Subject Code	15B11CI411	Semester Even (specify Odd/Even)	Semester IV Session 2020 -2021 Month from: Jan to June 2021
Subject Name	Algorithms and Problem Solving		
Credits	3	Contact Hours	3

Faculty (Names)	Coordinator(s)	Dr. Tribhuwan Kumar Tewari (J62), Dr. Shikha Mehta (J128)
	Teacher(s) (Alphabetically)	J62 – Ankita Wadhwa, , Dr. Dhanlakshmi, Dr. Suma Dawn, Dr. Taj Alam, Dr. Tribhuwan Kumar Tewari J128 – Akansha Bharadwaj, Dr. Krishna Asawa, Dr. Shikha Mehta, Dr. Shilpa Bhudhkar,

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;	4

		Network flow	
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	6
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 (Attendance (7), Assignment(9), Mini-project (9))
Total	**100**

Project based learning: Each student in a group of 3-4 will have to develop a mini project based on data structures algorithms. The students can opt any real-world application where these algorithms can be applied. The students have to implement the mini project using C/C++/Java language. Project development and its presentation will enhance coding skills, knowledge and employability of the students in IT sector.

	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. **(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, 2008
5.	Sedgewick, Algorithms in C, 3rd edition. Addison Wesley, 2002
6.	Alfred V. Aho, J.E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Addison-Wesley Series in Computer Science and Information Processing, 1983
7.	ACM Transactions on Algorithms (TALG)
8.	Algorithmica Journal, Springer
9.	Graphs and Combinatorics, Journal, Springer

10.	The ACM Journal of Experimental Algorithmics
Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. **(Text books)**	
1.	Tim Roughgarden, Algorithms Illuminated: Part 1: The Basics, Soundlikeyourself Publishing, September 27, 2017
2.	Tim Roughgarden, Algorithms Illuminated:Part 2: Graph Algorithms and DataStructures ,Soundlikeyourself Publishing, First Edition, 2018.
3.	Tim Roughgarden, Algorithms Illuminated :Part3:Greedy Algorithms and Dynamic Programming,Soundlikeyourself Publishing, First Edition, 2019.
4.	Weiss, Data Structures and Algorithm Analysis in C++, 4th Edition**,** Pearson, 2014

Subject Code	15B17CI471	Semester Even (specify Odd/Even)	Semester IV Session 2020-2021 Month from: Jan to June 2021	
Subject Name	Algorithms and Problem Solving Lab			
Credits	1	Contact Hours	2	

Faculty (Names)	Coordinator(s)	Suma Dawn (62), Dhanalekshmi G(62), AkankshaMehndiratta (128)
	Teacher(s) (Alphabetically)	**J62:**AnkitVidyarthi, AnkitaWadhwa, Bharat Gupta, Dhanalekshmi G, KashavAjmera, Satish Chandra, Suma Dawn. **J128:** AkankshaMehndiratta, Amrit Pal Singh, PulkitMehndiratta, Raju Pal, Shikha Mehta, ShilpaBudhar, VarshaGarg.

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.	Analyze Level (Level 4)
C274.6	Formulate, elaborate and design an efficient solution to a given problem using appropriate data structure and algorithm design technique	Apply Level (Level 3)

Module No.	Title of the Module	List of Experiments	CO
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	CO1, CO2, CO3, CO4
2.	Search Trees and Priority Queue	Search Trees: Segment tree, Interval Tree, and RB Tree; Priority queue using Binomial and Fibonacci Heap	CO1, CO2
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.	CO3, CO5
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	CO3, CO5

		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	CO3, CO5
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	CO3, CO5
7.	String Algorithms	Naïve String Matching, Finite Automata Matcher, Rabin Karp matching algorithm, Knuth Morris Pratt, Tries; Suffix Tree; and Suffix Array	CO3, CO5
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*)	CO3, CO5
9.	Case-study / Assignment / Mini-Project	Designing an efficient solution to a given problem using appropriate data structure and algorithm design technique	CO5, CO6

Evaluation Criteria

Components	Maximum Marks
Lab Test 1	**20**
Lab Test 2	**20**
Evaluation 1	**10**
Evaluation 2	**15**
PBL/Mini Project	**20**
Attendance	**15**
Total	**100**

