level (Level-5)
C121.5	Design and develop the computational intelligent web algorithms to handle complex real problems	Create Level (Level-6)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Web Content Feature Engineering	Frequency Filter, POS Tag, Unigram, Ngram, Collocation, Levenstein Distance, KL-Divergence, T-Test.	4
2	Web Language Models	Vector Space Models: TF-IDF, SGRank, SGRank-IDF,	8

		Single Rank, Word-Word occurrence matrix; Word Embedding with GloVe, Word2Vec, CBoW, Skip Gram Model Probabilistic models: Bayes model, BM25 Ranking model;	
3	Web Content Searching	Link Based Search Algorithm, Power Iteration Method for ranking nodes on web, Handling Spider Traps and Dead ends, Topic Sensitive Page Ranking.	4
4	Ranking Algorithm and performance measures	Point wise ranking, Pair wise Ranking, Listwise ranking, Metrics for Learning to rank : CG, DCG, NDCG, P@K, MAP, AP	4
5	Web caching Algorithm	LRV, FIFO, LRU, Random, OPT, Size based, PSS	4
6	Matrix Factorization Techniques	Matrix decomposition, Eigenvalue decomposition, Non-Negative matrix factorization, Singular value decomposition, objective functions , UV decomposition, CUR decomposition	5
7	Tensor Factorization	Multidimensional Matrix, Matricization, Tucker decomposition, High Order SVD, clustHOSVD, other methods	4
10	Collective Intelligence	Crowd Sourcing, Local-Global Behavioral Interactions, Self-Organizing Systems, Self-Adaptive Evolutionary Systems, Information Extraction from Deep Web, Decision Making Under Uncertainty	4
11	Graph Structure in the Web	Social Network Analysis, Google Patent Algorithm, News Feed Algorithm, Edge Rank Algorithm, Web of Things, Situational Awareness	5
		Total number of Lectures	**40**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1	Web Intelligence Journal: https://www.iospress.nl/journal/web-intelligence-and-agent-systems/

2.	Soumen Chakrabarti,. Mining the Web: Discovering knowledge from hypertext data. Morgan Kaufmann, 2003.
3.	Scime, Anthony, ed. Web mining: applications and techniques. IGI Global, 2005.
4.	Hitzler, Pascal, Markus Krotzsch, and Sebastian Rudolph. Foundations of semantic web technologies. CRC Press, 2011.
5.	Sponder, M., & Khan, G. F. (2017). Advanced Web Analytics and Web Intelligence. In Digital Analytics for Marketing (pp. 115-144). Routledge.
6.	Symeonidis, P., & Zioupos, A. (2016). Matrix and Tensor Factorization Techniques for Recommender Systems (Vol. 1). New York: Springer International Publishing.
7.	Aggarwal Charu.C, Social Network Data Analytics, Springer Science+Business Media, LLC 2011
8.	Velásquez, J. D. (2010). Advanced techniques in web intelligence (Vol. 311). L. C. Jain (Ed.). Springer.
9.	Zhong, N., Liu, J., & Yao, Y. (2003). Web intelligence. Springer Science & Business Media.
10	Borgatti Stephon. P., Everett Martin G and Johnson Jeffery C , Analyzing Social Networks, Sage Publications, 2013

Detailed Syllabus
Lecture-wise Breakup

Course Code	19M12CS113	**Semester** Odd **(specify Odd/Even)**	**Semester** I sem (M.TechCSE)/DD **Session** 2022 -2023 **Month** from **Jul'22** to **Dec'22**
Course Name	ADVANCED WIRELESS NETWORKS		
Credits	3	**Contact Hours**	3-0-0

Faculty (Names)	**Coordinator(s)**	Dr K. RAJALAKSHMI
	Teacher(s) (Alphabetically)	Dr K. RAJALAKSHMI

