Detailed Syllabus
Lecture-wise Breakup

Subject Code	15B11CI411	**Semester Even (specify Odd/Even)**	**Semester** IV **Session** 2018 -2019 **Month from:** Jan **to** June 2019
Subject Name	Algorithms and Problem Solving		
Credits	**4**	**Contact Hours**	**4**

Faculty (Names)	**Coordinator(s)**	Dr. Manish Kumar Thakur, Varsha Garg
	Teacher(s) (Alphabetically)	J62 - Dr. Anita Sahoo, Deepti Singh, Kashav Ajmera, Dr. Manish K Thakur, Sherry Garg J128 – Dr. Mukesh Saraswat, Dr. Neeraj Jain, Pulkit Mehendiratta, Varsha Garg

COURSE OUTCOMES		**COGNITIVE LEVELS**
C214.1	Analyze the complexity of different algorithms using asymptotic analysis.	Analyze Level (Level 4)
C214.2	Select an appropriate data structure and apply related operations for a given problem.	Apply Level (Level 3)
C214.3	Apply algorithmic principles for solving a given problem.	Apply Level (Level 3)
C214.4	Identify, formulate and design an efficient solution to a given problem using appropriate data structure and algorithm design technique.	Create Level (Level 6)

Module No.	**Subtitle of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Introduction to problem solving approach; Asymptotic Analysis: Growth of Functions and Solving Recurrences; Notations- Big O, big omega, big theta, little o; Empirical analysis of sorting and searching algorithms – Merge sort, Quick sort, Heap sort, Radix sort, Count sort, Binary search, and Median search	6
2.	Search Trees and Priority Queue	Search Trees: Segment tree, Interval Tree, and RB Tree; Priority queue using Binomial and Fibonacci Heap	6
3.	Design Technique: Divide and Conquer	Fundamentals of Divide and Conquer (D&C) approach using Binary search, Quick sort, and Merge sort; Strassen's matrix multiplication; and Closest pair, etc.	2
4.	Design Technique: Greedy Algorithms	Introduction to greedy based solution approach; Minimum Spanning Trees (Prim's and Kruskal algorithms); Shortest Path using Dijkstra's algorithm; Fractional and 0/1 Knapsack; Coinage problem; Bin packing; Job scheduling – Shortest job first, Shortest remaining job first, etc.; Graph coloring; and Text compression using Huffman coding and Shannon-Fano coding, etc.	6
5.	Design Technique: Backtracking Algorithms	Review of backtracking based solution approach using N queen, and Rat in a maze; M-coloring problem; Hamiltonian Cycle detection; Travelling salesman problem; Network flow	4
6.	Dynamic Programming	Fundamentals of Dynamic programming based solution approach; 0/1 Knapsack ; Shortest path using Floyd Warshall; Coinage problem; Matrix Chain Multiplication;	6

		Longest common subsequence; Longest increasing sequence, String editing	
7.	String Algorithms	Naïve String Matching, Finite Automata Matcher, Rabin Karp matching algorithm, Knuth Morris Pratt, Tries; Suffix Tree; and Suffix Array	6
8.	Problem Spaces and Problem solving by search	Problem Spaces: States, goals and operators, Factored representation (factoring state into variables) Uninformed search (BFS, DFS, DFS with iterative deepening), Heuristics and informed search (hill-climbing, generic best-first, A*)	4
9.	Tractable and Non-Tractable Problems	Efficiency and Tractability, P, NP, NP-Complete, NP- Hard problems	2
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Punctuality (5), Online Test on CP Portal (10), Mini-project (10))
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.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein , Introduction to Algorithms, MIT Press, 3rd Edition, 2009
2.	Steven Skiena ,The Algorithm Design Manual, Springer; 2nd edition , 2008
3.	Knuth, The art of Computer Programming Volume 1, Fundamental Algorithms, Addison-Wesley Professional; 3 edition,1997
4.	Horowitz and Sahni, Fundamentals of Computer Algorithms, Computer Science Press, 1978
5.	Sedgewick, Algorithms in C, 3rd edition. Addison Wesley, 2002
6.	Weiss, Data Structures and Algorithm Analysis in C, Benjamin and Cummings Pub., 1994
7.	Alfred V. Aho, J.E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Addison-Wesley Series in Computer Science and Information Processing, 1983
8.	ACM Transactions on Algorithms (TALG)
9.	Algorithmica Journal, Springer
10.	Graphs and Combinatorics, Journal, Springer
11.	The ACM Journal of Experimental Algorithmics

Detailed Syllabus
Lab Session-wise Breakup

Subject Code	15B17CI471	**Semester: EVEN**	**Semester** IV **Session** 2018 -2019 **Month from:** Jan **to** June 2019
Subject Name	Algorithms and Problem Solving Lab		
Credits	**2**	**Contact Hours**	**4**

Faculty (Names)	**Coordinator(s)**	Dr. Ankita Verma and Mr. Pulkit Mehendiratta
	Teacher(s) (Alphabetically)	Dr. Amarjeet Prajapati, Ms. Ankita Wadhwa, Dr. Ankita Verma, Dr. Anita Sahoo, Dr. Aparajita Nanda, Dr. Bharat Gupta, Ms. Deepti Singh, Mr. Kashav Ajmera, Dr. Manish Thakur, Dr. Manju, Ms. Indu Chawla, Mr. Rohitpal Singh, Dr. Sangeeta Mittal, Dr. Satish Chandra, Ms. Sherry Garg, Dr. Shikha Jain, Ms. Sonal

COURSE OUTCOMES		**COGNITIVE LEVELS**
C274.1	Choose and define appropriate data structure to a given problem	Remember Level (Level 1)
C274.2	Understand various data structures and algorithm design techniques with the help of examples.	Understand Level (Level 2)
C274.3	Apply and build various algorithms and design techniques to solve the given problem.	Apply Level (Level 3)
C274.4	Analyze the algorithm by their complexity using asymptotic analysis.	Analyze Level (Level 4)
C274.5	Evaluate the correctness and complexity of the algorithm for a given problem.	Evaluate Level (Level 5)
C274.6	Formulate, elaborate and design an efficient solution to a given problem using appropriate data structure and algorithm design technique	Create Level (Level 6)

Module No.	**Title of the Module**	**List of Experiments**	**No. of Labs for the module**
1.	Analysis of algorithms, Searching and sorting based problems	Introduction to problem solving approach; Asymptotic Analysis; Solving Recurrences; Empirical analysis of sorting and searching algorithms – Merge sort, Quick sort, Heap sort, Radix sort, Count sort, Binary search, and Median search	2
2.	Search Trees and Priority Queue	Search Trees: Segment tree, Interval Tree, and RB Tree; Priority queue using Binomial and Fibonacci Heap	4
3.	Design Technique: Divide and Conquer	Problems based on Divide and Conquer (D&C) approach such as Binary search, Quick sort, and Merge sort; and Closest pair, etc.	4
4.	Design Technique:	Introduction to greedy based solution approach; Minimum Spanning Trees (Prim's and Kruskal	4

	Greedy Algorithms	algorithms); Shortest Path using Dijkstra's algorithm; Fractional and 0/1 Knapsack; Coinage problem; Bin packing; Job scheduling – Shortest job first, Shortest remaining job first, etc.; Graph coloring; and Text compression using Hamming coding and Shannon-Fano coding, etc.	
5.	Design Technique: Backtracking Algorithms	Review of backtracking based solution approach using N queen, and Rat in a maze; M-coloring problem; Hamiltonian Cycle detection; Travelling salesman problem; Network flow	4
6.	Dynamic Programming	Fundamentals of Dynamic programming based solution approach; 0/1 Knapsack ; Shortest path using Floyd Warshall; Coinage problem; Matrix Chain Multiplication; Longest common subsequence; Longest increasing sequence, String editing	4
7.	String Algorithms	Naïve String Matching, Finite Automata Matcher, Rabin Karp matching algorithm, Knuth Morris Pratt, Tries; Suffix Tree; and Suffix Array	2
8.	Problem Spaces and Problem solving by search	Problem Spaces: States, goals and operators, Factored representation (factoring state into variables) Uninformed search (BFS, DFS, DFS with iterative deepening), Heuristics and informed search (hill-climbing, generic best-first, A*)	2
9.	Project Evaluation	Designing an efficient solution to a given problem using appropriate data structure and algorithm design technique	2