Project based learning: Students in a group of 4-5 will be designing an efficient solution to a given problem / case-studies using appropriate data structure and algorithm design technique studies in the course. The students have to implement the mini project using C/C++/Java language. Project development and its presentation will enhance coding skills, knowledge and employability of the students in IT sector.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. **(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, 2008
5.	Sedgewick, Algorithms in C, 3rd edition. Addison Wesley, 2002
6.	Alfred V. Aho, J.E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Addison-Wesley Series in Computer Science and Information Processing, 1983
7.	ACM Transactions on Algorithms (TALG)

8.	Algorithmica Journal, Springer
9.	Graphs and Combinatorics, Journal, Springer
10.	The ACM Journal of Experimental Algorithmics

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. **(Text books**)	
1.	Tim Roughgarden, Algorithms Illuminated: Part 1: The Basics, Soundlikeyourself Publishing, September 27, 2017
2.	Tim Roughgarden, Algorithms Illuminated:Part 2: Graph Algorithms and DataStructures ,Soundlikeyourself Publishing, First Edition, 2018.
3.	Tim Roughgarden, Algorithms Illuminated :Part3:Greedy Algorithms and Dynamic Programming,Soundlikeyourself Publishing, First Edition, 2019.
4.	Weiss, Data Structures and Algorithm Analysis in C++, 4th Edition**,** Pearson, 2014

Subject Code	19B13BT211	Semester: Even	Semester: IV Session: 2020-2021 Month from: Jan to June
Subject Name	Environmental Studies		
Credits	0	Contact Hours	4

Faculty (Names)	Coordinator(s)	1. Prof.. Krishna Sundari S
	Teacher(s) (Alphabetically)	1. Prof. Krishna Sundari S 2. Prof. Neeraj Wadhwa 3. Dr. Manisha Singh 4. Dr.Garima Mathur 5. Dr. Rachana 6. Ms. Ekta Bhat 7. Dr. Susinjan Bhattacharya

COURSE OUTCOMES		COGNITIVE LEVELS
C205.1	Explain diversity of environment, ecosystem resources and conservation.	Understand Level (C2)
C205.2	Identify hazards related to environmental pollution and safe management practices	Apply Level(C3)
C205.3	Apply modern techniques for sustainable Urban planning and Disaster management	Apply Level(C3)
C205.4	Recall Government regulations, Environmental Policies, Laws & ethics	Understand Level (C2)
C205.5	Survey ground situation on specific environmental aspects, examine risks involved, make a field report and present the findings	Analyzing Level(C4)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	The Multidisciplinary nature of	Definition, scope and importance, Need for public awareness, Types of Ecosystems, World Biomes, Ecosystem functioning,	6

	environment, Biodiversity	Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity, Case studies.	
2.	Natural resources, Energy consumption & conservation	Water, Land, Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Global Conventions on Energy, Kyoto protocol, Case studies.	10
3.	Pollution, hazardous waste management	Air, Water & Land, chemical, noise pollution, sources & causes, effects, Electronic waste, nuclear hazards, Case studies.	8
4.	Urban planning, human communities, Disaster management	Sustainable building, Disaster Management and Contingency Planning, human population, resettlement, rehabilitation environmental movements, environmental ethics, Critical issues concerning Global environment Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc Case studies.	8
5.	Environmental Policies, Laws, Regulations & ethics	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, Case studies.	4
6	Field Work/	Explore the current environment related occurrences at national and international level, Study of successful sustainable measures, a know-how 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.	6
Total number of Lectures			**42**

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.	Benny Joseph, Environmental Studies Simplified, 3rd Edition, McGraw Hill Education, India, Published 2nd August, 2017
2.	Erach Bharucha, Textbook of Environmental Studies for UG Courses, 3rd Edition, Orient Black Swan, Published 1st Jan 2013
3.	Issues of the Journal: Down to Earth, Published by Centre for Science and Environment CSE), Delhi

Detailed Syllabus

Lecture-wise Breakup

Course Code	18B11EC213	Semester Even	Semester IV Session 2020 -2021 Month from Jan-June
Course Name	**DIGITAL SYSTEMS**		
Credits	4	**Contact Hours**	3+1

Faculty (Names)	Coordinator(s)	Atul Kumar, Atul K Srivastava
	Teacher(s) (Alphabetically)	Amit Kumar Goyal, Kaushal Nigam, Saurabh Chaturvedi