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Understand the fundamentals of Wireless Transmission Technology, and media access Technologies.	Understand (C2)
CO2	Network design, simulate and analysis of various protocols in wireless networks such as WLAN, Bluetooth.	Create (C6)
CO3	Analyse the GSM & UMTS Telecommunication Systems	Analyze (C4)
CO4	Discuss the features of 4G and 5G networks	Apply (C3)
CO5	Demonstrate the features of SDN framework	Apply (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Applications of Wireless Networks, history of wireless communication, open research topics, simplified reference model	**4**
2.	Wireless Transmission	Frequency for radio transmission, regulation, signals, antennas, signal propagation, multiplexing, modulation, spread spectrum, cellular systems	**6**
3.	Medium Access Control	Specialized MAC, Hidden and exposed terminals, near and far terminals, SDMA, FDMA, TDMA, CDMA., comparison of S/T/F/CDMA	**4**
4.	Wireless LAN	Infra-red vs. radio transmission, Infrastructure and ad-hoc network, IEEE802.11: System architecture, protocol architecture, Physical Layer, Medium access control layer, MAC management, 802.11b, 802.11a, Bluetooth.	**6**
5	WiMAX	IEEE802.16 and WiMAX – Security – Advanced 802.16 Functionalities – Mobile WiMAX - 802.16e – Network Infrastructure	**3**
6.	Telecommunication Systems	GSM: Mobile Services, System Architecture, Radio Interface, Protocols, Localization and calling, Handover, Security, Data Services, GPRS,EDGE, UMTS and IMT-2000: UMTS releases and standardization, UMTS system architecture, UMTS radio interface, UTRAN, Core Network, Handover	**5**

7.	LTE, 4G, 5G	LTE – Network Architecture and Interfaces – Air Interface and Radio Networks – Mobility Management - Interconnection with UMTS and GSM – LTE Advanced (3GPPP Release 10) - Physical Layer and Multiple Access - OFDMA - Channel Modelling for 4G – Introduction to 5G - 3GPP 5G-NR Standards, usage scenarios, 5G Architecture, Next Gen Core (NGC) Network Function , 5G Non Standalone Options (NSA), 5G Advance Networks, mmWave Systems	**8**
8.	Software Defined Networks	Introduction – Centralized and Distributed Control and Data Planes – Open Flow – SDN Controllers – General Concepts – VLANs – NVGRE – Network Overlays – Types – Virtualization – Data Plane – I/O – Design of SDN Framework	**6**
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance = 10, Quizzes /Assignments /Mini-Project = 15)
Total	**100**

Students form group of size 2-3 members. Each group will identify several wireless network issues in distributed applications in various thrust areas like healthcare, industrial, education, smart city, logistics, environment, governance and etc. Once problem has been identified, the group will analyze the problem and synthesize wireless network based solutions to the identified problem. Each group will apply different wireless network technology and concepts such as WIFI, Bluetooth, WiMAX, 4G/5G, and SDN. This approach will enhance skills of each student and increase the understanding of incorporating wireless networks in recent distributed applications. Moreover, candidate will gain the enough knowledge to provide the wireless network based solutions to enhance the scalability, mobility and coverage issues of any organization/company. After this course, a student will able to undertake any work in this area in the industry or research.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

	Reference Books
1.	Jochen Schiller, “Mobile Communications”, second edition, Addison-Wesley, 2004.
2.	Martin Sauter, From GSM to LTE, An Introduction to Mobile Networks and Mobile Broadband, Wiley, 2014.
3.	Savo G Glisic, Advanced Wireless Networks – 4G Technologies, John Wiley & Sons, 2007.
4.	Jonathan Rodriguez, Fundamentals of 5G Mobile Networks, Wiley, 2015.
5	Paul Goransson, Chuck Black, ―Software Defined Networks: A Comprehensive Approach, Morgan Kauffman, 2014.
6.	Naveen Chilamkurti, SheraliZeadally, HakimaChaouchi, Next-Generation Wireless Technologies‖, Springer, 2013.
7.	IEEE, ACM Transactions, Journals and Conference papers on “Advance Wireless Network”

Detailed Syllabus
Lecture-wise Breakup

Course Code	**19M12HS211**	Semester: Odd (specify Odd/Even)	Semester: III Session: 2022 -2023 Month from: July-December
Course Name	**Cost Accounting for Engineering Projects**		
Credits	03	Contact Hours	3-0-0

Faculty (Names)	Coordinator(s)	Dr. Praveen Kumar Sharma
	Teacher(s) (Alphabetically)	Dr. Praveen Kumar Sharma

