Detailed Syllabus

Lecture-wise Breakup

Subject Code	16B1NCI635	Semester Even	Semester Even Session 2019
			Month from January to June
Subject Name	Data and Web Mining		
Credits	4	Contact Hours	3-1-0

Faculty (Names)	Coordinator(s)	Neetu Sardana	
	Teacher(s) (Alphabetically)	1. Anuja Arora	
		2. Neetu Sardana	

S. No.	Course Objective	Cognitive Level (Bloom's Taxonomy)
C330-3.1	Apply the pre-processing techniques to nominal, binary, categorical and ordinal data.	Apply Level (Level III)
C330-3.2	Design a Data warehouse using star, snowflake and galaxy schema and perform OLAP operations like roll-up, drill-down, slicing and dicing, etc	Apply Level (Level III)
C330-3.3	Apply a wide range of classification techniques like Naïve-bayes, decision tree, and KNN for the numerous application including fraud detection, target marketing, medical diagnosis, etc.	Apply Level (Level III)
C330-3.4	Cluster the similar/dissimilar objects using different methods like partitioning, hierarchical and density based clustering.	Create Level (Level VI)
C330-3.5	Analyze the transactional data for finding frequent and interesting patterns using association rule mining techniques like Apriori and FP-Growth.	Analyse Level (Level IV)
C330-3.6	Analyze the link structure of web using page rank and HITS algorithms.	Analyse Level (Level IV)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Introduction	Data Mining, Its Importance, Data Mining Functionalities—What Kinds of Patterns Can Be Mined? Are All of the Patterns Interesting? Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining.	2
2.	Data warehouse and data pre-processing	Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data extraction, Data Cleaning, Data Integration and Transformation, Data Reduction, Loading into Staging area, Post Load Processing	1
3.	Dimensional modeling and OLAP Technology	Defining Dimensional model, Granularity of Facts, Star Schema, Snowflake schema, Factless fact schema, Methods for Data Cube Computation, OLAP operations	3
4.	Classification Algorithms	Issues Regarding Classification and Prediction, Bayesian Classification, Usability and Complexity Analysis of Bayesian algorithm, Nearest Neighbour algorithm, Decision Tree based algorithm , Rule based Algorithm , Performance evaluation of classifiers: Precision recall, F Measure, Sensitivity, Sensibility; Ensemble based techniques	9
5.	Clustering Algorithms	Types of Data in Cluster Analysis, Clustering Methods: Partitioning Methods: K means and K Mediod, Hierarchical Methods: Divisive and Agglomerative, Density based clustering,: DBSCAN, BIRCH. Application of clustering.	6

6.	Association Algorithms	Usability and Complexity Analysis of Apriori Algorithm, FP Growth Algorithm, ECLAT , using multiple support.	6
7.	Web Algorithms	Link Based Search Algorithm, Web Crawling, Indexing, Searching, Zone Indexing, Term-Frequency, Link Analysis Algorithm.	4
8	Ranking Algorithms	Page rank, Hits ranking algorithms	3
9	Web caching Algorithm	LRV, FIFO, LRU, Random, OPT	3
10	Recommendation Algorithms	Collaborative Filtering, Item-to-Item recommendation, Memory Based Recommendation,	3
		Total number of Lectures	40

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publicati Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
Textbooks:	
1.	Jiawei Han, Micheline Kamber, Data Mining, Morgan Kaufmann Publishers, Els 3rd edition ,2012
2.	Kimball R. and Ross M ,The Data Warehouse Toolkit", Wiley, 3rd edition,2013
3.	Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, s edition, 2019
Reference Books:	
4.	Pujari, Arun K, Data mining techniques , Universities press, 3rd edition , 2013
5.	Soumen Chakrabarti, Mining the Web: Discovering knowledge from hy data", Morgan Kaufmann, Elsevier, 2002
6.	Alex, Berson, Stephen J.Smith, Data Warehousing, data mining and OLA McGraw-Hill,2004
7.	Inmon W.H., Building the Data Warehouse ,4th Edition, Wiley, 2006
8.	Anahory S. and Murray D, Data Warehousing in the Real World, Addis Wesley, 2006.
9.	Margaret H. Dunham, Data Mining: Introductory and Advanced Topics

	Prentice Hall,2003
10.	Mattison R. ,Web Warehousing and Knowledge Management", Tata McGraw-Hill, 1999.
11.	David Hand, Heikki Mannila and Padhraic Smyth ,Principles of Data Mining, PHI, 2005

Evaluation Criteria

Components	Maximum Marks
T1 Exam	20
T2 Exam	20
End Semester Exam	35
TA	25 (Attendance: 7, Class Test/Quizzes:7, Internal Assessment:5, Assg In PBL Mode=6)
Total	**100**

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B1NHS634	Semester Even (specify Odd/Even)	Semester Session 2019 -2020 Month from Jan 2020 to June2020
Course Name	Theatre and performance(Value added)		
Credits	2	**Contact Hours**	1-0-2

Faculty (Names)	Coordinator(s)	Dr Nilu Choudhary
	Teacher(s) (Alphabetically)	Dr Nilu Choudhary

CO Code	COURSE OUTCOMES	COGNITIVE LEVELS
C305-7.1	Demonstrate problem solving ability and effective life skills through theatre performances.	Understanding level(C2)
C305-7.2	Develop awareness of the role of these arts in human life	Understanding level(C2)
C305-7.3	Apply skills of listening, articulation, awareness and collaboration through the creation of performance.	Applying level(C3)
C305-7.4	Design and present an original performance alone or in collaboration with other artists.	Creating level(C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction of Theatre	History of theatre: role of theatre in human culture with special reference to India	2
2.	Characterization	Tips for developing character, thinking about thoughts, Flash –back, Performance	2
3.	Script Writing	Turning a story into a play , How to write a one Act , setting	3

		the scene ,character , stage direction , Dialogues	
4.	School of Drama	Natya-Shastra, Stanislavsky and Brecht	3
5.	Text and its interpretation	Mother Courage ,Galileo , Aadhe Adhure (any one)	3
6.	Back-stage work	Management, planning, execution	1
		Total number of Lectures	**14**

Module No.	Title of the Module	List of Experiments/Activities	CO
1.	Moving in Space.	Students will be moving around the room, filling up the space, changing pace, changing direction, being aware of other people but not touching them. Find new ways of moving, with a different emphasis each time – smooth, jagged, slow, fast, heavy, light, high up, low down and so on. Every now and again Teacher will shout "Freeze! And Students need to freeze every muscle in your body. Absolutely NO LAUGH, LOOKING AROUND, OR MOVING. You will be out.	**C305-7.1**
2.	Mirror Activity	A great way to get students aware of body movement and working together.	**C305-7.1**
3.	Characterization	Developing and analyzing characters to reveal the special qualities and personalities of the characters in a story, making character believable.	**C305-7.2**
4.	Script Writing	The more passionate you feel about your idea, the more attractive your play will be. Divide the idea into a beginning, middle and end.	**C305-7.3**
5.	Role Assignment	No acting or movement at this point – just sit together to speak and hear the script carefully. Discuss and clarify any confusing aspects of the script and any apparent challenges in bringing the script to the stage. Division of script into small "units" and rehearsed separately	**C305-7.3**
6.	Turning story into a play	Read thru each episode or unit separately "on its feet".Actors moving around the stage space. Set	**C305-7.3**

		blocking for each episode. Use ideas generated from Mini-Episodes, and Staging with Images. Make sure the gestures, movements, and stage pictures tell the story clearly.	
7.	Stage blocking	Practice the blocking and the lines so that everyone knows what happens when and what their performance responsibilities are. Memorize lines. Work on making characters, relationships, and dialogue clear. This is a good place in which to use the Creating the Character lessons. Pay attention to vocal projection and articulation. Generate ideas about any technical elements you want to incorporate using the Transformation of Objects.	**C305-7.3**
8.	Script to performance	Finalize and run the entire play from beginning to end without stopping to check any additional rehearsal required to get everything running smoothly or not. Finally Perform!!	**C305-7.4**

Evaluation Criteria

Components	Maximum Marks
Mid Term	30
End Term	40
TA	30 (Script writing, End term stage performance)
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.	Eric Bentley, ed., The Theory of the Modern Stage: An Introduction to Modern Theatre and Drama, Penguin Books, 1968
2.	Mark Fontier, Theory/ Theatre: An Introduction, New York: Routledge, 2002
3.	Michael Holt, Stage Design and Property, Oxford: Phaidon, 1986
4.	Michael Holt, Costume and Make-up, Oxford: Phaidon, 1988
5.	Natyashastra, tr. by Adya Rangacharya, New Delhi: Munshiram Manoharlal, 1996,

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B11CI611	Semester Even (specify Odd/Even)	Semester 6th Session 2019 -2020 Month from January
Course Name	Theory of Computation and Compiler Design (Flexi-Core for B.Tech CSE)		
Credits	4	Contact Hours	3-1-0

Faculty (Names)	Coordinator(s)	Sanjeev Patel (J128), Ashish Mishra (J62)
	Teacher(s) (Alphabetically)	J62: Anita Sahoo, Ashish Mishra, ChetnaDabas , Dhanalekshmi G,Kirti Aggarwal J128: Mukesh Saraswat, Sanjeev Patel

COURSE OUTCOMES		COGNITIVE LEVELS
C314.1	Solve the problems related to regular expression, regular grammar, and Finite Automata	Apply Level (C3)
C314.2	Identify the phases of compilers for a programming language and construct the parsing table for a given syntax	Apply Level (C3)
C314.3	Discover syntax directed translation rules for a given context free grammar by examining S-attributed and L-attributed grammars.	Analyze Level (C4)
C314.4	Construct grammars and machines for a context free and context sensitive languages	Apply Level (C3)
C314.5	Build the intermediate code by applying various code optimization strategies.	Apply Level (C3)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	*Finite automata*	Review of Automata, its types and regular expressions, Equivalence of NFA, DFA and €-NFA, Conversion of automata and regular expression, Applications of Finite Automata to lexical analysis. [14 L]	14