Evaluation Criteria

Components	**Maximum Marks**
Labtest 1	**20**
Labtest 2	**20**
Quiz(6)	**5*6 (each of 5 marks)**
Project	**15**
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.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein , Introduction to Algorithms, MIT Press, 3rd Edition, 2009
2.	Steven Skiena ,The Algorithm Design Manual, Springer; 2nd edition , 2008
3.	Knuth, The art of Computer Programming Volume 1, Fundamental Algorithms, Addison-Wesley Professional; 3 edition,1997
4.	Horowitz and Sahni, Fundamentals of Computer Algorithms, Computer Science Press, 1978
5.	Sedgewick, Algorithms in C, 3rd edition. Addison Wesley, 2002
6.	Weiss, Data Structures and Algorithm Analysis in C, Benjamin and Cummings Pub., 1994
7.	Alfred V. Aho, J.E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Addison-Wesley Series in Computer Science and Information Processing, 1983

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11CI412	**Semester** Even **(specify Odd/Even)**	**Semester** IV **Session** 2018 -2019 **Month from** Jan to June 2019
Course Name	Operating Systems and System Programming		
Credits	3	**Contact Hours**	3-1-0

Faculty (Names)	**Coordinator(s)**	1. Rupesh Kumar Koshariya
	Teacher(s) (Alphabetically)	1. Dr. Devpriya Soni 2. Dr Neha Bharil 3. Dr Om Prakash Patel 4. Rupesh Kumar Koshariya

COURSE OUTCOMES		**COGNITIVE LEVELS**
C215.1	Understanding fundamental of operating systems and system programming.	Understand Level (C2)
C215.2	Apply the process management concept and threads in OS	Apply Level (C3)
C215.3	Analyze the performance of various device and resource management techniques for different systems.	Analyze Level (C4)
C215.4	Examine process synchronization and deadlock problem related to inconsistency and race conditions with shared variables.	Analyze Level (C4)
C215.5	Analyze the working of IO management and disk scheduling	Analyze Level (C4)
C215.6	Analyze and report appropriate OS design choices when building real-world systems.	Analyze Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction and Historical context of Operating Systems	What are Operating Systems? All components Description, The Evolution of OS: Batch Systems, multi programming systems, Time sharing systems, Parallel systems, Real Time systems, Distributed systems.	2
2.	Operating Structure and Architecture	Operating system structure: Micro kernel, Monolithic systems, Layered systems, Virtualization, Client-server model, Mobile Operating System. X86 architecture overview, Booting sequences, Boot loaders and their stages, BIOS and its routines, Interrupts.	2
3.	Process Concepts, Threads & Concurrency, Scheduling Concurrency & Synchronization	Process concepts, Threads: Overview, Benefits, User and Kernel threads, Multithreading models. Scheduling, Operations on processes, Cooperative processes, IPC, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Process synchronization: Critical section problems, Semaphores, Synchronization hardware	10

	issues,	and monitors.	
4.	Deadlock	System model, Characterization, Methods for handling deadlocks. Deadlock prevention, Avoidance and detection, Recovery from deadlock	3
5.	Memory Management.	Background, Swapping, Contiguous memory allocation, Paging, Segmentation, Segmentation with Paging, Virtual Memory	6
6.	File System management and Input output management	File concept, Access models, Directory structure, Protection, File-system Structure, Allocation methods, Free space management. Overview, I/O hardware, Application I/O interface.	2
7.	Secondary Storage Management	Disk structure, Disk scheduling, Disk management., Swap-space management	2
8.	Fault and Security Issues	Overview of system security, Security methods and devices, Protection, access, and authentication, Models of protection, Memory protection.	2
9.	Distributed O.S	Int. to distributed operating systems, synchronization and deadlock in distributed systems	1
10.	Case studies of OS	Windows, Linux ,IBM	2
11.	System Programming	Introduction, Components of a Programming System: Assemblers, Loaders, Macros, Compliers, Formal System.	2
12.	Memory Addressing	Memory Multiplexing, Binding of Instruction and Data to Memory. Address Translation, Multi-Segment, Special Registers, Wait/Exit, Address Translation.	2
13.	Interrupts and Exceptions	Synchronous and asynchronous interrupts, Calling a System Call from User Space, INT, Trap Handling, System call dispatch, arguments and return value, Device Interrupts.	2
14.	Kernel Synchronization, System Calls and System Signals	Disabling Interrupts, Lock Implementation, Linux Synchronization Primitives	2
15.	Device Drivers	Block Device Drivers, Character Device Drivers, Network Drivers	2
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz+ Assignment)
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.	Charles Crowley “Operating System A Design Approach” TMH.
2.	Andrew S. Tanenbaum “Operating Systems Design and Implementation”, Third Edition, Prentice Hall Publications 2006
3.	A.S. Tanenbaum, “Modern Operating Systems”, 2nd edition, Prentice Hall India.
4.	A.Silberschatz, P.Galvin, G. Gagne, “Operating systems concepts” Willey international company (sixth edition)
5.	Gary Nutt, “Operating Systems – A modern perspective”, Pearson Education
6.	David Solomon and Mark Russinovich ,” Inside Microsoft Windows 2000”, Third Edition, Micorosoft Press
7.	D. M. Dhamdhere, “ Systems Programming and Operating systems” TMH, 2nd revised edition.2006
8.	ACM/IEEE transactions on operating systems concepts.
9.	www.vmware.com
10.	www.luitinfotech.com/kc/what-is-cloud-computing.pdf
11.	https://cs162.eecs.berkeley.edu/static/sections/section8.pdf
12.	Charles Crowley “Operating System A Design Approach” TMH.

Operating System and System Programming LAB (15B11CI472)

Detailed Syllabus

Lab-wise Breakup

Course Code	**15B17CI472**	**Semester Even (specify Odd/Even)**	**Semester** 4 **Session** 2018 -2019 **Month from Jan to May**
Course Name	**Operating System and System Programming LAB**		
Credits	0-0-1	**Contact Hours**	**2**

Faculty (Names)	**Coordinator(s)**	Dr. Sangeeta
	Teacher(s) (Alphabetically)	1. Amanpreet kaur 2. Amarjeet Kaur 3. Hema N 4. Sangeeta 5. Taj Alam 6. Shilpa Budhkar 7. Parmeet Kaur 8. Purtee Kohli 9. Vivek Singh