COURSE OUTCOMES		**COGNITIVE LEVELS**
C201.1	Understand basic concepts of Cost Accounting	Understand (C2)
C201.2	Apply concepts of cost in project management	Apply (C3)
C201.3	Analyze cost behaviour for decision making	Analyze (C4)
C201.4	Construct different budgets for controlling the cost	Create (C6)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Introduction & Overview of Strategic Cost Management Process	2
2.	Cost Concepts	Relevant Cost, Differential Cost, Incremental Cost, Opportunity Cost, Objectives of a costing system, Inventory Valuation, Provision of data for decision making	4
3.	Project execution	Meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities.	5
4.	Project Execution & Quantitative	Pre project execution main clearances and documents Project team: Role of each member. Importance Project site	7

	techniques for cost management	Data required with significance, Project contracts, Types and contents, Project execution, Project cost control, bar charts, Project commissioning, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory	
5.	Cost Behavior	Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems.	6
6.	Profit Planning Marginal Costing	Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach,	6
7.	Material Planning	Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card& value chain analysis.	6
8.	Budgetary Control	Flexible budgets, Performance budgets, zero based budgets, Measurements of divisional profitability pricing decisions including transfer pricing.	6
Total number of Lectures			**42**

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz+ project)
Total	**100**

Project based learning: student will form the group of four to five students. To make subject application based, student will apply various concepts such as Cost management and various types of Costing, project execution & quantitative technique for cost management, cost behaviour and profit planning. Student will apply these concept on organization, or in any ongoing project or interdisciplinary base research project or any innovative idea in any particular industry along with feasibility.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1. S. M. Datar and M. Rajan, *Horngren's Cost Accounting: A Managerial Emphasis. 16th ed*. Pearson Education, 2018.

2.	B. M. L. Nigam and I. C. Jain, *Cost Accounting: Principles And Practice*, PHI Learning Pvt. Ltd. PHI Learning Pvt. Ltd., 2010.
3.	R. S. Kaplan and A. A. Atkinson, *Advanced management accounting*. PHI Learning, 2015.
4.	A. K. Bhattacharyya, *Principles and practice of cost accounting*. PHI Learning Pvt. Ltd., 2004.
5.	N. D. Vohra, *Quantitative Techniques in Management, 3e*. Tata McGraw-Hill Education, 2006.
6.	C. Drury, *Management and Cost Accounting ,10th edition, Cengage Learning*. 2017.
7.	P. Chandra, *Projects-Planning Analysis, Selection, Implementation & Review 9e, Tata McGraw Hill, New Delhi.* 2019.

Detailed Syllabus
Lecture-wise Breakup

Course Code	**19M13HS211**	Semester: Odd	Semester: M.Tech III and M.Tech Integrated X Session: 2022 -2023 Month: August 2022-January 2023
Course Name	**Constitution of India**		
Credits	2-0-0	Contact Hours	2

Faculty (Names)	Coordinator(s)	Dr. Chandrima Chaudhuri
	Teacher(s) (Alphabetically)	Dr. Chandrima Chaudhuri

COURSE OUTCOMES		**COGNITIVE LEVELS**
C202.1	Demonstrate an understanding of the historical inheritances and institutional legacies of Indian Constitution	Understand (C2)
C202.2	Assess the nature of the Indian constitution and its applicability in the study of politics in India.	Evaluate (C5)
C202.3	Assess the devolution of powers and authority of governance of the Union government and the local government.	Evaluate (C5)
C202.4	Demonstrate an understanding of the powers and functions of the Indian executive, legislature and judiciary	Understand (C2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	History of Making of the Indian Constitution	• History • Drafting Committee-Composition & Working	2

2.	Philosophy of the India Constitution	• Preamble • Salient Features • Federalism	2
3.	Fundamental Rights and Directive Principles	• Right to Equality • Right to Freedom • Right against Exploitation • Right to Freedom of Religion • Cultural and Educational Rights • Right to Constitutional Remedies • Directive Principles of State Policy • Conflict between DPSP and FR • Fundamental Duties	5
4.	Organs of Governance	• Parliament-Composition, Qualifications & and Disqualification, Powers and Functions • Executive- President, Governor Council of Ministers • Judiciary-Appointment and Transfer of Judges, Qualifications, Power and Functions	8
5.	Local Administration	• District's Administration head: Role and Importance • Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation • Panchayati raj: Introduction, PRI: Zila Panchayat. • Elected officials and their roles, CEO Zila Panchayat: Position and role • Block level: Organizational Hierarchy (Different departments) • Village level: Role of Elected and Appointed officials • Importance of Grass root democracy	8
6.	Election Commission	• Election Commission: Role and Functioning	3
Total number of Lectures			**28**