2.	*PDA and Parser*	Push down automata, Context Free grammars, top down and bottom up parsing, YACC programming specification **[12 L]**	12
3.	*Chomsky hierarchy and Turing Machine*	***Chomsky hierarchy and Turing Machine:*** Chomsky hierarchy of languages and recognizers, Context Sensitive features like type checking, Turing Machine as language acceptors and its design.**[6L]**	6
4.	*Code generation and optimization*	***Code generation and optimization:*** Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code generation, type conversions, and equivalence of type expression, Code generation and optimization. **[10L]**	10
		Total number of Lectures	42

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance: 7, Class Test/Quizzes:7, Internal Assessment:5, Assg In PBL Mode=6)
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)
Text Book(s):
1. Hopcroft, John E.; Motwani, Rajeev; Ullman, Jeffrey D. (2013) "Introduction to Automata Theory, Languages, and Computation" (3rd ed.). Pearson. 2013
2. Raghavan, Compiler Design, TMH Pub,2013 Edition
Reference Book(s):
3. Alfred Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman, "Compilers: principles, techniques, and tools," 2nd Edition, Pearson Education
4. K. L. P. Mishra, N. Chandrasekaran, "Theory of Computer Science Automata, Languages and Computation", 3rd Edition, PHI 2007

5.	John C. Martin, "Introduction to Language and the Theory of Computation", TMH 2004
6.	S.P.Eugene, "Theory of automata, formal language and computation", New Age International Publishers , New Delhi 2003
7.	Sipser, M., Introduction to the Theory of Computation, Second Edition, Thomson Course Technology, 2007
8.	ACM Transactions on Computation Theory
9.	ACM Journal on Theory of Computation.

Course Code	15B11CI612	Semester EVEN 2020 (specify Even)	Semester II Session 2019 -2020 Month from January to June
Course Name	Theory of Programming Languages (Flexi-Core for B.Tech CSE)		
Credits	04	Contact Hours	3L+1T

Faculty (Names)	Coordinator(s)	Dr. P. Raghu Vamsi(62) , Ms. Anubhuti Roda Mohindra(128)
	Teacher(s) (Alphabetically)	Dr. P. Raghu Vamsi,Ms. Anubhuti Roda Mohindra, Ms. Anuradha

COURSE OUTCOMES (NBA CODE: C315)		COGNITIVE LEVELS
C315.1	Define the characteristics of programming languages and the functionality of various phases of a compiler.	Remember Level (Level 1)
C315.2	Demonstrate the formal grammars, functional programming paradigms, Logic programming paradigms, and multi-language programming concepts.	Understand Level (Level 2)
C315.3	Construct deterministic top-down and bottom-up parsers.	Apply Level (Level 3)
C315.4	Examine fundamental issues underlying the design decisions of different programming languages such as data types, sub programs, sequence control, storage management, event handling, parameter passing, etc.	Analyze Level (Level 4)
C315.5	Explain concurrency using C++, Java and Python.	Analyze Level (Level 4)
C315.6	Perform comparative evaluation of programming languages with respect to readability, writability, reliability, and cost of execution by selecting an appropriate programming language for evaluation of a computational problem.	Evaluate Level (Level 5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	**Introduction**	Need to study concepts of Programming Languages (PLs), History of PLs, Characteristics of good PL, Language Design Principles, Compiler, Interpreter, Assembler, Linker and Loader, Language evaluation criteria, PL translators, compilers and interpreters.	2
2.	**Lexical Analysis**	Formal grammars – Chomsky hierarchy of grammars – Type 1, 2, 3 grammars; DFA and NFA construction, Minimizing DFA, Attribute Grammars; Weakness in Grammars; Derivation of Languages – Left and Right most derivation; Derivation trees; Ambiguity in grammars – Cause of ambiguity, removing ambiguity, eliminating epsilon productions, eliminating unit productions, eliminating useless productions; Chomsky Normal Form; Bakus Norm Form.	8
3.	**Parsing**	Deterministic Top-Down parsing – LL(1) grammars without epsilon rules, LL(1) with epsilon rules, recursive descent parsing; Deterministic Bottom-up parsing – LR parser.	5-6
4.	**Data Types**	Elementary data types, user defined data types, pointer types, type checking, type conversion	2
5.	**Expressions and Assignment Statements**	Arithmetic expressions, overloaded operators, type conversion, relational and Boolean expression, short circuit evaluation, assignment statements, mixed mode assignment.	2
6.	**Sub Programs**	Design issues of subprograms, Local referencing environments, parameter passing methods, parameters that are subprograms, calling subprograms directly, generic subprograms, design issues, user defined overloaded operators, subprograms with static and dynamic variables, nested subprograms, blocks, dynamic scoping, recursion.	3
7.	**Sequence control**	Implicit and explicit sequence control, statement level control structures, selection statements, iterative	2

		statements, unconditional branching, guarded commands;	
8.	**Storage Management**	Run time elements requiring storage, storage management phases, stack storage, heap storage, fixed and variable size elements	2
9.	**Event and Exception Handling**	Bug, Error, exception, event, Exception handling in C++ and Java, Event handling in Java	2
10.	**Support for Object-Oriented Programming (OOP)**	Object Orientation, Design issues for Object Oriented Languages, OOP in Ada, C++, C#, Java, Objective-C, Ruby, and Smalltalk.	2
11.	**Concurrent Programming**	Subprogram level concurrency, semaphores, Monitors, message passing, statement level concurrency, Java Threads, concurrency in C++ and Python.	5-6
12.	**Functional Programming**	Functions and Lambda calculus, Scheme, Haskell	3
13.	**Logic Programming**	Logic and Horn Clauses, Logic programming in Prolog, Prolog examples.	3
14.	**Program correctness**	Axiomatic semantics, correctness of object oriented programs, correctness of functional programs, Formal methods and Tools.	2
		Total number of Lectures	**43-45**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance = 07,Class Test, Quizzes, etc = 07,Internal assessment = 05, Assignments in PBL mode = 06)
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)
	Text Books:
1.	Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Pearson Publisher, 2014.
2.	A.B. Tucker, R.E. Noonan, "Programming Languages: Principles and Paradigms", 2nd Edition, TMH, 2015.
	Reference Books:
1.	Daniel I. A. Cohen, "Introduction to Computer Theory", 2nd edition, Wiely.
2.	Kenneth C. Louden, Programming Languages: Principle and practice, Cengage Learning, 2012.
3.	Robert Harper, Practical Foundations for Programming Languages (Second Edition). Cambridge University Press, 2016.
4.	Friedman, Wand and Haynes, Essentials of Programming Languages, 2nd or 3rd ed., MIT Press.
5.	D. A. Watt, Programming Language Design Concepts, Wiley dreamtech .
6.	NPTEL Video Lecture: http://nptel.ac.in/courses/106102067/

Detailed Syllabus

Lab-wise Breakup

Course Code	15B17CI671	Semester Even (specify Odd/Even)	Semester 1st Session 2019 -2020 Month from Jan to May
Course Name	Compiler Design Lab		
Credits	2	Contact Hours	2

Faculty (Names)	Coordinator(s)	Dr. Chetna Dabas & Dr Anita Sahoo (Sec-62) & Dr Mukesh Saraswat (Sec-128)
	Teacher(s) (Alphabetically)	JIIT Sec-62: Anita Sahoo, Ashish Mishra, Chetna Dabas, Dhanalekshmi G, Dharmveer Rajpoot, Kavita Pandey, Kirti Aggarwal, Mohit Kumar, Kirti Aggarwal, Sonal JIIT Sec 128: Dr. Mukta Goyal, Dr. Sanjeev Patel, Dr. Shailesh Kumar

COURSE OUTCOMES		COGNITIVE LEVELS
C376.1	Design different types of automata.	Apply Level
C376.2	Develop programs using Lex tools for lexical processing of input streams.	Apply Level
C376.3	Develop yacc programs for parsing.	Apply Level
C376.4	Examine and construct different lexical analyzers and parsers using lex and yacc tools.	Analyze Level

Module No.	Title of the Module	List of Experiments	CO
1.	Automata Design	Experiments to design and develop different types of automata (NFA, DFA), Language recognized by specific strings like Implementation of scenario based automata, Simulating the automata recognition a Language, Implementation of extended transition function using C Language. Extraction of email ids from text files.	1

2.	Lex programming for Lexical Processing	Develop lex programs for recognizing and stripping of comments in a file, count number of characters, words, and lines. Develop lex programs for recognizing all HTML tags in a file, extraction of valid IP addresses, lex programs for Recognition and extraction of vowels in English Language. Design of standalone scanner using lex.	2
3.	Yacc programming for parsing	Develop yacc programs to create parsers. Design and develop lex and yacc calculator using yylex(), yywrap(),yyin(). Design a Scanner which stores all the identifiers and literals encountered in an input stream in the form of a STACK and prints the STACK. Application of parsing in NLP, Probability theory, AI and gaming etc.	3
4.	Combined Lexical Analyzer and Parsers	Develop lex and yacc programs, where the generated output of lex program is given as an input to yacc for parsing. Develop programs to recognize nested if control statement and display the levels of nesting. Develop programs to recognize and evaluate the string corresponding to a specified grammar using lex and yacc.	4