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Understand Various Unix Commands	Understanding (Level-2)
CO2	Develop programs to create different types of processes using pthread library under Linux environment.	Apply (Level-3)
CO3	Develop programs to implement resource management task like CPU scheduling algorithms, deadlock handling.	Apply (Level-3)
CO4	Develop programs to implement and test various synchronization techniques like semaphores, binary semaphore and monitors via different classical test suites.	Apply (Level-3)
CO5	Design and analyse various disk-scheduling algorithms, memory management schemes, file management systems.	Analyzing (Level-4)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Introduction to UNIX	Learning Unix Commands(file commands, directory commands, symolic links,terminal commands,help commands,information commands,useful cshell symbols,permissions and file storage (unix),permissions and file storage (andrew),processes,printingEnvironment,customizing networking,x-applicationsunix filters)	1
2.	Process Management and Thread Management	Develop programs to create different types of processes under Linux environment. Develop programs to create multitasking threads using pthread library under Linux environment. Develop programs to implement interprocess communication	2
3.	CPU Scheduling, Deadlock Handling	Develop programs to implement resource management task like CPU scheduling algorithms(First Come First Served,Shortest Job First, Round Robin, Priority Scheduling, Multi level Queue, Multilevel Feedback), deadlock handling(Prevention, Avoidance	3

		and Detection)	
4.	Process Sychronization	Develop programs to implement and test various synchronization techniques like semaphores, binary semaphore and monitors via different classical test suites.	4
5.	Disk Scheduling and File Management	Design and analyse various disk-scheduling algorithms. Develop programs to implement memory management schemes. Design, implement and assess file management systems (file organization and file directories) for different OS.	5

Evaluation Criteria

Components	**Maximum Marks**
Lab Test 1	20
Lab Test 2	20
Day-to-Day(Evaluations, Viva, Attendance, Project)	60 …
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.	CharlesCrowley "Operating System A Design Approach"TMH.
2.	Andrew S. Tanenbaum "Operating Systems Design and Implementation", Third Edition,Prentice Hall Publications2006
3.	A.S. Tanenbaum, "Modern Operating Systems", 2nd edition, Prentice Hall India.
4.	A.Silberschatz, P.Galvin, G. Gagne, "Operating systems concepts" Willey international company (sixth edition)
5.	Gary Nutt, "Operating Systems – A modern perspective", Pearson Education
6.	David Solomon and Mark Russinovich ," Inside Microsoft Windows 2000", Third Edition, Micorosoft Press
7.	D. M. Dhamdhere, " Systems Programming and Operating systems" TMH, 2nd revised edition.2006
8.	ACM/IEEE transactions on operating systems concepts.
9.	www.vmware.com
10.	www.luitinfotech.com/kc/what-is-cloud-computing.pdf
11.	https://cs162.eecs.berkeley.edu/static/sections/section8.pdf

Detailed Syllabus
Lecture-wise Breakup

Subject Code	16B1NCI432	**Semester: Even (specify Odd/Even)**	**Semester** 4 **Session** 2018-2019 **Month from** Jan19 **to** June19
Subject Name	Fuzzy logic and Neural Networks		
Credits	4	**Contact Hours**	3-1-0

Faculty (Names)	**Coordinator(s)**	Ms. Archana Purwar, Dr. Mukesh Saraswat
	Teacher(s) (Alphabetically)	Ms. Ankita Verma ,Ms. Parul Agarwal, Mr. Shariq Murtuza

SL.NO.	COURSE OUTCOME(CO)	COGNITIVE LEVEL (BLOOMS TAXONOMY)
C230-2.1	Explain the concepts of fuzziness involved in various systems and fuzzy set theory.	Understanding Level (Level 2)
C230-2.2	Apply the different methods of defuzzification, Fuzzy Logic and approximate reasoning	Apply Level (Level 3)
C230-2.3	Analyze different fuzzy inference systems for various real world problems.	Analyze Level (Level 4)
C230-2.4	Explain the fundamental concepts of Artificial Neural Networks and various learning algorithms of supervised, unsupervised and associative memory networks.	Understanding Level (Level 2)
C230-2.5	Apply artificial neural networks in various applications of classification e.g. pattern recognition, character recognition, etc.	Apply Level (Level 3)
C230-2.6	Analyze different artificial neural networks to solve practical problems.	Analyze Level (Level 4)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Introduction to Fuzzy Logic	Classical Sets, Fuzzy Sets: operations and properties. Operations on fuzzy relations	4
2.	Membership functions	Features, fuzzification, methods of membership value assignments	2
3.	Defuzzification	Introduction; Lambda-Cuts for fuzzy sets and fuzzy relations; Defuzzification methods	3
4.	Fuzzy Rules	Introduction; formation of rules, decomposition and aggregation of rules;	4

		Approximate Reasoning	
5.	Fuzzy inference systems (FIS) and applications	FIS methods: Mamdani and Sugeno; Applications: such as fuzzy logic control etc.	5
6.	Artificial Neural Network: An Introduction	Fundamental concepts; Evolution of NN; Basic Models of ANN; connections and learning; Terminologies such as weights, Bias, Threshold, Learning Rate etc.;McCulloch-Pitts Neuron;Heb Network	5
7.	Supervised Learning Network	Perceptron Network, Adaptive Linear Neuron; Multiple Adaptive Linear Neurons, Back Propagation Network, Radial Basis Function Network	5
8.	Associate Memory Networks	Introduction and training algorithm for pattern association; Autoassociative Memory Netwok; Hetroassociative Memory Network, Bidirectional associative memory; Hopfield Network	6
9.	Unsupervised Learning Network	Introduction; Fixed Weight Competitive Nets; Kohonen Self-Organizing Feature Maps; Adaptive Resonance Theory	6
10.	Applications of ANN	Applications:Recognition of characters, Fabric defect identification etc.	2
		Total number of Lectures	**42**

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.	Timothy J. Ross, "Fuzzy Logic with Engineering Applications," McGraw Hill, 1995
2.	Simon Haykin, "Neural Networks" Pearson Education
3.	B.Yegnanarayana, "Artificial Neural Networks," PHI, India, 2006
4.	S. N. Sivanandan and S.N. Deepa, "Principles of Soft Computing", Wiley India, 2012.
5.	Limin Fu, "Neural Networks in Computer Intelligence," McGraw Hill, 2003
6.	Fakhreddine O. Karray and Clarence De Silva., "Soft Computing and Intelligent Systems Design, Theory, Tools and Applications," Pearson Education, India, 2009
7.	Simbrain and Matlab tools for simulation of ANN and FIS

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NCI438	**Semester** Even	**Semester** Fourth **Session** 2018-19 **Month from** Jan to June 2019
Course Name	Introduction Data warehouse and Data mining		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**		Mr. Avinash Pandey
	Teacher(s) (Alphabetically)		1. Ms. Anuradha Gupta, 2. Avinash Pandey

COURSE OUTCOMES		**COGNITIVE LEVELS**
C230-6.1	Define the scope and understanding of data mining & warehousing concepts and interpret the different models used for OLAP and data preprocessing	Understanding Level (Level 2)
C230-6.2	Apply the techniques of clustering, classification, frequent pattern mining, feature selection and visualization on real world data	Applying Level (Level 3)
C230-6.3	Analyzing data mining techniques to solve the real time problems.	Analyzing Level (Level 4)
C230-6.4	Evaluate the performance of different data-mining algorithms including data preparation, modeling and performance.	Evaluate Level (Level 5)

Module No.	**Title of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	**Introduction to data ware house**	Data warehousing components, data extraction, cleanup, and transformation tools –metadata; business analysis - reporting and query tools and applications, online analytical processing (OLAP), multidimensional data model;	8
2	**Data Mining**	Introduction, types of data, data mining functionalities, interestingness of patterns, integration of a data mining system with a data warehouse , issues , role of data pre-processing and data normalization;	8
3.	**Association rule mining and classification**	Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules Classification and Prediction - Basic Concepts, Decision Tree Induction, Bayesian Classification, Support Vector Machines, Other Classification Methods	10

4.	**Cluster Analysis**	Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data	9
5.	**Applications and Trends in Data Mining**	Data Mining Applications: Social Network Analysis, Mining Sequence Patterns in Biological Data, Text Mining	5
Total number of Lectures			**40**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz + Mini-Project)
Total	**100 Marks**

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

1.	W. H. Inmon, "Building the Data Warehouse", 3rd edition
2.	Anahory and Murray, Data warehousing in the real world, Pearson education/Addison Wesley.
3.	Margaret Dunham, Data Mining: Introductory and Advanced Topics, Published by Prentice Hall.
4.	Jiawei Han, Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Publishers, 2002. (www.cs.sfu.ca/~han/DMbook.html).