Evaluation Criteria	
Components	**Maximum Marks**
Mid Term:	30
End Semester Examination	40
TA	30 (Attendance,Quiz, Project)
Total	**100**

Project: Projects based on the different aspects of the Indian Constitution have to be submitted by the students as a part of the project-based learning. This would help the students learn about the nitty gritty of the Constitution, their rights and duties which would later on help them not only in their work place but in their general life.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Austin, G. (1996). *The Indian Constitution: Corner Stone of a Nation*. Oxford: Oxford University Press
2.	Bakshi, P.M.(2015). *The Constitution of India*. Delhi: Universal Law Pub. Co. Pvt. Ltd
3.	Bhuyan, D. (2016). *Constitutional Government and Democracy in India*. Cuttack:Kitab Mahal..
4.	Busi, S.N. (2016). *Dr. B. R. Ambedkar framing of Indian Constitution*. Hyderabad*:*Ava Publishers
5.	Basu, D.D. (2018). *Introduction to the Constitution of India*. Nagpur: Lexis Nexis
6.	Jayal, N.G. & Mehta, P.B. (eds.)(2010). *The Oxford Companion to Politics in India*. New Delhi: Oxford University Press.
7.	Constitution series by Rajya Sabha Television and discussion on Indian Constitution by Rajya Sabha Television

Detailed Syllabus
Lab-wise Breakup

NOTE: All the entries (…) must be in Times New Roman 11.

Course Code	17M15CS113	**Semester** **Odd 2022**	**Semester** ... **Session** 2022-23 **Month from** July to Dec, 202
Course Name	**Cloud Technology Lab**		
Credits	1	**Contact Hours**	2 Hours

Faculty (Names)	**Coordinator(s)**	Dr Prakash Kumar
	Teacher(s) (Alphabetically)	Dr. Prakash Kumar

COURSE OUTCOMES		**COGNITIVE LEVELS**
C171.1	Demonstrate the architecture and layers of Cloud Service Models, Deployment models etc.	Understand (level 2)
C171.2	Understand the working of CloudSim and run different scheduling algorithms.	Apply (level 3)
C171.3	Analyze various Scheduling algorithms and compare their performances on Virtual Machines, Containers and Dockers.	Analyze (level 4)
C171.4	Apply and evaluate the energy aware algorithms for using DVFS techniques.	Evaluate (level 5)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	CloudSim installations and Use	Create Virtual Machines (VMs) on CloudSim.	CO1
2.		Allocate different Cloudlets to VMs and Data Centers using different scheduling algorithms	CO2
3.	Analyze various Scheduling algorithms in different scenarios on cloudsim	Create different Data Centers and allocate the VMs to them and analyze the outcomes	CO3
4.		Assign the cloudlets and change the scheduling techniques for various scenarios Creating and Running applications using Containers and Dockers in Cloud Environments.	CO3
5.	Evaluate Energy Aware Simulations using DVFS	Apply and evaluate energy aware algorithms using DVFS techniques.	CO4
n.	…	…	…

Evaluation Criteria

Components	**Maximum Marks**
Lab Test# 1	20
Lab Test# 2	20
D2D work	60 (D2D: 30 marks, PBL: 20 marks, Attendance: 10 marks)
Total	**100**

Project Based Learning: A group of maximum 2 students are to be formed. Each group shall choose a Cloud based project. The project shall be designed and/or modeled based on any Cloud Platform like AWS, Google cloud, Eucalyptus, CloudSim, iFogSim or any simulation tools. The project shall function and run as per the objective of the project. Live demonstration of the project shall be shown during their presentation. The project evaluation shall be done based on the quality, innovation, relevance and creativity involved.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	K. Hwang, Geoffrey C. Fox, Jack J. Dongarra, "Distributed and Cloud Computing- From Parallel Processing to the Internet of Things", Morgan Kauffman Publishers, Elsevier.
2	George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'REILLY publication.
3	"Virtualization Overview", White paper, VM Ware.
4.	Rodrigo N. Calheiros, Rajiv Ranjan, Anton Beloglazov, Cesar A. F. De Rose, and Rajkumar Buyya, CloudSim: A Toolkit for Modeling and Simulation of Cloud Computing Environments and Evaluation of Resource Provisioning Algorithms, Software: Practice and Experience, Volume 41, Number 1, Pages: 23-50, ISSN: 0038-0644, Wiley Press, New York, USA, January 2011.
5.	Tom Guérout, Thierry Monteil, Georges Da Costa, Rodrigo Neves Calheiros, Rajkumar Buyya, Mihai Alexandru, Energy-aware Simulation with DVFS, Simulation Modelling Practice and Theory, Volume 39, No. 1, Pages: 76-91, ISSN: 1569-190X, Elsevier Science, Amsterdam, The Netherlands, November 2013.
6.	Rajkumar Buyya, Rajiv Ranjan and Rodrigo N. Calheiros, Modeling and Simulation of Scalable Cloud Computing Environments and the CloudSim Toolkit: Challenges and Opportunities, Proceedings of the 7th High Performance Computing and Simulation Conference (HPCS 2009, ISBN: 978-1-4244-4907-1, IEEE Press, New York, USA), Leipzig, Germany, June 21 - 24, 2009. **- Keynote Paper.**
7.	https://www.docker.com
***m*.**	…