COURSE OUTCOMES		COGNITIVE LEVELS
C207.1	Familiarize with the fundamentals of number system, Boolean algebra and Boolean function minimization techniques.	Applying Level (C3)
C207.2	Analyze and design combinational circuits using logic gates.	Analyzing Level (C4)
C207.3	Analyze state diagram and design sequential logic circuits using flip flops.	Analyzing Level (C4)
C207.4	Understand the classification of signals & systems and learn basic signal operations & Fourier analysis.	Analyzing Level (C4)
C207.5	Understand various steps involved in digitization and transmission of a signal.	Understanding Level (C2)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Boolean Function Minimization Techniques and Combinational Circuits	Number systems, Karnaugh Map, Quine-McCluskey method, Prime Implicants, Essential Prime implicants, Adder, Subtractor, Multiplexer, Demultiplexer, Encoder, Decoder, Comparator and Code Converters	9
2.	Flip Flops	SR, JK, Master Slave JK, T And D; Excitation Tables, Conversion of Flip-Flops	3
3.	Counters	Synchronous and Asynchronous Counters, Design of Counters Using Flip- Flops, Registers, Shift Registers, Counters Using Shift Registers; State Diagram Design, Analysis of Sequential Circuits Using Flip-Flops	9
4.	Signals and systems	Signals and classification of signals: Continuous time anddiscrete time, Even and odd, periodic and non-periodic,Energy and Power signals, Basic signals: unit impulse, unitstep and unit ramp. Basic operations of signals: timescaling,time- shifting, etc. Systems and classification of systems: continuous and discrete, Linear and non-linear, causal and non-causal.	5
5.	Fourier Analysis	Fourier Series, Fourier Transform Fourier Transform pair of standard signals and properties of Fourier transform. Discrete	5

		Fourier Transform (DFT), Properties and DFT, standard signal pairs.	
6.	Sampling and Pulse code modulation	Sampling theorem, Proof of sampling theorem, Nyquist rate and Nyquist interval. Quantization (Mid rise and Mid tread), Quantization error, PCM (modulator and demodulator), Transmission bandwidth in PCM, Signal to quantization noise ratio of PCM.	6
7.	Digital modulation techniques and Line coding	BASK, BFSK and BPSK modulation techniques with modulator and demodulator. Linear DM and basics of ADM. Line coding formats- UNRZ, URZ, BNRZ, BRZ, AMINRZ, AMI-RZ and Manchester.	5
		Total number of Lectures	**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment = 10, Quiz = 5, Attendance = 10)
Total	**100**

Program Based Learning: Students will be able to design and implement the projects using decoders, comparators and multiplexers. Desiging of new flip flops, counters and shift resistors enhance the application ability in students. Applying DFT and FFT to design novel systems also develop aptitude among students. Analog to digital signal transimission techniques and several digital communication techniques develop latest knowledge wireless/communication based Industries.

	Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)
1.	S. Salivahanan, and S. Arivazhagan, "Digital circuits and design", Vikas publishing house PVT Limited. Fifth edition (March 2018)
2.	Oppenheim, Alan V., Alan S. Willsky, and Syed Hamid Nawab. "Signals and Systems," Prentice-HallEnglewood Cliffs 2 edition (2015)
3.	S. Haykin, "Digital Communications Systems", John Wiley & Sons, 1 edition, 2013
4.	H. Taub & D. L. Schilling, "Principles of Communication Systems", 2nd edition, McGraw-Hill HigherEducation. 3 edition (September 2007)

Course Description

Course Code	18B15EC213	Semester -: Even (specify Odd/Even)	Semester-: IV, Session 2020 -2021 Month- : January - May
Course Name	Digital Systems Lab		
Credits	1	Contact Hours	2

Faculty (Names)	Coordinator(s)	Parul Arora & Mandeep Narula
	Teacher(s)	Ankur Bhardwaj, Ashish Gupta, Kapil Dev Tyagi, Priyanka Kwatra, Raghvenda Singh, Ritesh Sharma, Shivaji Tyagi, Shruti Kalra, Smriti Bhatnagar, Varun Goel, Yogesh Kumar

COURSE OUTCOMES		COGNITIVE LEVELS
C208.1	Develop the MATLAB programs based on the concept of combinational digital circuits.	Applying (C3)
C208.2	Develop the MATLAB programs to apply the theory of sequential digital circuits.	Applying (C3)
C208.3	Experiment with MATLAB to apply the theory of signals & systems and digital signal processing.	Applying (C3)
C208.4	Experiment with MATLAB to apply the concept of digital communication.	Applying (C3)