Evaluation Criteria

Components	Maximum Marks
Lab Test 1	20
Lab Record	15
Project	10
Evaluation 1 & 2	10+10
Lab Test 2	20
Attendance	15
Total	**100**

Text Books:	
1.	Hopcroft, John E.; Motwani, Rajeev; Ullman, Jeffrey D. (2013) "Introduction to Automata Theory, Languages, and Computation" (3rd ed.). Pearson. 2013
2.	Raghavan, Compiler Design, TMH Pub, 2013 Edition

	Reference Books:
1.	Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, "Compilers: Principles, Tools and Techniques", 2nd ed, Pearson Education, 2007
2.	Alan Holub, "Compiler Design in C," Prentice-Hall, 1990
3.	Douglas Thain, "Introduction to Compilers and Language Design", 1st edition, 2019, ISBN: 978-0-359-13804-3
4.	John R. Levine (that's me), Tony Mason, and Doug Brown, ``Lex & Yacc," 2nd Edition, O'Reilly and Associates, 1992
5.	Sipser, M., Introduction to the Theory of Computation, Second Edition, Thomson Course Technology, 2007

Lab-wise Breakup

Course Code	15B17CI672	**Semester** EVEN 2020 **(specify Even)**	**Semester** II **Session** 2019 -2020 **Month from** January-June
Course Name	Programming Languages Lab		
Credits	01	**Contact Hours**	02

Faculty (Names)	Coordinator(s)	Dr. P. Raghu Vamsi
	Teacher(s) (Alphabetically)	Dr. P. Raghu Vamsi (62) and Dr. Anuradha Gupta (128)

COURSE OUTCOMES NBA Code: C377		COGNITIVE LEVELS
C377.**1**	Understand the principle to program in an imperative (or procedural), an object-oriented, a functional, and a logical programming language.	Understand Level (Level 2)
C377.**2**	Improve the ability of applying appropriate programming languages for various classes of programming problems.	Apply Level (Level 3)
C377.**3**	Construct and apply programming languages parsers, programming abstractions, Graphical User Interfaces, Common Gate Way applications, database programming using Java and Python programming languages.	Apply Level (Level 3)
C377.**4**	Analyze and examine the behavior of simple programs in imperative languages using concepts such as binding, scope, control structures, subprograms and parameter passing mechanisms.	Analyze Level (Level 4)
C377.**5**	Evaluate multi-language programming concepts using applicable concurrent programming features of C++, Java, and Python.	Evaluate Level (Level 5)

Module No.	Title of the Module	List of Experiments	CO
1.	Introduction to Java/Python	Lab Assignments 01 and 02	1

	programming – Control statements, String handling, Functions, and File I/O		
2.	Regular expressions (Lex and Yacc).	Lab Assignments 03, 04 and 05	2
3.	Java/Python data structures – Lists, Tuples, Sets, and Dictionaries	Lab Assignments 01 and 02	2
4.	Object oriented programming with C++/Java/Python.	Lab Assignments 08 and 09	3
5.	GUI Programming	Lab Assignments 08 and 09	3
6.	Database Access	Lab Assignment 10	3
7.	CGI programming	Lab Assignment 10	3
8.	Exception Handling	Lab Assignment 11	4
9.	Concurrent programming	Lab Assignment 12 and 13	5
10.	Functional programming using Haskell and Logic programming using Prolog	Lab Assignment 14	1

Evaluation Criteria

Components	**Maximum Marks**
Lab evaluation -1 + Lab Test – 1 (After T1 Examination)	10 + 20 = 30
Lab evaluation -2 + Lab Test – 2 (After T2 Examination)	10 + 20 = 30
Lab Project and Viva	25
Attendance *	15

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.	Y. Daniel Liang, "Introduction to Programming using Python", Person, 2013.
2.	Fabrizio Romano, "Learning Python", Open source, Packet Publishing, 2015.
3.	Magnus Lie, "Beginning Python from Novice to Professional", 2nd Edition, Apress, 2008.
4.	Zed A. Shaw, "Learn Python the Hard Way", 3rd Edition, Addison-Wesley, 2014.
5.	Mark Lutz, "Learning Python", O'reilly, 2013.
6.	Mark Lutz, "Python Pocket Reference", O'relly, 2014.
7.	Schildt, H. (2002). "The Complete Reference Java 2. Williams", 2009. 1034 p.
8.	Schildt, Herbert. C++: The Complete Reference. McGraw-Hill, 2003.
9.	Kanetkar, Yashavant P. Let us C. BPB publications, 2016.

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B19CI691	Semester Even (specify Odd)		Semester VI Session 2019 -2020 Month from January to June
Course Name	Minor Project-2			
Credits	2		Contact Hours	4

Faculty (Names)	Coordinator(s)	MUKESH SARASWAT, ANKIT VIDYARTHI
	Teacher(s) (Alphabetically)	ALL FACULTY

COURSE OUTCOMES		COGNITIVE LEVELS
C351.1	Compare and Contrast all tools and techniques to generate solution that meet specific need to solve complex problems.	Understand Level (Level-2)
C351.2	Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach	Apply (Level-3)
C351.3	Develop software systems that meet specified design and performance requirements that contributes to global, economic, environmental and social-context	Apply (Level-3)
C351.4	Evaluate & justify the proposed solution using appropriate learning strategies	Evaluate Level (Level-5)
C351.5	Design & develop integrated software models and techniques towards research initiatives	Create Level (Level-6)

Evaluation Criteria

Components	Maximum Marks
Viva-1	20
Viva-2	20
D2D	60
Total	**100**

Course Code	16B1NCI633	Semester Even (specify Odd/Even)	Semester VI Session 2019 -2020 Month from January-June
Course Name	Introduction to Mobile Application Development		
Credits	4	**Contact Hours**	3-1-0

Faculty (Names)	Coordinator(s)	Dr. Arpita Jadhav Bhatt (62), Dr. Bindu Verma (128)
	Teacher(s) (Alphabetically)	Dr. Arpita Jadhav Bhatt (62), Dr. Bindu Verma (128)

COURSE OUTCOMES		COGNITIVE LEVELS
C331-5.1	Analyze functional aspects of Android mobile operating system for developing Android applications	Analyze Level (Level 4)
C331-5.2	Explain how Android applications work, their life cycle, manifest, Intents, event handling and using external resources	Understand Level (Level 2)
C331-5.3	Design and develop useful Android applications with compelling user interfaces by using, extending, and creating own layouts using different adapters and picker views, fragments, sending and receiving SMS and email	Create Level (Level 6)
C331-5.4	Make use of Google Map API to develop location aware services through Internet for mobile environments	Apply Level (Level 3)
C331-5.5	Apply functional aspects of database handling to develop Android applications using SQLite database	Apply Level (Level 3)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module

1.	Introduction to App development	Introduction to app development process and its platforms and development tools, Android Architecture, Setting up the environment, SDK, Architectural components, Creating simple Android applications, Activities, Intents and manifest files, Life cycles of an activity, working with intents, using intent object to link activities and types of intent, passing data using intents,	8
2.	Event Handling	Handling buttons and action listener methods and events, performing simple operations with button	6
3.	Designing and handling Graphical User Interface –I	Views and View Groups, Types of Layouts, Textview, EditText, XML layouts, Image View, List View, Grid View, Spinners Navigation bar, tab bar, user inputs like swipes, pinch, zoom etc. Adapter classes, model classes	10
4.	Designing and handling Graphical User Interface –II	Handling different types of buttons: Radio button, Check box button, toggle, progress bar view, displaying pictures and menus with views, using menus with views Designing interfaces with Views: Basic views, Picker views : Date/Time,	8
5.	Designing and handling Graphical User Interface –III	Customizing List view, Enabling Filtering and Multi-Item Support in the List View , Creating and Using a List Fragment, customizing Grid and Spinner views by defining row layouts, using GridView view, Sending and receiving SMS programmatically, sending Email and implementing location based services using map APIs	7
6.	Mobile Databases	Sqlite introduction, database Create, Retrive, Update, delete operations, backup of DB's	7
		Total number of Lectures	**46**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance:7, Project:7, Internal Assessment:5, Assignment PBL Mode: 6)
Total	**100**

Recommended Reading material:

Text books: Author(s), Title, Edition, Publisher, Year of Publication etc. (in the IEEE format)	
1.	Hagos T. Android Studio IDE Quick Reference: A Pocket Guide to Android Studio Development. Apress; 2019 Jul 31.
2.	Meier R, Lake I. Professional Android. John Wiley & Sons; 2018 Aug 23.
3.	Griffiths D, Griffiths D. Head First Android Development: a brain-friendly guide. " O' Reilly Media, Inc."; 2017 Aug 9.
4.	Darwin IF. Android Cookbook: Problems and Solutions for Android Developers. " O'Reilly Media, Inc."; 2017 May 10.
5.	Burd BA. Android application development all-in-one for dummies. John Wiley & Sons; 2015 Jul 9.
6.	Burton M. Android App Development For Dummies. John Wiley & Sons; 2015 Mar 9.