Detailed Syllabus

Subject Code	19B12CS211	**Semester** **EVEN**	**Semester** EVEN (IV Sem CSE) **Session** 2018 - 19 **Month: January to June 2019**
Subject Name	Automata Theory and Computations		
Credits	**4**	**Contact Hours**	**3-1-0**

Faculty (Names)	**Coordinator(s)**	Dr. Ankit Vidyarthi
	Teacher(s) (Alphabetically)	Dr. Ankit Vidyarthi

Course Outcomes		**Cognitive Level**
C230-1.1	Relate the basic difference between deterministic and non-deterministic computing machines.	Understand (Level 2)
C230-1.2	Summarize and translate the output based finite machines	Understand (Level 2)
C230-1.3	Solve the problems related to language recognition for non-regular grammar	Apply (Level 3)
C230-1.4	Interpret the language accepted by tuning machine	Apply (Level 3)
C230-1.5	Analyze problems related to undecidability and take part in approximation theory.	Analyze (Level 4)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Introduction	Alphabets, Strings and Languages, Automata, Grammars, Deterministic finite Automata (DFA), State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata	7
2.	Regular expression	Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Non Regular Languages, Pumping Lemma for regular Languages, FA with output: Moore and Mealy machine	7
3.	Context free grammar	Derivation, Derivation trees, Ambiguity in Grammer, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership	7
4.	Push Down Automata	Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA	8
5.	Turing machines	Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer	8

		functions, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem	
6.	Undecidability	Introduction to Undecidability, Undecidable problems about TMs, Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory	5
		Total number of Lectures	42

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25
Total	**100 Marks**

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.	J. Hopcroft, R. Motwani, and J. Ullman. "Introduction to Automata Theory, Languages, and Computation", 3rd edition, 2007, Pearson/Addison-Wesley
2	P. Linz., "Introduction to Formal Languages and Automata", 6th edition, 2017, Jones and Barlett
3.	Michael Sipser, "Introduction to the Theory of Computation", 3rd edition 2013, Cengage Learning.
4.	K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science : Automata, Languages and Computation", PHI Learning Private Limited, Delhi India.
5.	Harry R. Lewis and Christos H. Papadimitriou, Elements of the theory of Computation, Second Edition, Prentice-Hall of India Pvt. Ltd.

Detailed Syllabus
Lecture-wise Breakup

Course Code	**18B12CS311**	**Semester** Even **(specify Odd/Even)**	**Semester** IV **Session** 2018 -2019 **Month from** January 2019 – June 2019
Course Name	**OOAD (Object Oriented Analysis and Design)**		
Credits	3-1-0	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dr. Sandeep Kumar Singh
	Teacher(s) (Alphabetically)	…

COURSE OUTCOMES		**COGNITIVE LEVELS**
C230-4.1	Illustrate algorithmic (procedural) decomposition and Object-Oriented decomposition.	Understand Level (Level 2)
C230-4.2	Dissect the requirements to identify the potential use cases, classes and objects in the system.	Analyzing Level (Level 4)
C230-4.3	Build UML diagrams such as class diagram, object diagram for structural modelling and state chart diagram, sequence diagrams for behavioural modelling.	Apply Level (Level 3)
C230-4.4	Apply object oriented design principles to solve real world problems.	Apply Level (Level 3)
C230-4.5	Analyse and implement complex software systems using the Gang of Four (GoF) design patterns, e.g., creational patterns, structural patterns, behavioural patterns, etc.	Analyse Level (Level 4)
C230-4.6	Estimate the complexity of object oriented designs using several metrics.	Evaluate Level (Level 5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to Object Oriented Analysis and Design	What is OOAD, Why OOAD, Benefits and Costs, Understanding the challenges OOAD can address.	3
2.	Object Oriented Analysis	Identifying Classes and Objects, Responsibilities, Relationships in problem domain, Object Model	6
3.	Object Oriented Design	Use Case Diagrams, Class Diagram, Object Diagram Sequence Diagram, State Diagrams	6
4.	Object Oriented Design	Object Constraint Language(OCL), Use Case Modeling, Modelling and Implementing Static Behaviour and Dynamic Behaviour.	6
5.	Design Principles	SOLID principles and its applications	3
6.	Design Patterns	Overview of Design Patterns, Design Patterns Types-Creational, Structural and Behavioral Patterns. Understand and Apply various design patterns in different scenarios, Reusable Design Patterns.	7
7.	OO Design Metrics	Understanding and Analyzing Software Design Metrics for Object Oriented Software.	6

8.	OOAD Case Studies	Applying OOAD in different contexts	7
		Total number of Lectures	**44**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (To be mapped from Class Test 1,2,3)
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.	Object-Oriented Modeling and Design with UML (2nd Edition) Michael R. Blaha; James R Rumbaugh
2.	Head First Object-Oriented Analysis and Design A Brain Friendly Guide to OOA&D By Brett McLaughlin, Gary Pollice, David West
3.	OBJECT-ORIENTED ANALYSIS AND DESIGN With applications Third EDITION Grady Booch Rational Santa Clara, California
4.	Object Oriented Analysis and Design Andrew Haigh
5.	UML and C++ A practical approach to OO Development
6.	Testing Object-oriented Systems: Models, Patterns, and Tools Book by Robert V. Binder
7.	A Practical Guide to Testing Object-oriented Software Book by David A. Sykes and John D. McGregor
8.	Object Management Group (OMG): http://www.omg.org/. This is the official Site for UML.
9.	Design Patterns: Elements of Reusable Object-Oriented Software with Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides, 2003

Detailed Syllabus
Lecture-wise Breakup

Subject Code	Computer Graphics and Image Processing	**Semester:** EVEN **(specify Odd/Even)**	**Semester 4 Session** 2018-19 **Month from JAN to June 2019**
Subject Name	16B1NCI440		
Credits	**4**	**Contact Hours**	L-T-P (3-1-0)

Faculty	**Coordinator(s)**	Pawan Kumar Upadhyay
Course Outcome:	At the completion of the course, students will be able to **C230-3.1** Exemplify the basic concept of computer graphics and image processing **C230-3.2** Apply the common 2D & 3D graphics concepts, including viewing transformations, clipping, projections. **C230-3.3** Apply Image processing concept related to intensity and neighbourhood transformations, image enhancement, frequency transformations: DFT,DCT, DWT **C230-3.4** Categorize the various types of graphical methods and techniques of image processing used to describe the different system **C230-3.5** Estimate the performance of color models, illumination and lighting techniques, spatial and frequency filters and qualify for the graphics and image processing. **C230-3.6** Use applications related to computer graphics and image processing using computing resources based on best practices and design principles	

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Computer Graphics	Introduction, Basic graphics system, Color models, primitive like point, line, circle drawing, 2D translation, Windowing and clipping	15
2.	Image Processing	Image storage, Image processing in spatial domain, Image processing in frequency domain, Line , edge detection, basic filters, Laplacian, Gaussian	15
3.	Case Studies and Applications	Soma basic vision applications like OCR, Signature recognition, gesture recognition etc.	12
		Total number of Lectures	**42**

Recommended Reading material:	
1.	Computer Graphics with OpenGL by Donald Hearn, M. Pauline Baker (Published by: Prentice Hall)