Module No.	Title of the Module	List of Experiments	COs
1.	Introduction to basic logic gates	Write Matlab programs for the verification of truth tables of basic logic gates and their realization using universal logic gates.	C208.1
2.	Basics of adder and substractor circuits	Write Matlab programs for half adder, half subtractor, full adder, and full subtractor.	C208.1
3.	Decoder logic circuits	Write Matlab programs for the design of 2-to-4 decoder and 3-to-8 decoder.	C208.1
4.	Multiplexer logic circuits	Write Matlab programs for the design of 2-to-1, 4-to-1, and 8-to-1 multiplexers.	C208.1

5.	Introduction to sequential circuit: SR-Latch	Realization of SR Latch using MATLAB-Simulink.	C208.2
6.	Introduction to sequential circuit: D-Flip-flop	Realization of D Flip-Flop using MATLAB-Simulink.	C208.2
7.	Introduction to sequential circuit: JK-Flip-flop	Realization of JK Flip-Flop using MATLAB-Simulink.	C208.2
8.	Continuous time and discrete time signals	Write Matlab programs for the generation of elementary continuous time signals and discrete time signals.	C208.3
9.	Sampling and reconstruction process	Write Matlab program to study the sampling and reconstruction process.	C208.3
10.	Quantization process of the signals.	Write Matlab program to study the quantization process of sinusoid signals.	C208.3
11.	Digital Modulation Techniques	Write Matlab programs to study the binary phase shift keying and frequency shift keying modulation process.	C208.4
12.	Introduction to Discrete Fourier Transform (DFT) and Inverse Discrete Fourier Transform (IDFT)	Write Matlab programs to compute Discrete Fourier Transform (DFT) and Inverse Discrete Fourier Transform (IDFT) for the spectral analysis of signals.	C208.3
13.	Encoder logic circuits	Write Matlab code for 8:3 encoder and priority encoder.	C208.1
14.	Code Converters	Write Matlab code for Binary to Gray and Gray to Binary Code Converter.	C208.1
Evaluation Criteria			

Components	Maximum Marks
Mid Term Viva	20
End Term Viva	20
Report file, Attendance, and D2D	60
Total	**100**

==**Project based learning:** Students will learn about Combinational and Sequential logic circuits and design them using MATLAB programming. Additionally, students in group sizes of two-three will realize various applications of Digital Systems employing these circuits.==

#Due to Pandemic situation of COVID-19, All the MATLAB programs will be performed using open source SCILAB and OCTAVE, due to unavailability of licensed MATLAB software to the students.

	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.	Salivahanan, S., and S. Arivazhagan. *Digital circuits and design*. Vikas publishing house PVT Limited. Fifth edition (March 2018)
2.	Oppenheim, Alan V., Alan S. Willsky, and Syed Hamid Nawab. "Signals and Systems," *Prentice-Hall Englewood Cliffs* **2 edition (2015)**
3.	S. Haykin *Digital Communications Systems* John Wiley & Sons, 1 edition,2013
4.	H. Taub & D. L. Schilling, Principles of Communication Systems, 2nd edition, McGraw-Hill Higher Education. **3 edition (September 2007)**

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B1NHS431	Semester : EVEN	Semester IV Session 2020-2021
			Month: January 2021 to June 2021
Course Name	Introduction to Literature		
Credits	3	Contact Hours	3 (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
C206-5.1	Understand figurative language to demonstrate communication skills individually and in a group.	CL-2 Understanding
C206-5.2	Develop a critical appreciation of life and society through a close reading of select texts.	CL-3 Applying
C206-5.3	Analyse a literary text thematically and stylistically and examine it as representing different spectrum of life, human behavior and moral consciousness of society.	CL-4 Analysing
C206-5.4	To interpret Literature as reflection of cultural and moral values of life and society.	CL-5 Evaluating

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Literature & Genres	Introduction Literary Genres Literary Devices Learning Communication Skills through Literature	5
2.	Poems	On His Blindness: John Milton My Last Duchess: Robert Browning "Hope" is the thing with feathers: Emily Dickinson A Prayer before Birth: Louis MacNeice Goodbye Party for Miss Pushpa T.S.: Nissim Ezekiel	6
3.	Prose & Short Stories	The Spectator Club: Richard Steele Evidence: Isaac Asimov Toba Tek Singh: Saadat Hasan Manto	6