Reference Books : Author(s), Title, Edition, Publisher, Year of Publication etc. (in the IEEE format)	
1	Annuzzi Jr J, Darcey L, Conder S. Introduction to Android application development: Android essentials. Pearson Education; 2014.
2.	Hardy B, Phillips B. Android Programming: The Big Nerd Ranch Guide. Addison-Wesley Professional; 2013 Apr 9.
3.	Wei-Meng L. Beginning android application development. Hoboken: Wiely. 2012.
4.	Meier R. Professional Android 4 application development. John Wiley & Sons; 2012.
5.	https://developer.android.com
6.	https://developer.android.com/training/basics/firstapp/building-ui

Course Code	16B1NCI634	Semester Even (specify Odd/Even)	Semester: VIth Session 2019 -2020 **Month** from **January** to **May**
Course Name	Agile Software Development		
Credits	4	**Contact Hours**	3+1

Faculty (Names)	**Coordinator(s)**	Indu Chawla
	Teacher(s) (Alphabetically)	Indu Chawla

COURSE OUTCOMES		COGNITIVE LEVELS
C331-4.1	Interpret the trade-offs between traditional software development methods and agile software development methods for a software project effectively.	Understand level (Level 2)
C331-4.2	Identify and make use of an appropriate agile software engineering approach viz. extreme programming, Scrum, Crystal techniques as a part of software development.	Apply Level (Level3)
C331-4.3	Apply Refactoring techniques on source code for improved design	Apply Level (Level3)
C331-4.4	Choose tools and construct the methods for testing Agile projects using various testing strategies	Apply level (Level3)
C331-4.5	List the Planning, tracking, estimation and monitoring of agile projects with techniques like burn down charts, velocity calculation and task boards etc.	Analyze level (level4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module

1.	Introduction	Traditional software development methods, Agile software development methods and lean software development methods	3
2.	Agile Fundamentals	Agile manifesto, Agile principles, Characteristics of Agile processes, an iterative development process, Pros and cons of incremental development and software prototyping.	3
3.	Requirements and Planning	User stories, agile estimation, planning techniques- Prioritizing Themes, Financial prioritization, prioritizing desirability	4
4.	Scrum	Introduction, Scrum - Prioritizing, Estimating, and Planning, The Scrum Experience (hands-on exercise)	5
5.	Extreme Programming (XP)	Extreme Programming Values, Principles and Practices, Pair programming, Embracing change, incremental change	5
6.	Crystal	Crystal methodologies: project categories, complexity, family members, Crystal's seven properties, Crystal clear development process cycle, Crystal yellow, crystal orange and crystal orange web.	4
7.	Kanban	The principles of kanban, Improving process with kanban, Measure and manage flow, Emergent behavior	4
8.	Feature-Driven Development	Processes of feature driven development, practices and progress in FDD	2
9.	Testing	Agile testing strategy, automated unit test, test plan, test driven development, alpha, beta and acceptance testing	5
10.	Refactoring	Bad smells in code, properties of refactoring, refactoring examples, benefits, cost and risk of reafctoring	7
		Total number of Lectures	42

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20

End Semester Examination	35
TA	25
	Attendance = 07
	Class Test, Quizzes, etc = 07
	Internal assessment = 05
	Assignments in PBL mode = 06.
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)
	Text Books
1.	Stellman, Andrew, and Jennifer Greene. Learning agile: Understanding scrum, XP, lean, and kanban. " O'Reilly Media, Inc.", 2014.
2.	Kung, David. Object-oriented software engineering: an agile unified methodology. McGraw-Hill Higher Education, 2013.
3.	Layton, Mark C., and Steven J. Ostermiller. Agile project management for dummies. John Wiley & Sons, 2017.
4.	Gupta, Rajeev. Agile Automation and Unified Funtional Testing. Pearson Education India, 2016.
5.	Fowler, Martin. Refactoring: improving the design of existing code. Addison-Wesley Professional, 2018.
6.	Stellman, Andrew, and Jennifer Greene. Learning agile: Understanding scrum, XP, lean, and kanban. " O'Reilly Media, Inc.", 2014.
7.	Viscardi, Stacia. The Professional ScrumMaster's Handbook. Packt Publishing Ltd, 2013.
	References
8.	Shore, James. The Art of Agile Development: Pragmatic guide to agile software development. " O'Reilly Media, Inc.", 2007.
9.	Schwaber, Ken. Agile project management with Scrum. Microsoft press, 2004.
10.	Pressman, Roger S. Software engineering: a practitioner's approach. Palgrave macmillan, 2005.
11.	Cohn, Mike. User stories applied: For agile software development. Addison-Wesley Professional, 2004.
12.	Cohn, Mike. Agile estimating and planning. Pearson Education, 2005.
13.	Martin, Robert C. Agile software development: principles, patterns, and practices. Prentice Hall, 2002

Detailed Syllabus

Lecture-wise Breakup

Subject Code	16B1NCI642	Semester (Even)		Semester Even Session 2018 - 19 Month from January to May
Subject Name	Wireless Networks			
Credits	4	Contact Hours		3-1-0

Faculty (Names)	Coordinator(s)	Dr. Manju
	Teacher(s) (Alphabetically)	Dr. Manju, Dr. Vivek Kumar Singh

COURSE OUTCOMES		COGNITIVE LEVELS
C331-3.1	Define basic concepts & terms related to IEEE 802.11 wireless networks	Remember Level (Level 1)
C331-3.2	Explain cellular concepts of mobile radio propagation in wireless networks, IEEE 802.11 adhoc routing protocols and transport layer protocols	Understand Level (Level 2)
C331-3.3	Identify different categories and design issues of IEEE 802.11 MAC protocol	Apply Level (Level 3)
C331-3.4	Analyze metrics of MAC & Mobile IP based routing protocols using simulators	Analyze Level (Level 4)
C331-3.5	Evaluate various security parameters in wireless networks	Evaluate Level (Level 5)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures
1.	Overview of Wireless	Introduction to wireless communication &	4

	Communications & Networks	wireless networks, principles and challenges of various wireless communication generations; GSM, GPRS, 3G, 4G, and 5G	
2.	Data Link Layer	Path Loss and Shadowing, The 802.11 MAC, MAC Access Modes and Timing Section, Contention-Based Access Using the DCF Section, Fragmentation and Reassembly Frame Format. Data Frames, Control Frames, Management Frames, Contention-Based Data Service, Multi-acces communication, Aloha and CSMA Protocols, Other MAC Protocols, Multiple access Interference, IEEE 802.11 wireless LAN, Medium Access control, Interframe spaces, Virtual Carrier Sensing and Network Allocation Vector, ARQ and Atomic Operations, Backoff Procedure with the DCF, Hidden and Exposed Stations,	10
3.	Network Layer	Mobile IP, Network layer routing protocols, key component mechanisms, link metric estimation and neighborhood table management for proactive and reactive routing protocols, opportunistic routing, End-to-End Path Capacity, Mobility, Capacity of Mobile Ad Hoc Networks	8
4.	Transport Layer	Transport layer protocols, with an emphasis on congestion control, including TCP over wireless, Feedback TCP, Adhoc TCP, Split TCP, congestion sharing mechanisms, Explicit and precise rate control,	8
5.	Security in Wireless Networks	Wireless security techniques, WEP, The Extensible Authentication Protocol, Application based attacks, Network Security Attacks, Transport Layer Attacks, DLL Attacks, Cryptographic solutions	8
6.	Introduction to Simulation Tools & Performance Measurement	Network simulation software tools, MAC Protocol Performance Measures, Wireless networks security performance measurement	4
			42
Evaluation Criteria			

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance = 07, Class Test/Quizzes = 07, Internal assessment = 05 Assignments in PBL mode = 06.)
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)	
Text Books	
1.	C. Siva Ram Murthy, B. S. Manoj, "Ad Hoc Wireless Networks Architectures and Protocols, Prentice Hall Communications Engineering and Emerging Technologies Series.
2.	James F. Kurose, Keith W. Ross, 'Computer Networking : A Top-Down Approach, 6th Edition , Pearson
3.	Nupur Prasad Giri, Wireless Technology, 1st edition (2016) Dreamtech Engineering Textbooks
4.	Sunilkumar S. Manvi, Mahabaleshwar S. Kakkasageri, 'Wireless and Mobile Networks: Concepts and Protocols, 2nd Edition, Wiley
Reference Book	
1.	Matthew Gast, 802.11Wireless Networks: The Definitive Guide , O'Reilly . (2005)
2.	Ivan Marsic , Wireless Networks: Local and Ad Hoc Networks, 1st Ed., Prentice-Hall, Englewood Cliffs, NJ, 1995.
3.	IEEE, ACM Transactions, Journals and Conference papers on "Wireless Communications & Networking."

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NCI643	Semester EVEN	Semester VI Session 2019 -2020
			Month from JAN-JUN

Course Name	Computational Intelligence		
Credits	4	**Contact Hours**	3 – 1 - 0

Faculty (Names)	Coordinator(s)	Dr. R.B. Mishra, Dr. Swati Gupta
	Teacher(s) (Alphabetically)	Dr. R.B. Mishra, Dr. Satish Chandra, Dr. Swati Gupta

COURSE OUTCOMES		COGNITIVE LEVELS
C330-1.1	Infer vagueness, ambiguity and uncertainty in natural language using fuzzy logic concepts.	Understanding [Level 2]
C330-1.2	Apply the intelligent techniques using rough set theory, fuzzy Logic, genetic and hybrid techniques to solve different type of real world problems	Apply [Level 3]
C330-1.3	Analyze the principles of fuzzification, defuzzification and their applications in different set of problems.	Analyze[Level 4]
C330-1.4	Integrate and develop hybrid Intelligent techniques for real time engineering application.	Create [Level 6]
C330-1.5	Compare and conclude the results of different techniques through writing technical reports.	Evaluate [Level 5]

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Introduction to CI: Pitfalls of AI, formal definition of CI, synergism in soft computing, Types of Adaptation and learning, Computational intelligence as Adaptation and Self organization.	03
2.	Methods of Knowledge representation	Rough Set Theory, Fuzzy sets and Fuzzy relations, methods of knowledge representation	04

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3.	Fuzzy Inference System with applications	Rule-Based Expert Systems and Fuzzy Expert Systems: Rule-based expert systems, Fuzzy sets and operations of fuzzy sets, Fuzzy rules and fuzzy inference, Fuzzy expert systems . Case Studies (data clustering, pattern recognition)	09	
4.	Neural Network with Applications	Pattern recognition and neural networks: Supervised and unsupervised learning, machine perception, object identification and speech recognition Unsupervised learning neural networks: self-organizing feature maps , Radial basis function networks , ART network, case studies	09	
5.	Evolutionary Computations	Introduction to evolutionary computing: GA, DE, PSO, ACO, ABC, GWO, BBO	08	
6.	Intelligent Systems	Hybrid Intelligent systems: Evolutionary algorithms in designing neural networks, Evolutionary algorithms vs. fuzzy system Neuro Fuzzy Systems concepts and applications	09	
		Total number of Lectures		**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance = 07, Class Test, Quizzes, etc = 07, Internal assessment = 05 Assignments in PBL mode = 06.)
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)

Text Books:

1.	Andries P. Engelbrecht, *Computational Intelligence: An Introduction, 2nd Edition*. John Wiley & Sons, 2013

Reference Books:

2.	Konar, Amit. *Computational intelligence: principles, techniques and applications*. Springer Science & Business Media, 2006.
3.	Fulcher, John. *Computational intelligence: an introduction*." In *Computational intelligence: a compendium*, pp. 3-78. Springer, Berlin, Heidelberg, 2008.
4.	Eberhart, Russell C., and Yuhui Shi. *Computational intelligence: concepts to implementations*. Elsevier, 2011.