Detailed Syllabus
Lecture-wise Breakup

Course Code	19M12CS112	**Semester** Odd **(specify Odd/Even)**	**Session** 2022 -2023 **Month** from July to Dec
Course Name	Metaheuristics in Modelling and Optimization		
Credits	3	**Contact Hours**	3-0-0

Faculty (Names)	**Coordinator(s)**	Dr. Parul Agarwal
	Teacher(s) (Alphabetically)	Dr. Parul Agarwal

COURSE OUTCOMES At the completion of the course, Students will be able to		**COGNITIVE LEVELS**
C131.1	Interpret and explain the concepts of Metaheuristics based optimization and it's application in a diverse range of applications.	Understand Level (C2)
C131.2	Model single solution and population based Metaheuristic algorithms to solve a given optimization problem.	Apply Level (C3)
C131.3	Model Metaheuristic algorithms to solve Multi-objective optimization problems.	Apply Level (C3)
C131.4	Model hybrid Metaheuristic algorithms to solve a given optimization problem.	Apply Level (C3)
C131.5	Explain algorithms and architectures for parallel implementation of Metaheuristics.	Understand Level (C2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Optimization Models, Approximate Algorithms, When to use Metaheuristics?, Methods and Application	4
2.	Fundamentals of Metaheuristics	Representation, Objective Functions; Constraint Handling; Parameter Tuning; Performance Analysis.	5
3.	Single-Solution Based Metaheuristics	Basic Concepts, Fitness Landscape Analysis; Local Search; Tabu Search; Iterated and Guided Local search; Variable Neighborhood Search; Smoothing Methods; Noisy Methods	6
4.	Population-Based Metaheuristics Methods	Basic Concepts; Evolutionary Algorithms, Swarm Intelligence, Stochastic diffusion search, Social cognitive optimization	6
5.	Metaheuristics for Multi-objective Optimization	Basic concepts; Multi-objective Continuous and Combinatorial Problems, Multi-criteria Decision Making; Design Issues	3
6.	Fitness Assignment Strategies and Evaluation of Multi-objective Optimization	Scalar approach, Criterion-Based Methods; Dominance-Based Approaches; Indicator based Approaches; Diversity Preservation; Performance Evaluation	7
7.	Hybrid Metaheuristics	Design and Implementation Issues; Mathematical Programming Approaches; Classical Hybrid Approaches;	7

		Hybrid Metaheuristics with Machine Learning and Data Mining; Hybrid Metaheuristics for Multi-objective Optimization	
8.	Parallel Metaheuristics	Parallel Design and Implementation of Metaheuristics; Parallel Metaheuristics for Multi-objective Optimization	4
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance(10), Assignments/Mini-project/Tutorials/Quiz (15)
Total	**100**

Project based learning: Each group of 3-4 students will be assigned an optimization problem at the beginning. They are required to apply the metaheuristic methods they study on the given problem.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Metaheuristics: From Design to Implementation by El-Ghazali Talbi, Wiley, June 2009.
2.	Sean Luke, 2013, Essentials of Metaheuristics, Lulu, second edition, available athttp://cs.gmu.edu/←sean/book/metaheuristics.
3.	Gandomi, Amir; Yang, Xin-She; Talatahari, Siamak; Alavi, Amir; "Metaheuristic Algorithms in Modeling and Optimization", Metaheuristic Applications in Structures and Infrastructures, Dec 2013.
4.	Kalyanmoy Deb; "Multi-Objective Optimization Using Evolutionary Algorithms:An Introduction"; https://www.egr.msu.edu/~kdeb/papers/k2011003.pdf
5.	Kalyanmoy Deb; "Single and Multi-Objective Optimization Using Evolutionary Algorithms"; https://www.iitk.ac.in/kangal/papers/2004002.pdf
6.	Paulo Cortez, Modern Optimization with R, Use R! series, Springer, September 2014, ISBN 978-3-319-08262-2.