2.	Machine Vision by Ramesh Jain, Rangachar Kasturi and Brian Schunk (McGraw Hill 1995)
3.	Computer Graphics: Principles and Practice by James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes (Published by: Addison-Wesley Professional)
4.	Fundamentals of Computer Graphics by Peter Shirley (Published by: AK Peters)
5.	Digital Image Processing (Hardcover) by Rafael C. Gonzalez (Published by: Prentice Hall)
6.	Image Processing by Henri Maitre (Published by: Wiley-Iste)
7.	Principles of Digital Image Processing: Fundamental Techniques (Undergraduate Topics in Computer Science) by Wilhelm Burger, Mark J. Burge (Published by: Springer)

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B11MA301	**Semester** Even	Semester IV Session 2018 -2019 Month from Jan 2019 to June 2019
Course Name	Probability and Random Processes		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Prof. B.P. Chamola, Dr.Pinkey Chauhan	
	Teacher(s) (Alphabetically)	Dr. Amit Srivastava, Prof. B.P. Chamola, Dr.Himanshu Agarwal, Dr. Lakhveer Kaur, Dr. Lokendra Kumar, Dr. Neha Singhal, Dr. Pankaj Srivastava, Dr.Pinkey Chauhan, Dr. Priyanka Sangal, Dr.Puneet Rana, Dr.Yogesh Gupta	

COURSE OUTCOMES:		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C201.1	explain the basic concepts of probability, conditional probability and Bayes' theorem	Understanding Level (C2)
C201.2	identify and explain one and two dimensional random variables along with their distributions and statistical averages	Applying Level (C3)
C201.3	apply some probability distributions to various discrete and continuous problems.	Applying Level (C3)
C201.4	solve the problems related to the component and system reliabilities.	Applying Level (C3)
C201.5	identify the random processes and compute their averages.	Applying Level (C3)
C201.6	solve the problems on Ergodic process, Poisson process and Markov chain.	Applying Level (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Probability	Three basic approaches to probability, conditional probability, total probability theorem, Bayes' theorem.	5
2.	Random Variables	One dimensional random variables (discrete and continuous), distribution of a random variable (density function and cdf). MGF and characteristic function of a random variable and its utility. Bivariate random variable, joint, marginal and conditional distributions, covariance and correlation.	8
3.	Probability Distributions	Bernoulli, binomial, Poisson, negative binomial, geometric distributions. Uniform, exponential, normal, gamma, Earlang and Weibull distributions.	8
4.	Reliability	Concept of reliability, reliability function, hazard rate function, mean time to failure (MTTF). Reliability of series, parallel, series-parallel, parallel-series systems.	6
5.	Random Processes I	Introduction, Statistical description of random processes, Markov processes, processes with independent increments. Average values of random processes. Strict sense and wide sense stationary processes, their averages. Random walk, Wiener	7

		process. Semi-random telegraph signal and random telegraph signal process. Properties of autocorrelation function.	
6.	Random Processes II	Ergodic processes. Power spectral density function and its properties. Poisson processes. Markov chains and their transition probability matrix (TPM).	8
Total number of Lectures			**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutorials)
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.	**Veerarajan, T.,** Probability, Statistics and Random Processes, Tata McGraw-Hill, 2002.
2.	**Papoulis, A. & Pillai, S.U.,**Probability, Random Variables and Stochastic Processes, Tata McGraw-Hill, 2002.
3.	**Ross, S. M.,**Introduction to Probability and Statistics for Engineers and Scientists, 4th Ed., Elsevier, 2004.
4.	**Palaniammal, S.,**Probability and Random Processes, PHI Learning Private Limited, 2012.
5.	**Prabha, B. and Sujata, R.,**Statistics, Random Processes and Queuing Theory, 3rd Ed., Scitech, 2009.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NHS431	**Semester** Even	**Semester IV Session 2018-19** Month from **Jan 2019 – June 2019**
Course Name	HUMAN RESOURCE MANAGEMENT		
Credits	3	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Dr Kanupriya Mirsa Bakhru
	Teacher(s) (Alphabetically)	Dr Kanupriya Mirsa Bakhru, Dr Praveen Sharma

COURSE OUTCOMES		**COGNITIVE LEVELS**
C207-1.1	Demonstrate a basic understanding of different functions of human resource management: Employer Selection, Training and Learning, Performance Appraisal and Remuneration, Human Relations and Industrial Relations.	Understand Level (C2)
C207-1.2	Apply various tools and techniques in making sound human resource decisions.	Apply level (C3)
C207-1.3	Analyze the key issues related to administering the human resource management activities such as recruitment, selection, training, development, performance appraisal, compensation and industrial relation.	Analyze Level (C4)
C207-1.4	Critically assess and evaluate different human resource & industrial relation practises and techniques and recommend solutions to be followed by the organization	Evaluate Level (C5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Introduction to Human Resource Management and its definition, HRM functions and its relation to other managerial functions, Nature, Scope and Importance of Human Resource Management in Industry, Role & position of Personnel function in the organization. Human Resource Planning	3
2.	Employer Selection	Recruitment Process; Selection Process - Job and Worker Analyses, Matching Job with the Person; Selection Methods - Application Blank, Biographical Inventories, References and Recommendation Letters, Interviews	8
3.	Training and Learning	Need Identification; Psychological Factors in Learning; Training Methods in the Workplace; Effective Training Programme	6
4.	Performance Appraisal and Remuneration	Different methods of Performance Appraisal, Basic concepts in wage administration, company's wage policy, Job Evaluation, Issues in wage administration, Bonus & Incentives	6
5.	Human Relations and Industrial Relations, Trends in Human Resource Management	Factors influencing industrial relations - State Interventions and Legal Framework - Role of Trade unions - Collective Bargaining - Workers' participation in management. Trends in Human Resource Management: Analytics, Artificial Intelligence	5
		Total number of Lectures	**28**

Evaluation Criteria

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

TA	25(Project, Quiz)
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.	VSP Rao, Human Resource Management: Text and Cases, 2nd Edition , Excel Books, 2002
2.	K. Aswathappa, Human Resource Management: Text and Cases, 8th Edition, Published by Mc Graw-Hill
3.	Dessler, Gary and Varkkey, Biju., Human Resource Management, 14th Edition published by Pearson Education Ltd., 2017

Detailed syllabus
Lecture-wise Breakup

Subject Code	16B1NHS432	**Semester: EVEN**	**Semester** IV **Session** 2018-19 **Month** from Jan 2019 to June 2019
Subject Name	POSITIVE PSYCHOLOGY		
Credits	3	**Contact Hours**	2-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Badri Bajaj	
	Teacher(s) (Alphabetically)	Dr. Badri Bajaj	

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C207-2.1	Demonstrate an understanding of the various perspectives of positive psychology and apply them in day to day life	Apply Level (C3)
C207-2.2	Examine various theories and models of happiness, well-being and mental health	Analyze Level (C4)
C207-2.3	Recommend possible solutions for enhancing happiness, well-being and mental health	Evaluate Level (C5)
C207-2.4	Evaluate interventions/strategies for overall positive functioning	Evaluate Level (C5)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Introduction to Positive Psychology	Overview, Perspectives, Classification and Measures: Human Strengths and Positive Outcomes.	4
2.	Prosocial Behavior	Empathy and Egotism; Altruism, Gratitude, and Forgiveness.	4
3.	Positive Emotions and Wellbeing	Emotional and Cognitive States; Focus on Application: Finding the positive in the Negative; Positive Emotions & Well-Being; Positive Emotions & Flourishing; Flow Experiences	4
4.	Happiness	Happiness and its Traditions; Determinants- Subjective Well-Being Hedonic Basis of Happiness; Life Satisfaction; Self –Realization: The Eudaimonic Basis of Happiness Happiness and Emotional Experiences; Other Facts of Life- Work & Unemployment; Intelligence; Education; and Religion.	4
5.	Mental Health	Mental Health and Behavior; Prevent the Bad and Enhance the Good.	4
6.	Positive Environments	Positive Schooling, Good at Work, Balance Between ME and WE.	4