5.	Ross, Timothy J. *Fuzzy logic with engineering applications.* John Wiley & Sons, 2017.
6.	Jang, Jyh-Shing Roger, Chuen-Tsai Sun, and Eiji Mizutani. *Neuro-fuzzy and soft computing; a computational approach to learning and machine intelligence*, 2015.
7.	Cox, Earl, Michael O'Hagan, Rodman Taber, and Michael O'Hagen. *The fuzzy systems handkbook with cdrom.* Academic Press, Inc., 1998.
8.	Haykin, Simon. *Neural networks: a comprehensive foundation*. Prentice Hall PTR, 1994.
9.	De Jong, Kenneth A. *Evolutionary computation: a unified approach*. MIT press, 2006.
10.	Ajith Abraham, Rafael Falcón, Rafael Bello, *Rough Set Theory: A True Landmark in Data Analysis,* Springer, 2009

Subject Code	16B1NCI644	Semester Even (specify Odd/Even)	Semester Even Session 2019 - 20 Month from January to May
Subject Name	Cloud based Enterprise Applications		
Credits	4	Contact Hours	3-1-0

Faculty (Names)	Coordinator(s)	Bharat Gupta
	Teacher(s)	Bharat Gupta

COURSE OUTCOMES		COGNITIVE LEVELS
C331-6.1	Differentiate between Public, Private, and Hybrid Clouds	Understand Level (Level 2)
C331-6.2	Develop Enterprise applications based on XML, JavaScript, Java Servlets, Java Server Pages, etc.	Apply Level (Level 3)
C331-6.3	Develop web service based solutions by using REST, JSON, SOAP, etc.	Apply Level (Level 3)
C331-6.4	Examine emerging technologies in cloud environment.	Analyse Level (Level 4)
C331-6.5	Evaluate the performance of different Public Cloud Platforms e.g., GAE, AWS and Azure.	Evalute Level (Level 5)
C331-6.6	Design and deploy Enterprise applications on one of the Cloud Service Providers, i.e., Amazon AWS or Microsoft Azure.	Create Level (Level 6)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1	XML Programming	XML, DTD, XML schema, XPath, XQuery	6
2	Web services	REST, JSON,SOAP	6
3	JavaScript	Basic constructs, Conditional statements, Loop, External linking with .js, Browser related events	6
4.	Server Side programming	Java servlet, Java server pages	8
5.	Introduction to Cloud Computing	Public, private, and Hybrid clouds; Features of cloud platforms	4

6.	Public Cloud Platforms	Introduction to GAE, AWS and Azure; Programming support of Google App Engines, Amazon AWS, and Microsoft Azure; Emerging cloud software environments	7
7.	Apache Hadoop	Introduction to distributed computing, Map Reduce	3
8.	Virtualization	Virtualization structures/tools and mechanism, Virtualization of CPU, Memory and I/O devices	2

Total number of Lectures	42

Evaluation Criteria

Components	Maximum Marks
T1	**20**
T2	**20**
End Semester Examination	**35**
TA	**25**

- **Attendance:7**
- **Tutorial Assessment/Quiz:7**
- **Internal assessment:5**
- **Assignments in PBL mode:6**

Total	**100**

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

Text Book

1.	Arshdeep Bahga, Vijay Madisetti, "Cloud Computing:A Hands-on Approach", Universities Press, 2014

References

1.	https://www.w3.org/XML/
2.	https://aws.amazon.com/
3.	https://azure.microsoft.com/en-in/
4.	https://cloud.google.com/appengine/docs/
5.	John Pollock, JavaScript, 3rd Edition, Mc Graw Hill, 2011

6.	https://docs.oracle.com/javase/tutorial/jaxp/
7.	Elliotte Harold, W. Means, XML in a Nutshell, 3rd Edition, O'Reilly Media, 2009
8.	http://www.oracle.com/technetwork/java/javaee/jsp/index.html (JSP)
9.	https://docs.oracle.com/javaee/6/tutorial/doc/bnafd.html (Java Servlet Technology)

Course Code	16B1NCI648	Semester Even (specify Odd/Even)	Semester VI Session 2019 -2020
			Month from Jan 20 – Jun 20

Course Name	Information Retrieval and Semantic Web		
Credits	4	Contact Hours	3 – 1 -- 0

Faculty (Names)	Coordinator(s)	Dr Devpriya Soni
	Teacher(s) (Alphabetically)	Dr Devpriya Soni

COURSE OUTCOMES		COGNITIVE LEVELS
C330-15.1	Analyze the capabilities and limitations of information retrieval systems.	Analyze Level (Level 4)
C330-15.2	Apply techniques for design and implementation of retrieval systems for text and other media.	Apply Level (Level 3)
C330-15.3	Analyze the results of retrieval from large quantities of data by using various algorithms of information retrieval and Optimization of the results.	Create Level (Level 6)
C330-15.4	Analyze the different retrieval metrics for retrieval evaluation.	Analyze Level (Level 4)
C330-15.5	Understand the concepts of web crawling and web retrieval and its optimization.	Understanding Level (Level 2)
C330-15.6	Apply the taxonomy and ontology concepts, Resource Description Framework (RDF) and web ontology language (OWL) on semantic web applications	Apply Level (Level 3)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module

1.	Introduction to Information Retrieval	Theory of information retrieval, Information retrieval on data and information retrieval on the web Information retrieval tools and their architecture.	4
2.	Boolean Retrieval & Index Construction	An example information retrieval problem, Processing Boolean queries, The extended Boolean model versus ranked retrieval, Blocked sort based, single pass in Memory, Distributed and dynamic Indexing.	6
3.	Dictionary and tolerant retrieval	Wild card queries, Spelling correction , Phonetic correction	4
4.	Scoring Term weighting and the vector space model	Term frequency and weighting, Vector space model, Variant tf-idf scoring	4
5.	Link analysis	Web as graph, PageRank	4
6.	Information retrieval tools	Web directory, Search engine, Meta search engines, Web searching and search engine architecture, Searching algorithms (Fish, Shark etc...), and Page ranking algorithms.	6
7.	Web Crawling	WebCrawler architecture and Web crawling (parallel, distributed and focused web crawling).	6
8	Taxonomy and Ontology	Creating domain specific ontology, Ontology life cycle Semantic Web: Resource description Framework (RDF), Turtle format, Storing RDF in Databases/files, Language Tags and labels in RDF files, RDF schema and web ontology language (OWL).	8
		Total number of Lectures	**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance = 07, Class Test, Quizzes, etc = 07, Internal

	assessment = 05, Assignments in PBL mode = 06)
Total	**100**

	Recommended Reading material:
	Text Books
1.	Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, "An introduction to Information Retrieval", 2013 Cambridge University Press UP.
2.	Rijsbergen C. J. 2012,"Information Retrieval", 2nd edition.
	Referenc Books
1.	Salton, G. and McGill, M.J., "*Introduction to Modern Information Retrieval*", Computer Series. McGraw-Hill, New York, NY.
2.	ACM Transaction on Internet Technology.