Detailed Syllabus
Lab-wise Breakup

Course Code	**17M15CS111**	**Semester:** ODD	**Semester: I** **Session** 2022 -2023 **Month from** July to Dec 2022
Course Name	Advanced Algorithms Lab		
Credits	1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Manish Kumar Thakur
	Teacher(s) (Alphabetically)	Manish Kumar Thakur

COURSE OUTCOMES		**COGNITIVE LEVELS**
C170.1	Implement algorithms and use appropriate advanced data structures for solving computing problems.	Level 3: Apply
C170.2	Design algorithms using divide-and-conquer, greedy and dynamic programming strategies, and further recite algorithms that employ these strategies.	Level 3: Apply Level 5: Evaluate
C170.3	Illustrate the mathematical foundation of network flows and some important flow algorithms.	Level 2: Understand Level 3: Apply
C170.4	Implement randomized algorithms to solve various problems, and validate their correctness and complexity.	Level 3: Apply Level 4: Analyze
C170.5	Understand P, NP, polynomial reduction, NP-hardness, and NP-Completeness.	Level 2: Understand Level 4: Analyze
C170.6	Comprehend and select algorithm design approaches in a problem specific manner.	Level 6: Create

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Fundamentals of data structures and algorithmic problem solving	Searching, Sorting, time complexity, Heaps, Arrays, Linked List, Trees, Fibonacci heaps, splay trees, dynamic trees.	CO1
2.	Divide and Conquer Technique	Solving Matrix multiplication problem and subset- sum problem using divide-and-conquer approach	CO2
3.	Greedy Algorithms	Greedy Approximation algorithms- Set Cover Problem, K Centers Problem, Fractional and 0/1 Knapsack, Coinage problem; Bin packing; Job scheduling, Graph coloring; and Text compression using Huffman coding and Shannon-Fanon coding.	CO2
4.	Dynamic Programming Technique	Fundamentals of Dynamic programming-based solution approach, Printing Shortest Common Super sequence, Dynamic Programming on Trees, Maximum sum rectangle in a 2D matrix.	CO2
5.	Graph Algorithms	Solve and analyze Graph problems, Algorithms. All Pair Shortest Problem, Subset-sum problem. Minimum Spanning Trees (Prim's and Kruskal algorithms); Shortest Path using Dijkstra's algorithm, K-clique problem, Graph Coloring problem.	CO1, CO2
6.	Flows in Network	Network flows - max flow and min-cost flow/circulation, Edmonds-Karp algorithm	CO3

7.	Tractable and Non- Tractable Problems	One Way of Coping with NP-Hardness. Randomized Rounding. Vertex Cover and Travelling Salesman Problem.	CO4, CO5
8.	Mini-Project	Mini-Project	CO6

Evaluation Criteria

Components	**Maximum Marks**
Lab Test# 1	20
Lab Test# 2	20
D2D work	60
Total	**100**

Project based learning: Students in group of 3 to 4 students are required to develop mini-project based on the concepts taught in this course like Greedy algorithms, dynamic programming, network flow, etc. The solution approach for the identified problem statements should include the usages of advanced data structures including string data structures. The problem statements may be a puzzle-based games, graph-based problems, string-based problems, etc. The developed mini project will enhance the algorithmic thinking and problem-solving approaches of students which are highly desirable to excel in software industries.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, MIT Press, 4th Edition, 2022
2.	Steven Skiena, The Algorithm Design Manual, Springer; 3rd Edition, 2020
3.	Tim Roughgarden, Algorithms Illuminated: Part 1: The Basics, Sound like yourself Publishing, September 27, 2017
4.	Tim Roughgarden, Algorithms Illuminated: Part 2: Graph Algorithms and Data Structures, Sound like yourself Publishing, First Edition, 2018.
5.	Tim Roughgarden, Algorithms Illuminated: Part3: Greedy Algorithms and Dynamic Programming, Sound like yourself Publishing, First Edition, 2019.