7.	Living Well	Mindfulness; Contours of a Positive Life: Meaning & Means; Cultural Context, Every Stage of Life, Resilience, Positive Youth Development, Life Tasks of Adulthood, Successful Aging.	4
Total number of Lectures			**28**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Quiz , 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.	Snyder, C.R., Lopez, S. J., & Pedrotti, J.T. (2011). Positive Psychology: The Scientific and Practical Explorations of Human Strengths. 2nd Ed., Sage Publications
2.	Wesley J. Chun (2014). Positive Psychology, 1st Ed., Pearson
3.	Dewe, P. & Cooper, C. (2012). Well-Being & Work: Towards a Balanced Agenda. Palgrave Macmillian:NY
4.	Vijay Parkash, Updesh Kumar, Archana. (2015). Positive Psychology: Applications in Work, Health and Well – Being. 1st Ed., Pearson

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NHS434	**Semester** : Even	**Semester** IV **Session** 2018 -2019 **Month** from Jan 2019 to June 2019
Course Name	Introduction to Contemporary Form of Literature		
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**
C207-4.1	Interpret & relate with the genres, periods, and conventional as well as experimental forms of literature as current ethical, technological and cultural reflections of society.	Understand Level (C2)
C207-4.2	Apply literary and linguistic theories on the texts to identify them as cultural constructs inculcating human values in the society.	Apply Level (C3)
C207-4.3	Analyze social, cultural, moral and linguistic changes in contemporary world through cloze study of select representative texts of different cultures thematically and stylistically.	Analyse Level (C4)
C207-4.4	Determine the reciprocal relationship between the individual and culture individually and/or through a research based paper/poster presentation with an aim to analyze social, cultural and moral fibre of youth in multidisciplinary environment, giving holistic solutions for sustainable development of society.	Evaluate Level (C5)
C207-4.5	Create literary, non-literary write-up with proper applied grammar usage, having moral and cultural significance for today's world individually and in a team.	Create Level (C6)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introducing Literary Theories	• From Formalism to Reader Response Theory: Major Terms & Concepts • Narrative Art & Narratology • Cultural Studies: An Introduction	6
2.	Introducing New Forms & Sub Genres Today: Features & Portions	• New Fiction: Graphic Novels, Cyberpunk • Non Fiction: Memoirs & Autobiographies, Biographies & Personal Narrative	5
3.	Spiritual Literature	*Siddhartha*- Hermen Hesse (novella)	3
4.	Travel Literature	*Eat, Pray & Love (Book & cinematic adaptation)*	3
5.	Afro American Literature	*Things Fall Apart(Novella)*– Chinua Achebe	3
6.	Commonwealth / Post Colonial	*Hayavadana(Short Play)*- Girish Karnad	3

	Literature		
7.	European Literature:	*The Bloody Chamber & Other Short Stories-* Angela Carter (Short Stories)	2
8	Canadian Literature	*The Penelopiad- Margaret Atwood*	3
		Total number of Lectures	**28**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Presentation , Oral Questions)
Total	**100**

Recommended Reading material:

1.	**Margaret Atwood**, 'The Penelopiad', 1st Edition, Canongate Series, Knopf, Canada, 2005.
2.	**M.H. Abrams**, 'A Glossary of Literary Terms'.7th Edition, Hienle & Hienle: Thomson Learning, USA, 1999.
3.	**Mark William Roche**, 'Why Literature matters in the 21st Century', 1st Edition, Yale University Press, 2004.
4.	**Chinua Achebe**, Things Fall Apart. Reprint . New York: Anchor Books, 1994.
5.	**Angela Carter**, 'The Bloody Chamber & Other Short Stories', 1st Edition, Gollancz, UK, 1979. https://dudley.harvard.edu/files/dudley/files/the_bloody_chamber.pdf
6.	**Hermen Hesse**, 'Siddhartha', 1st Edition. New Directions, US, 1951. For online version: https://www.gutenberg.org
7.	**Elizabeth Gilbert**, 'Eat, Pray & Love. 1st Edition, Penguin,US, 2006.

Detailed Syllabus
Lecture-wise Breakup

Course Code	19B12HS412	**Semester:** Even	**Semester:** IV **Session** 2018 -2019 **Month from:** Jan 2019-June 2019
Course Name	Industrial Economics		
Credits	03	**Contact Hours**	2-1-0

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

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C207-7.1	Apply the concept of consumer behavior, production, cost and market demand for goods in industry.	Applying Level (C3)
C207-7.2	Evaluate different market structures in respect of price and quantity competition and technological change.	Evaluating Level (C5)
C207-7.3	Analyze the Industrial location and productivity	Analyzing Level (C4)
C207-7.4	Examine industrial profile, industrial proliferation and environmental preservation	Analyzing Level (C4)
C207-7.5	Evaluate the role and types of institutional finance, Regional industrial imbalance & Social Security.	Evaluating Level (C5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Introduction of Industrial Economics, Framework & Problems; SCP (Structure-Conduct-Performance) Sellers' concentration; Hrfindahl- Hirschman Index.	3
2.	Industrial Organization and Market Structure	Consumer & Producer Surplus; Economies of scale; Cost conditions, Market structure and profitability; Oligopoly theory versus the SCP paradigm.	5
3.	Industrial location and Industrial Productivity	Factors influencing Industrial location and Weber, Florence and Losch theory of industrial location. Measuring Industrial Productivity and Factors influencing Industrial Productivity.	5
4.	Industrial Efficiency	Factors influencing Industrial efficiency & profitability: Internal & External factors, Rostow Stages of Economic Development and Inter-relationship between Industrial Development and Economic Development.	4
5.	Indian Industrial Growth and Pattern	Classification of industries; Industrial policy in India, Issues in industrial proliferation and environmental preservation; Pollution control policies.	3
6.	Industrial Profile and Problems	Structure and Organization of Large Industries in India. Public & Private Sector Enterprises. MSME Role & Problems.	3
7.	Industrial Finance	Role, nature and types of Institutional Finance for industrial development.	2

8.	Industrial Imbalance & Social Security	Regional Industrial Imbalance: Causes and effects of Industrial Imbalances: Measures adopted by Government to reduce regional imbalance & Social Security system provided by Government of India for various industries.	3
Total number of Lectures			**28**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Test, Quiz)
Total	**100**

Recommended Reading material:

1.	**Singh, A. and A.N. Sadhu**, Industrial Economics, Himalaya Publishing House, Bombay,1988
2.	**Barthwal, R.R.**, Industrial Economics, Wiley Eastern Ltd., New Delhi, 1985
3.	**Cherunilam, F**., Industrial Economics : Indian Perspective (3rd Edition), Himalaya Publishing House, Mumbai, 1994
4.	**Ahluwalia, I.J**., Industrial Growth in India, Oxford University Press, New Delhi, 1985
5.	**Hay, D. and D.J. Morris**, Industrial Economics : Theory and Evidence, Oxford University Press, New Delhi, 1979
6.	**Kuchhal, S.C.**, Industrial Economy of India (5th Edition), Chaitanya Publishing House, Allahabad, 1980

Detailed Syllabus
Lecture-wise Breakup

Course Code	19B12HS411	**Semester : Even**	**Semester IV Session** 2018 -2019 **Month from** Jan 2019 to June 2019
Course Name	Market Research & Consumer Behaviour		
Credits	3	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Dr. Monica Chaudhary
	Teacher(s) (Alphabetically)	Dr. Monica Chaudhary