Lecture-wise Breakup

Course Code	16B1NHS631	Semester Even	Semester 6th Session 2019 -2020
			Month from January 2020 to May 2020
Course Name	PROJECT MANAGEMENT		
Credits	3	**Contact Hours**	2-1-0

Faculty (Names)	Coordinator(s)	Dr. Santoshi Sengupta (Sec-62), Dr. Deepak Verma (Sec-128)
	Teacher(s) (Alphabetically)	Dr. Deepak Verma, Dr. Santosh Dev, Dr. Santoshi Sengupta

COURSE OUTCOMES		COGNITIVE LEVELS
304-5.1	Apply the basic concepts of project management such as features, objectives, life cycle, model and management, in a given context	Apply Level (C3)
304-5.2	Analyze projects and their associated risks by understanding the various theoretical frameworks, non-numerical and numerical models in order to make correct selection decisions	Analyze Level (C4)
304-5.3	Evaluate the stages of project management and identify and determine correct techniques for planning and scheduling	Evaluate Level (C5)
304-5.4	Evaluate management processes for budgeting, controlling and terminating projects in order to achieve overall project success	Evaluate Level (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Project Management: Introduction	Characteristics of project; Life Cycle of Project; Project Model; Project Management as discipline; Contemporary aspects of Project Management	4
2.	Project Selection	Theoretical Models; Non-numeric models; Numeric Models; Financial Models; Project Portfolio process,	6

		Significance and applicability of Monte Carlo simulation	
3.	Project Organization, Manager and Planning	Pure Project organization; Functional Organizations; Mixed organizations; Matrix organizations; Role, Attitudes and Skills of Project Manager, Project Coordination, Systems Integration, Work Breakdown Structure, Linear Responsibility Charts.	4
4.	Risk Management	Theoretical Aspects of risk, Risk Management process, Numeric Techniques, Hillier model, Sensitivity Analysis, Certainty Equivalent approach and Risk adjusted discount rates, Game theory.	4
5.	Project Scheduling and Resource Allocation	Theoretical aspects-Importance, Focus Area-PERT/CPM, AOA and AON charts, Probability Analysis, Gantt Charts, Crashing of Projects- Time and Cost tradeoff, Basics-Resource Leveling and Loading.	6
6.	Budgeting, Control and Project Termination	Estimating Project Budgets, Improving the process of cost estimation, Basics, Importance, Purpose of control, Types of Control, Desirable features of Control, Control Systems, Critical Ratio Method, Control of creative activities, Control of change and scope creep, Why Termination, Types of termination, typical termination activities.	4
Total number of Lectures			**28**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Project, Oral Questions)
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. Meredith, Mantel, Project Management-A Managerial Approach, 10th Edition, Wiley Publications
2. Timmothy Kloppenborg, Contemporary Project Management, 5tht Edition, Cengage Learning, 2017
3. Vohra, N. D., Quantitative Techniques in Management, 5th Edition, Tata McGraw Hill Publishing Company, 2017

Course Code	16B1NHS635	Semester: Even	Semester: VI Session: 2019 -2020 Month: Jan 2020 to June 2020
Course Name	Organizational Behavior		
Credits	3	Contact Hours	3(2-1-0)

Faculty (Names)	Coordinator(s)	Ms Puneet Pannu (Sec 62) & Dr Anshu Banwari (Sec 128)
	Teacher(s) (Alphabetically)	Dr Anshu Banwari Ms Puneet Pannu

COURSE OUTCOMES		COGNITIVE LEVELS
C304-6.1	Identify dynamic human behavior through an insight into relationships between individuals, groups and organizations	Apply (C3)
C304-6.2	Analyze individual management style as it relates to influencing and managing behavior in the organization.	Analyze (C4)
C304-6.3	Decide and justify set of strategies for meeting the special challenges in the 21st century competitive workplace	Evaluate (C5)
C304-6.4	Assess the potential effects of important developments in the external environment on behavior in organizations	Evaluate (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1	Introduction to OB: Challenges and Opportunities	Interdisciplinary Field, Concepts, Approaches, Responding to Globalization; Improving Quality & Productivity; Improving Customer Service; Improving People Skill; Empowering People; Stimulating Innovation & Change; Coping with Temporariness; Positive Organizational Behavior, Working in Networked Organizations; Balancing Work-Life Conflict	3
2	Managing Workforce Diversity	Major forms of Workplace Diversity, Valuing Diversity, Role of Disabilities, Discrimination, Diversity Initiatives, Diversity Awareness and Affirmative Action, Diversity Management and strategies to implement it Competitive Advantage of Diversity Management Generational Workforce	4
3.	Job Design and Flexible Job Environment	Job Design & its uses; Flexible Job Environment; Job Enrichment Model	2
4.	Leadership: Authentic Leadership	Inspirational Approach to Leadership: Authentic, Ethical & Servant Leadership Defining Authentic Leadership through Intrapersonal, Interpersonal and Developmental Aspects; Basic Model Of Authentic Leadership; Practical Approach to Authentic Leadership through the research of Terry and Bill George; Authentic Leadership: Trust and Ethics, Dimensions of Trust, Counseling & Mentoring	6
5.	Power & Politics	Concept of Power; Sources of Power Contingencies of Power; Power Tactics; Measuring Power Bases: Power Authority Obedience Organizational Politics: Types Factors contributing to Political Behavior; Consequences & Ethics of Politics	5
6.	Employee Engagement	Creating a Culture of Engagement, Models of engagement, Benefits of Employee Engagement, Gallup Study, Methods	2

		of engaging employees – from entry to exit, Managers Role in Driving Engagement	
7.	Organizational Culture & Workplace Spirituality	Creating Organizational Culture Approaches to Organizational Culture; How employees learn culture; Measuring Organizational Culture; Spirituality & Organizational Culture	3
8.	Organizational Change & Development	Organizational Change: Meaning & Types; Technology & Change; Resistance to Change v/s Inviting Change; Approaches to Organizational Change; Planning & Implementing Change; Organizational Development; OD Interventions & Change	3
		Total number of Lectures	**28**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Project)
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.	**S. Robbins, T. Judge, S. Sanghi**, *Organizational Behavior*, 13th Ed, Prentice-Hall India, 2001
2.	**P.Subba Rao**, *Organizational Behavior: Text Cases & Games*, 2nd Edition, Himalaya Publishing House , 2015
3.	**John R. Schermerhorn, Richard N. Osborne, Mary Uhl-Bien; James G. Hunt**, *Organizational Behavior*, 12th Edition, Wiley India Pvt. Ltd, 2012
4.	**Debra L.Nelson and James C. Quick**, *Organizational Behavior*, Cengage Learning, India Edition, 2009
5.	**Steven L. McShane and Mary Ann Von Glinow**, *Organizational Behavior Essentials*, Tata McGraw Hill Publishing Company Ltd, 2007
6.	**Jerald Greenberg**, *Behavior in Organizations*, 10th Ed, PHI Learning Pvt Ltd

Course Code	16B1NHS636	Semester : Even	Semester VI Session 2019 -2020
			Month: January 2020 to June 2020
Course Name	Literature & Adaption		
Credits	3	Contact Hours	2-1-0

Faculty (Names)	Coordinator(s)	Dr. Monali Bhattacharya (Sector 62)
		&
		Dr. Ekta Srivastava (Sector 128)
	Teacher(s) (Alphabetically)	Dr. Ekta Srivastava, Dr. Monali Bhattacharya

COURSE OUTCOMES		COGNITIVE LEVELS
C304-3.1	Understand and outline the elements and theories of adaptation and its various forms, and relate with the texts reflecting the cultural, moral and linguistic changes in the contemporary society.	Understanding Level (C2)
C304-3.2	Utilize visual literacy to analyze the language and style adopted in filmed texts and examine them as reflections of Readers' and Audience' values and perceptions in the context of myriad cultures and multidisciplinary settings individually and in groups.	Applying Level (C3)
C304-3.3	Analyze texts and their adaptations beyond the surface level of narrative or character as reflections of value systems of various cultures and times individually and in a team.	Analysing Level (C4)
C304-3.4	Evaluate, interpret and document source texts and adaptations thematically and stylistically to learn the nuances of language, culture and values of the society.	Evaluating Level (C5)

C304-3.5	Compose and make an effective presentation of a literary/non literary piece in any genre and design an ethical adaptation of any literary/non literary piece in another form individually and in groups.	Creating Level (C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction Literary Devices	Figures of speech, Character, Plotline, Conflict, Point of View	2
2.	Literature & Adaptation	Understanding Cultural Contexts Forms of Adaption Cinematography & Narratology	4
3.	Framework	Adaptation Theories; Reader Response & Audience Response Theories Case study of the Classic Fairy Tale The Sleeping and its contemporary adaptation Maleficent	7
4.	Play & adaptations	The Pygmalion: George Bernard Shaw Hamlet : William Shakespeare	6
5.	Novel & Adaptations	Pride & Prejudice: Jane Austen The Giver: Lois Lowry The Godfather: Mario Puzo	9
		Total number of Lectures	28
Evaluation Criteria			
Components		**Maximum Marks**	

T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Seminar/Presentation , Oral Questions)
Total	**100**

	Recommended Reading material:
1.	**Linda Hutcheon**, *A Theory of Adaptation*, Routledge, 2006
2.	**Mark William Roche**, *Why Literature matters in the 21st Century*, 1st edition, Yale University Press 2004
3.	**George Bernard Shaw**, *Pygmalion,* Electronic Version, Bartleyby.com, New York, 1999
4.	**Stanley Wills & Gary Taylor**, *The Complete Works. The Oxford Shakespeare* (Compact ed.). Oxford: Clarendon Press. , 1988.
5.	https://www.sparknotes.com/film/sleepingbeauty/
6.	**Jane Austen**, *Pride & Prejudice*, Reprint, Thomas Egerton, 2013
7.	**Mario Puzo***, The Godfather*, 1st Edition, G. P. Putnam's Sons, USA, 1969
8.	**Lois Lowry,** *The Giver, 1st Edition,* Houghton Mifflin Harcourt Publishing Company, USA, 1993

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NMA633		Semester : Even	Semester VI Session 2019 -2020 Month from Jan 2020 to June 2020
Course Name	Statistics			
Credits	4		Contact Hours	3-1-0
Faculty (Names)	Coordinator(s)	Dr. Himanshu Agarwal		
	Teacher(s) (Alphabetically)	Dr. Anuj Bhardwaj, Dr. Himanshu Agarwal, Dr. Pinkey Chauhan		

COURSE OUTCOMES		COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:		
C302-1.1	make use of measures of central tendency, dispersion, skewness and, kurtosis for description and visualization of population data.	Applying Level (C3)
C302-1.2	apply correlation and regression in statistical analysis of data.	Applying Level (C3)
C302-1.3	explain sampling theory and its distributions.	Understanding Level (C2)
C302-1.4	explain the concepts and properties of estimation theory.	Understanding Level (C2)
C302-1.5	apply sampling and estimation theory to find the confidence interval.	Applying Level (C3)
C302-1.6	analyze small and large sample data by using the test of hypothesis.	Analyzing Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Descriptive Statistics	Graphical representation such as histogram, frequency polygon, AM, GM, HM, median, mode, measures of dispersion, skewness and kurtosis such as central and non-central moments, population variance, β, γ coefficient, Box and Whisker plot.	8
2.	Correlation and Regression Analysis	Scatter diagram. Karl Pearson's and Spearman's rank correlation coefficient, regression lines, regression coefficient and their properties.	5
3.	Sampling and Sampling Distributions	Populations and Sample, random sample, statistics, sample moments, law of large numbers, central limit theorem, distribution of sample mean and sample variance, MGF,Chi-square distribution, F-distribution, Student's t distribution.	7

JIIT University, Noida

4.	Parametric Point Estimation	General concept of point estimation, methods of moments and maximum likelihood for finding estimators, unbiasedness, consistency, efficiency, UMVUE, Cramer-Rao inequality, sufficiency, factorization theorem, completeness, Rao-Blackwell theorem.	10
5.	Parametric Interval Estimation	definition of confidence interval, pivotal quantity, confidence interval for mean, variance, difference of means and difference of variances for small and large samples.	5
6.	Hypothesis Testing	The basic idea of significance test. null and alternative hypothesis, type-I and type II errors, testing of small and large samples for mean, variance, difference in means, and difference in variances.	7
Total number of Lectures			**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutprials)
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.	**Biswas and Srivastava**, A Textbook, Mathematical Statistics Ist Edition, Narosa Publishing House, New Delhi.
2.	**W. Feller**, Introduction to Probability Theory and its Applications Vol. I and II. Wiley Eastern-Ltd, 1971
3.	**V. K.Rohatgi**, An Introduction to Probability Theory and Mathematical Statistics Wiley Eastern, 1984
4.	**R. V. Hogg, A. T. Craig,** Introduction to Mathematical Statistics, McMillan, 1971
5	**AM. Mood**, **F. A. Graybill, and D. C. Boes**, Introduction to the Theory of Statistics McGraw Hill, 1974
6.	**Des Raj & Chandak**, Sampling Theory, Narosa Publishing House, 1998.
7.	**Sheldon Ross**, A First Course in Probability, 6th edition, Pearson Education Asia, 2002.
8.	**Meyer, P.L**, Introductory Probability and Statistical Applications Addison-Wesley Publishing Company, 1965.

Lecture-wise Breakup

Course Code	16B1NPH631	Semester: Even (specify Odd/Even)		Semester: VI Session 2019 -2020 Month from: Jan-June
Course Name	Computational Physics			
Credits	**04**		**Contact Hours**	04

Faculty (Names)	Coordinator(s)	Vikas Malik
	Teacher(s) (Alphabetically)	Vikas Malik

COURSE OUTCOMES		COGNITIVE LEVELS
CO1	Define key concepts used in Monte Carlo Simulation, Random walks, percolation and Numerical methods	Remember Level (C1)
CO2	Explain basics of numerical analysis, statistical mechanics, Monte Carlo simulations, percolation, random walks.	Understand Level (C2)
CO3	Model and simulate magnetic systems, polymers and networks; interpret simulation data	Apply Level (C3)
CO4	Develop advanced Monte Carlo techniques to solve Optimization problems. Simulate percolation of complex networks.	Create Level (C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Numerical Methods	Locating Roots of Equations, Interpolation and Numerical Differentiation, Numerical Integration,	10

		Systems of Linear Equations, Ordinary Differential Equations, Fourier Transform Techniques.	
2.	Simulation Techniques	Random Number Generation and Monte Carlo Methods, Equilibrium Statistical mechanics, Importance sampling, Metropolis algorithm.	10
3.	Applications of Computer Simulations in Physics	Ising Model Simulations of Magnetic Solids and Phase Transitions, Monte Carlo Intergration, Random Walk and its Applications to Polymers, Cluster Identification algorithms, Percolation and Fractal Phenomena, Chaos and Non-Linear Systems.	15
4.	**Advanced Simulation Techniques**	Cluster Algorithms, Variational Methods and Optimization Techniques.	05
		Total number of Lectures	**40**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (…)
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.	S. S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall India, 2005.
2.	Kerson Huang, Statistical Mechanics, 2nd Edition, John Wiley, 2009.
3.	K. Binder & D. Heermann, Monte Carlo Simulation in Statistical Physics, **2nd Edition,**Springer, 2013.
4.	Newman & Barkema, Monte Carlo Methods in Statistical Physics, Clarendon Press, 1999.
5.	Landau & Binder, A guide to Monte Carlo Simulations in Statistical Physics, Cambridge University Press, 2014.
6.	M. H. Kalos and P. A. Whitlock, *Monte Carlo Methods,* John Wiley and Sons, 2009.

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NPH632	Semester: Even	Semester: VI Session 2019 -2020 Month from: January to June
Course Name	Solid State Electronic Devices (16B1NPH632)		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dr. Sandeep Chhokar & Dr. Dinesh Tripathi
	Teacher(s)	Dr. Sandeep Chhokar & Dr. Dinesh Tripathi

COURSE OUTCOMES: Upon the completion of this subject, students will be able to

S.N.	DESCRIPTION	COGNITIVE LEVEL
C302-7.1	Define terminology and concepts of semiconductors with solid state electronic devices.	Remembering (C1)
C302-7.2	Explain various electronic, optical and thermal properties of semiconductors; various techniques used in device fabrication.	Understanding (C2)
C302-7.3	Solve numerical problems based on solid state electronic devices.	Applying (C3)
C302-7.4	Examine the impact of various parameters on semiconductor devices and their performances.	Analyzing (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Energy band and charges carriers in conductors	Bonding forces and energy bands in solids, charge carriers in semiconductors, carries concentrations, drift of carriers in electric and magnetic fields, Invariance of the Fermi level at equilibrium, optical absorption, Luminescence, Carrier lifetime and photoconductivity, diffusion of carriers	12
2.	Junctions	Fabrication of p-n junctions, equilibrium conditions, steady state conditions, reverse bias breakdown, recombination and generation in the transition region,	10

		metal semiconductor junctions, heterojunctions,	
3.	Transistors	Field effect transistor (FET), Metal-insulator FET, Metal-insulator-semiconductor FET, MOS FET, Bipolar junction transistors	08
4	Devices	Photodiodes, solar cell, light emitting diodes, semiconductor lasers, Negative conductance Microwave devices: Tunnel diode, IMPATT diode, Gunn diode	10
		Total number of Lectures	**40**

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 [2 Quiz/Class Tests (07 M), Attendance (07 M) Internal Assessment (05 M) Assignment in PBL Mode (06 M)]
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.	Semiconductor Physics and Devices, *by* Donald A. Neamen and Dhrubes Biswas; 4th Edison Mc GrawHill.
2.	Physics of Semiconductor devices, *by* S. M. Sze; Wiley-Interscience.
3.	Solid State Electronic devices *by* Ben G.Streetman; Prentice-Hall.
4.	Semiconductor Devices, *by*Mauro Zambuto; Mc GrawHill

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NPH633	Semester:Even	Semester:VI Session:2019 -2020
			Month: January to June
Course Name	Photovoltaic Techniques		
Credits	4/3	**Contact Hours**	4/3

Faculty (Names)	Coordinator(s)	Dr. B. C. Joshi -JIIT 62
		Dr. Prashant Chauhan – JIIT 128
	Teacher(s)	Dr. B. C. Joshi
		Dr. Prashant Chauhan

COURSE OUTCOMES		COGNITIVE LEVELS
CO1	Classify various type of renewable energy sources and explain working of photovoltaic device.	Understand Level (Level 2)
CO2	Demonstrate the use of basic principles to model photovoltaic devices	Understand Level (Level 2)
CO3	Identify challenges and apply strategies to optimize performance of various type of solar cells	Apply Level (Level 3)
CO4	Analyze Solar PV module, mismatch parameter and rating of PV module	Analyze Level (Level 4)
CO5	Evaluate the performance of various stand-alone PV systems with battery and AC and DC load	Evaluate Level (Level 5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Review	Energy issues, conventional energy sources, Renewable	02

		energy sources, Solar Energy	
2.	Solar cell fundamentals	Fundamental of semiconductor, charge carriers and their motion in semiconductors, carriers generation and recombination, p-n junction diode, introduction to solar cell, p-n junction under illumination, Current-Voltage (I-V), open circuit voltage (V_{OC}), short circuit current (I_{SC}) Maximum power, current and voltage and Efficiency, Quantum Efficiency	10
3.	Design of solar cells	Upper limits of cell parameters, loses in solar cell, solar cell design, design for high I_{sc}, V_{oc}, FF, solar simulators	08
4.	Solar cell technologies	Production of Si, Si wafer based solar cell technology, thin film solar cell technologies (CIGS, microcrystalline and polycrystalline Si solar cells, amorphous Si thin film solar cells), multijunction solar cells, Emerging solar cell technologies: organics solar cells, Dye-sensitized solar cell (DSC), GaAs solar cell	12
5.	Photovoltaic system	PV system: Introduction, Stand-alone system, Grid connected system, Hybrid system, Designing of PV system, Balance of system- BOS (Inverters, Controllers, Wiring, Batteries) Photovoltaic Cells, Estimating PV system size and cost, Photovoltaic safety.	08
		Total number of Lectures	**40**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (…)
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Textbooks, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Tom Markvart and Luis Castaner, "Solar Cells: Materials, Manufacture and Operations," Elsevier, 2006
2.	Stuart R. Wenhem, Martin A. Green, M.E. Watt, "Applied Photovoltaics," Earthscan, 2007

3.	Jenny Nelson, "The Physics of Solar Cells" Imperial college press," 003.Aatec publications, 1995.
4.	C S Solanki, Solar Photovoltaics, PHI

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NPH636	Semester: Even	Semester: VI Session 2019 -2020 Month from: January to June
Course Name	Medical and Industrial Applications of Nuclear Radiation		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dr. Manoj Tripathi
	Teacher(s)	Dr. Papia Chowdhury & Dr. Manoj Tripathi.