COURSE OUTCOMES		**COGNITIVE LEVELS**
C207-6.1	Explain the fundamentals concepts used in the study of consumer behaviour.	Remember Level (C1)
C207-6.2	Develop better marketing programs and strategies to influence consumer behaviour.	Apply Level (C3)
C207-6.3	Able to understand the key elements needed for Market Research.	Understand Level (C2)
C207-6.4	Design an effective market research framework.	Apply Level (C3)
C207-6.5	Design a research plan that demonstrates the understanding of Market Research.	Create Level (C6)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to Consumer Behaviour and Research	Topic 1: Introduction to Consumer Behaviour Topic 2: Consumer Research Topic 3: Consumer Behaviour and Marketing Strategy	3
2.	Market Research Fundamentals	Topic 1: Market research objective and design Topic 2: Primary data and secondary data Topic 3: Market Research Methods Topic 4: Qualtative & Quantitative Research Design	5
3.	Market Research Data Collection & Analysis	Topic 1: Sampling procedure & Methods Topic 2: Data Analysis	4
4.	Internal Influences on Consumer Behaviour	Topic 1: Motivation and Involvement Topic 2: Personality, Self-Image, and Life Style Topic 3: Consumer Perception & Learning Topic 4: Communication and Consumer Behaviour	6
5.	External Influences on Consumer Behaviour	Topic 1: The Influences of Culture on Consumer Behaviour Topic 2: Subcultures and Consumer Behaviour Topic 3: Social Class and Consumer Behaviour Topic 4: Reference Groups and Family Topic 5: Consumer Influence & the Diffusion of Innovations	3

6.	Consumer Decision Making	Topic 1: Consumer Decision Making-Process Topic 2: Consumer Decision Making-Outcomes Topic 1: Desiging market research Topic 2: Report Writing	4
7.	Market Research Project & Report Writing	Topic 1: Designing market research Topic 2: Report Writing	3
		Total number of Lectures	**28**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment 1,Assignment 2 and 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.	Schiffman, Consumer Behavior, Global Edition, 10th Edition, Pearson, USA,2014
2.	M.R. Solomon, Consumer Behavior, 7th Edition, Prentice Hall International, 2006.
3.	J. F. Engel, R.D. Blackwell, P.W. Miniard, Consumer Behavior, 8th Edition, The Dryden Press, , 1995
4.	P. Kotler, Marketing Management Analysis: Planning and Control, 9th Edition, Prentice Hall, , 1997

Detailed Syllabus
Lecture-wise Breakup

Course Code	**16B1NHS433**	**Semester Even (specify Odd/Even)**	**Semester 4 Session** 2018 -2019 **Month from Jan-June**
Course Name	Financial Management		
Credits	3	**Contact Hours**	3 (2-1-0)

Faculty (Names)	**Coordinator(s)**	Dr Shirin Alavi (Sector 62) and Dr. Sakshi Varshney (Sector128)
	Teacher(s) (Alphabetically)	1. Dr. Mukta Mani 2. Dr.Sakshi Varshney 3. Dr. Shirin Alavi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C207-3.1	Analyze the techniques of time value of money in taking investment decisions.	Analyze (Level 4)
C207-3.2	Contrast the various forms of business organizations and evaluate their financial performance.	Evaluate (Level 5)
C207-3.3	Evaluate investment projects using capital budgeting techniques	Evaluate (Level 5)
C207-3.4	Apply the concept of cost of capital into evaluation of investment projects	Apply (Level 3)
C207-3.5	Evaluate the leverage capacity of a business and its application in selection of long term sources of finance.	Evaluate (Level 5)
C207-3.6	Understand the practical considerations for managing working capital requirement in a firm.	Understand (Level 2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Basic financial concepts-Meaning of Accounting, Accounting Concepts and Conventions, Introduction to Double Entry system and Accounting equation, Definition and Objectives of Financial management,	2
2.	Time value of Money	Compounding, Discounting, Annuity, Perpetuity, Loan Amortization	3
3.	Analysis of Financial Statements	Understanding of Balance Sheet and Income Statements, Ratio Analysis, Interpretation, Importance and limitations	4
4.	Capital Budgeting: Principle Techniques	Nature of Capital Budgeting, Evaluation Techniques: Discounting (NPV, IRR etc.) and Non-discounting Techniques (payback, ARR etc)	4
5.	Long Term Sources of Finance	Definition, types, advantages and disadvantages	4
6.	Concept and measurement of cost of capital	Definition, measurement of specific costs, computation of Overall Cost of Capital,	4
7.	Cash Flows for Capital Budgeting	Identification and determination of relevant cash flows	3
8.	Leverages and Capital structure decision and Working Capital Management	Break Even Analysis, Operating, Financial and combined leverage, Capital structure EBIT- EPS analysis, Concept of working capital management, Practical Considerations in Working capital management	4

		Total number of Lectures	**28**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Test 1 + Test 2+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.	Khan, M.Y. and Jain, P.K., *Financial Management: Text, Problems and Cases*, 5th ed, Tata McGraw Hill, 2007.
2.	Chandra, P., *Financial Management Theory and Practice*, 6th ed., Tata McGraw Hill, 2004.
3.	Pandey, I.M., *Financial management*, 9th ed, Vikas Publishing House Pvt Ltd, 2006
4.	Van Horne, J.C. and Wachowicz, J.M., *Fundamentals of Financial Management*, 11th ed, Pearson Education, 2001
5.	Kishore, R.M., *Financial Management*, 6th ed, Taxmann, 2007.

Detailed Syllabus
Lecture-wise Breakup

Subject Code	**16B1NHS435**	**Semester : EVEN**	**Semester: IV Session: 2018-19** **Month: January2018 to June2018**
Subject Name	**SOCIOLOGY OF MEDIA**		
Credits	**3**	**Contact Hours**	**(2-1-0)**

Faculty (Names)	**Coordinator(s)**	**Prof. Alka Sharma**
	Teacher(s) (Alphabetically)	**Prof Alka Sharma** **Ms Shikha**

CO Code	COURSE OUTCOMES	COGNITIVE LEVELS
C207-5.1	Demonstrate a basic understanding of different methods and concepts used in the systematic study of Sociology of Media	Understanding(C 2)
C207-5.2	Examine various tools and techniques used and gain theoretical orientation towards media and society.	Analyzing(C 4)
C207-5.3	Analyze the key issues related to the processes of Production of Media, Popular Culture and consumer culture.	Analyzing(C 4)
C207-5.4	Critically evaluate the major methods of Cultural Consumption ,Social Class & the process of construction of subjectivities and audience reception in new Media	Evaluating(C 5)
C207-5.5	Create positive and critical attitude towards the use of new media and understanding of threats of Digital Age	Creating(C 6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Introduction to the Course	1
2.	Theoretical Orientation	• Functionalist Approach to the Sociology of Media and Popular Culture • Critical Approach to the Sociology of Media and Popular Culture • Symbolic Interactionist Approach to the Sociology of Media and Popular Culture	4
3.	Popular Culture	• What is popular culture? • Difference between 'pop' culture and 'high' culture • What distinguishes popular culture from other kinds of culture (art, folk culture)? Is there a distinction at all anymore? • Visualizing Society through 'pop' culture/ media • Risks and rituals that come with Popular Culture	5
4.	New media	• Difference between tradition media and new media • New media as technology • New Information Technology (brief history in case of India)	3
5.		• Mediatization of Society • Free-speech Media	3

	Media & State		
6.	Consumption of Media and Media reception	• Social Actors as Audience/ Audience as market– Theory • Media effects: Media and representations (gender, ethnic)- the under-representation and misrepresentation of subordinate groups. • Media and the construction of reality: media logic and cultivation analysis theory • Information Society vs Informed Society • Cultural Consumption and Social Class	7
7.	Media in Global Age	• Rise of Network Society- Manuel Castells • Global Media: impact of market & state • Global Perspectives: The world on our doorstep • Marketing and aesthetics in everyday life	5
		Total number of Lectures	**28**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Project, Presentation and attendance)
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.	JosephTurow, *Media Today: An Introduction to Mass Communication*,3rd Ed., Taylor & Francis. UK. (2008).
2.	JA Fisher 'High Art v/s Low Art, in Berys Nigel Gaut& Dominic Lopes (eds.), *The Routledge Companion to Aesthetics*. Routledge2001
3.	G.Ritzer, 'McDonaldization of Society,. *The Journal of American Culture*. Volume 6, Issue 1. (2001 [1983])Pp. 100-107.
4.	Manuel. Castells,'Introduction', in *Rise of Network Society: The Information Age: Economy, Society and Culture*, 2nd Ed (1996).