Course Name: Medical & Industrial Applications of Nuclear Radiation (16B1NPH636)
COURSE OUTCOMES: Upon the completion of this subject, students will be able to

S.N.	DESCRIPTION	COGNITIVE LEVEL
C302-11.1	Define nuclear structure, properties and reactions; Nuclear magnetic resonance process	Remembering (C1)
C302-11.2	Explain models of different nuclear imaging techniques; CNO cycle; principle of radioactive decays	Understanding (C2)
C302-11.3	Apply knowledge of nuclear reaction mechanisms in atomic devices, dosimetry, radiotracers, medical imaging, SPECT, PET, tomography etc.	Applying (C3)
C302-11.4	Analyze different radiocarbon dating mechanisms and processes	Analyzing (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module

1.	Nuclear Structure	Structure of matter; Nucleus: Nuclear Size, Structure and forces; Binding energy and Nuclear stability, mass defect; Nuclear reaction: Fission, Fusion, chain reaction. Nuclear fusion in stars, Formation of basic elements: proton-proton chain, CNO cycle, Hydrostatic equilibrium; Applications: atom bomb, hydrogen bomb, nuclear power plants, Nuclear reactor problems, precautions. **ii)** Radioactive decay, kinetics of radioactive decay, Types of radioactive decay and their measurement, Half life, decay constant, Population of states, Production of radionuclides. Radioactive dating, Radiocarbon dating: Formation, mechanism of dating, carbon cycle, radiocarbon clock and applications, advantages, disadvantages, precautions; Other dating techniques, protein dating, accuracy in dating;	17
2.	Radioactive Dating	Dosimetry and applications: Interaction of Radiation of matter: Biological effects of radiations; dosimetry, working principles, Tools and radiotherapy, Doses, Radioisotopes, Radiotracers;	09
3.	Nuclear Magnetic Resonance	Nuclear Magnetic Resonance: General Introduction to Magnetic Resonance, Reference Frame; RF Pulses, Larmor precision, Basic principles of NMR & ESR Spectroscopy, Nuclear shielding, Chemical shifts; Couplings, Nuclear Imaging; 1D,2D, 3D Images, Application of NMR in medical industry as MRI, working MRI, Types of differen MRI, Applications of NMR in quantum computation;	09
4	Dosimetry and applications	Nuclear Medicine and Nuclear imaging techniques, preclinical imaging, detector designing, photon counting, Medical imaging using $\beta+\gamma$ coincidences, SPECT AND PET: Radiation tomography	05
		Total number of Lectures	**40**

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 [2 Quiz/Class Tests (07 M), Attendance (07 M) Internal Assessment (05 M) Assignment in PBL Mode (06 M)]
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.	Basic Sciences of Nuclear Medicine; Magdy M K halil, Springer.
2.	Gopal B Saha, Physics and Radibiology of Nuclear Medicine; Springer.
3.	A. Beiser, Concepts of Modern Physics, Mc Graw Hill International.
4.	Radionuclide Techniques in Medicine, JM McAlister (Cambridge University Press, 1979).
5.	S.N.Ghosal, Nuclear Physics.

Lecture-wise Breakup

Course Code	16B19BT692	Semester Even (specify Odd/Even)	Semester 6th Session 2019-2020 Month from Jan - May
Course Name	Applied Mushroom Biology		
Credits	2	Contact Hours	2

Faculty (Names)	Coordinator(s)	Dr. Manisha Singh
	Teacher(s) (Alphabetically)	Dr. Manisha Singh

COURSE OUTCOMES		COGNITIVE LEVELS
CO692.1	Define mushroom biology	Remembering Level (C1)
CO692.2	Experiment with mushroom cultivation	Applying Level (C3)
CO692.3	Explain environmental and medicinal aspects of mushroom	Understanding Level (C2)
CO692.4	Analyze economics of mushroom cultivation	Analyzing Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Principles of Mushroom Biology	Introduction, concepts, types, uses of mushrooms, Edible and poisonous mushrooms	2
2.	Global production	Agribusiness involving mushrooms, global status, opportunities and constraints	2
3.	Mushroom cultivation	Cultivation: Culturing, preservation methods, spawn production, quality attributes, storage, transport of commercially important mushrooms	8

		Lab: Bed preparation, use of different types of substrates (straw, cotton mill waste, water hyacinth etc.) for cultivation of oyster, white button, shiitake and caterpillar mushrooms	
4.	Mushroom biotechnology	Constraints in transformation, production of new varieties, genomic and proteomic approaches	4
5.	Environmental & Medicinal aspects	Bioremediation using mushrooms, Production of nutraceuticals & value-added products Lab: Quality checks in cultivation process, processing and preservation	8
6.	Economics	Economics of setting up a commercial mushroom production unit Lab: Report on economics of production	4
		Total number of Lectures	**28**

Evaluation Criteria

Components	**Maximum Marks**
T2	20
End Semester Examination	35
TA	45
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. SHU-TING CHANG , PHILIP G. MILES: MUSHROOMS: *Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact,* SECOND EDITION, CRC Press, 2011
2. Research papers and manuals

Detailed Syllabus
Lecture-wise Breakup

Subject Code	16B1NCI631	Semester: (specify Odd/Even)		Semester EVEN Session 2019-2020 Month from Jan'20 to June'20
Subject Name	Advanced Data Structures and Applications			
Credits	4	Contact Hours		3-1-0

Faculty (Names)	Coordinator(s)	Prof. Krishna Asawa, Dr. K. Vimal Kumar
	Teacher(s) (Alphabetically)	Prof. Krishna Asawa, Dr. K. Vimal Kumar

COURSE OUTCOMES		COGNITIVE LEVELS
C330-2.1	Comprehend insights of various variants of string processing and space partitioning data structures like: Ternary Search Tree, K-d Trees, Quad-Tree, etc.	Understand level (Level 2)
C330-2.2	Build efficient storage and sorting mechanisms for large data with the help of k-way merge-sort algorithm.	Apply Level (Level 3)
C330-2.3	Analyse various advanced data structures like : OBST, Splay Tree, Leftist Tree, Indexed Trees, Disjoint Set etc.	Analyse Level (Level 4)
C330-2.4	Compare performance of various Hashing algorithms.	Evaluating Level (Level 5)
C330-2.5	Propose solutions for the real life problems with the aid of suitable data structures.	Creating Level (Level 6)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Amortized Analysis	Aggregate, Accounting and Potential Method, Dynamic tables	3
2.	External Sorting	Introduction to external sorting. Selection trees & k-way merging. Run generation. Optimal merging of runs.	3
3.	Binary Trees Variants	Optimal Binary Search Tree, Splay tree, AA-Tree, Treap.	5
4.	Indexed Tree	T-tree, Dancing tree, Queaps	3
5.	String Processing Data Structures	Rope, Tries, Suffix Tree, Ternary search tree, Gap buffer	4
6.	Disjoint SetData Structures	Disjoint-set operations, representation of disjoint sets, Disjoint-set forests	6
7.	Heaps	Pairing heap, Beap, Leftist tree.	3
8.	Space partitioning tree	Binary space partitioning, KD tree, Quad tree, Interval Tree, Segment Tree, Priority Search Tree.	6

9.	Hashes	Introduction, Perfect hash function - Cuckoo hashing, Coalesced hashing, Universal Hashing.	5
10.	Applications	Searching, Memory Indexing, Computer Graphics, Image Data Structures, Computational Biology.	4
		Total number of Lectures	**42**

Evaluation Criteria

Components	Maximum Marks	
T1	20	
T2	20	
End Semester Examination	35	
TA	25 (Attendance: 7, Class Test/Quizzes:7, Internal Assessment:5, Assg In PBL Mode=6)	
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)

Text Books:

1	A.A.Puntambekar: Advanced Data Structures - A Conceptual Approach Technical Publications, 2014
2	Peter Brass: Advanced Data Structures Cambridge University Press 2014
3	Suman Saha, Shailendra Shukla: Advanced Data Structures - Theory and Applications, 1st Edition, Chapman and Hall/CRC, 2019
4	A.M. Padma Reddy: Data Structures and Applications: A Simple and Systematic Approach, Cengage publisher, 2019
5	Weiss, Mark Allen: Data Structures and Algorithm Analysis in C/C++, 4th Edition, Pearson Education Asia, 2014
6	Cormen et al: Introduction to Computer Algorithms, 3rd edition , PHI New Delhi 2009(latest edition yet to be released)
7	Knuth: The Art of Computer programming Vol I, Vol III, 3rd edition , Pearson Education Asia (Adisson Wesley), 2016
8	Dinesh P Mehta, SartajSahani: Handbook of Data Structure and Applications, Chapman & Hall, 2018

Reference Books:

1	HananSamet: Foundations of Multidimensional and Metric Data Structure, Morgan Kaufman, 2006
2	Kruse, Tonso, Leung: Data Structures and Program Design in C, 2rd Edition, Pearson Education Asia, 2002
3	Aho, Hopcraft, Ullman: Data Structures and Algorithms, Pearson Education Asia (Adisson Wesley), New Delhi, 2001