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B11MA301	**Semester** Even	**Semester** IV **Session** 2018 -2019 **Month from** Jan 2019 to June 2019
Course Name	Probability and Random Processes		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Prof. B.P. Chamola,Dr.Pinkey Chauhan	
	Teacher(s) (Alphabetically)	Dr. Amit Srivastava, Prof. B.P. Chamola, Dr.Himanshu Agarwal, Dr. Lakhveer Kaur, Dr. Lokendra Kumar, Dr. Neha Singhal, Dr. Pankaj Srivastava, Dr.Pinkey Chauhan, Dr. Priyanka Sangal, Dr.Puneet Rana, Dr.Yogesh Gupta	

COURSE OUTCOMES:		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C201.1	explain the basic concepts of probability, conditional probability and Bayes' theorem	Understanding Level (C2)
C201.2	identify and explain one and two dimensional random variables along with their distributions and statistical averages	Applying Level (C3)
C201.3	apply some probability distributions to various discrete and continuous problems.	Applying Level (C3)
C201.4	solve the problems related to the component and system reliabilities.	Applying Level (C3)
C201.5	identify the random processes and compute their averages.	Applying Level (C3)
C201.6	solve the problems on Ergodic process, Poisson process and Markov chain.	Applying Level (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Probability	Three basic approaches to probability, conditional probability, total probability theorem, Bayes' theorem.	5
2.	Random Variables	One dimensional random variables (discrete and continuous), distribution of a random variable (density function and cdf). MGF and characteristic function of a random variable and its utility. Bivariate random variable, joint, marginal and conditional distributions, covariance and correlation.	8
3.	Probability Distributions	Bernoulli, binomial, Poisson, negative binomial, geometric distributions. Uniform, exponential, normal, gamma, Earlang and Weibull distributions.	8
4.	Reliability	Concept of reliability, reliability function, hazard rate function, mean time to failure (MTTF). Reliability of series, parallel, series-parallel, parallel-series systems.	6
5.	Random Processes I	Introduction, Statistical description of random processes, Markov processes, processes with independent increments. Average values of random processes. Strict sense and wide sense stationary processes, their averages. Random walk, Wiener	7

		process. Semi-random telegraph signal and random telegraph signal process. Properties of autocorrelation function.	
6.	Random Processes II	Ergodic processes. Power spectral density function and its properties. Poisson processes. Markov chains and their transition probability matrix (TPM).	8
Total number of Lectures			**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutorials)
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.	**Veerarajan, T.,** Probability, Statistics and Random Processes, Tata McGraw-Hill, 2002.
2.	**Papoulis, A. & Pillai, S.U.,**Probability, Random Variables and Stochastic Processes, Tata McGraw-Hill, 2002.
3.	**Ross, S. M.,**Introduction to Probability and Statistics for Engineers and Scientists, 4th Ed., Elsevier, 2004.
4.	**Palaniammal, S.,**Probability and Random Processes, PHI Learning Private Limited, 2012.
5.	**Prabha, B. and Sujata, R.,**Statistics, Random Processes and Queuing Theory, 3rd Ed., Scitech, 2009.

Detailed Syllabus
Lecture-wise Breakup

Course Code	**15B11GE301**	**Semester** Even **(specify Odd/Even)**	**Semester IVSession** 2018 -2019 **Month from:**January-June
Course Name	Environment Sciences		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Prof. Krishna Sundari S
	Teacher(s) (Alphabetically)	2. Ekta Bhatt 3. Dr. GarimaMathur 4. Prof. Krishna Sundari S 5. Manisha Singh 6. Prof. PammiGauba 7. Dr. Susinjan Bhattacharya

COURSE OUTCOMES		**COGNITIVE LEVELS**
C205.1	Explain different aspects of environment, ecosystem and associated concerns	Understand Level (C2)
C205.2	Identify various practices that can impact the environmental resource management	Apply Level(C3)
C205.3	Apply modern techniques including sustainable solutions and green technologies for a better environment	Apply Level(C3)
C205.4	Survey ground situation on specific environmental aspects, examine risks involved, make a field report and present the findings	Analyze Level(C4)
C205.5	Recall environment related Government regulations, policies, safety norms and Laws.	Remember Level(C1)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	The Multidisciplinary nature of environmental studies & Biodiversity	Definition, scope and importance, Need for public awareness, Types of Ecosystems, World Biomes, Ecosystem functioning, Biogeochemical cycles, Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity Case studies.	5
2.	Natural resources, Energy consumption & conservation, Global Conventions	Water, Land Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Role of an individual in conservation of natural resources, Equitable use of resources, Global Conventions on Energy, Kyoto protocol, Case studies .	8
3.	Pollution, hazardous waste management	Air, Water & Land pollution, sources & causes, Space pollution, causes & effects, Electronic waste, Radioactive materials, toxicity limits of pollutants. Critical issues concerning Global environment (Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc.) and their roots in: cultural, social, political, commercial, industrial, territorial domains, Case studies.	9

4.	Urban planning, Disaster management	Sustainable building, Analyses of seismic data including magnitude and epicenters of earthquakes, Disaster Management and Contingency Planning, Modern safety systems, Case studies.	6
5.	Environmental Impact assessment, Use of Satellite Imaging	Objectives of impact assessment, Study of impact parameters, Methods for impact identification, Economics, Remote sensing imagery from satellite sensors and role in environmental impact studies, Case studies.	5
6.	Sustainability & Planned reversal of human destruction to environment	Redevelopment of brown fields, energy plantations, social forestry, engineering aspects of Re-use & Recycling, biogas for marginal income groups, organic farming, eco-consumerism, dematerialization, green technologies, eco-tourism, Case studies.	5
7.	Environmental Laws & Regulations	Regulation of technology and innovation, Policy and laws, Different Acts such as: Environmental Protection Act, Air and Water Acts, Wildlife and Forest Acts), US-EPA, National Environmental Policy; Function of pollution control boards (SPCB and CPCB), their roles and responsibilities, Eco-mark Scheme, Laws relating to Urban and Rural land use, Ethics, Case studies.	4
8.	Field Work	Explore the surrounding flora & fauna (Study of common plants, insects, birds document environmental assets), documentation of industries in local region and their possible effects, measure of water, air and land quality, Visit to a local polluted site-Urban/Rural /Industrial / Agricultural, Study of simple ecosystems-pond, river, hill slopes etc	5
Total number of Lectures			**47**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignments, Attendance)
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.	Chiras D D.(Ed.). 2001. Environmental Science – Creating a sustainable future. 6th ed. Jones &Barlett Publishers.
2.	**Joseph, B., 2005, Environmental Studies, Tata McGraw Hill, India**
3.	**Textbook of Environmental Studies for UG Courses - ErachBharucha, University Press**
4.	Jogdanand S N 2004. Environmental Biotechnology: Industrial Pollution Management. Himalaya Pub. House, Delhi 284p
5.	David P Lawrence. 2003. Environment Impact assessment, Wiley publications
6.	Issues of the Journal: Down to Earth, published by Centre for Science and Environment