4.	Plays & Drama	Andher Nagari Chaupat Raja: Bhartendu Harishchandra	7
		The Characters of Macbeth & Lady Macbeth as Universal Characters.	
		Arms & The Man: G B Shaw	
5.	Novel	To Sir With Love: E.R. Braithwaite	4
		Total number of Lectures	28

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Project, Class participation)
Total	**100**

Recommended Reading material:	
1	M.H. Abrams, *'A Glossary of Literary Terms'*, 7th Edition, Hienle & Hienle: Thomson Learning, USA, 1999
2	Mark William Roche, *'Why Literature matters in the 21st Century'*, First Edition, Yale University Press, 2004.
3	E.R. Braithwaite, *'To Sir With Live'*, First Edition, Bodley Head, UK, 1959. Susie Thomas(Ed), "E. R. Braithwaite: 'To Sir, with Love' – 1959", Available at http://www.londonfictions.com
4	Khalid Hasan (Translator), *'Saadat Hasan Maanto : Toba Tek Singh'* Reprint, Penguin Books, India, 2008.
5	G.B Shaw, 'Arms & The Man', Paperback, 2013 https://onemorelibrary.com/index.php/en/?option=com_djclassifieds&format=raw&view=download&task=download&fid=10428
6	Anon, (n.d.). *The Spectator Club. Sir Richard Steele. 1909-14. English....* [online] Available at: http://www.bartleby.com/27/7.html [Accessed 2018].
7	*All poems online: http://www.poetryfoundation .org*
8	Wolfgang Clemen, *'Shakespeare's Soliloquies'*, First Edition, Routledge, London, 1987.

Detailed syllabus
Lecture-wise Breakup

Subject Code	15B1NHS432		Semester: Even	Semester IV Session 2020-2021 Months: from Jan to June
Subject Name	**INTRODUCTION TO 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
C206-6.1	Demonstrate a basic understanding of different perspectives and concepts of psychology	Understanding (Level 2)
C206-6.2	Apply the concepts of psychology in day to day life	Applying (Level 3)
C206-6.3	Examine the different theoretical perspectives and models of psychology	Analyzing (Level 4)
C206-6.4	Develop solutions for problems related to psychology using appropriate tools/models	Creating (Level 6)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	**Introduction to Psychology**	Definition, Nature, and Scope of Psychology; Approaches: Biological, Psychodynamic, Behaviorist, and Cognitive. Methods: Experimental, Observation and Case study; Fields of application.	3
2.	**Basic Concepts**	Person, Consciousness, Behavior and Experience, Perception and learning	5
3.	**Memory**	Process of Memory: Encoding, Storage, Retrieval; Stages of Memory: Sensory, Short term and Long term	3
4.	**Motivation**	Motives: Intrinsic and Extrinsic Frame Work, Theories of Motivation; Techniques of Assessment of Motivations; Frustration and Conflict.	3
5.	**Emotions**	Concept, Development, Expression, Theories of Emotions.	2

6.	**Intelligence**	Nature, Theories, Measurement and Approaches - Genetic and Environmental	3
7.	**Personality**	Nature, Approaches, Determinants and Theories; Techniques of Assessment: Psychometric and Projective Techniques.	5
8.	**Psychology of Adjustment**	Psychological Disorders: Anxiety, Stress, Depression; Psychotherapies.	4
		Total:	28

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

Project based learning: Students in a group will choose a research topic from the syllabi of psychology. Students will cover the following points to prepare project reports: Understanding of concept, related theories and perspectives; Describe the relevance of the chosen concept for personal growth; Discuss the application of chosen topic for your professional life; Elaborate the relevance of the topic at group level and societal level. Discussions on these practical aspects will enhance students' understanding & application of concepts of psychology in day to day life.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	R.A. Baron and G. Misra, Psychology, 5th Ed., Pearson, 2015
2.	S. Nolen-Hoeksema, B. L. Fredrickson, G. R. Loftus, and C. Luts, Introduction to Psychology, 16th Ed., Cengage Learning, 2014.
3.	S. K. Ciccarelli and G. E. Meyer, Psychology, Pearson, 5th Ed., 2017.
4.	Clifford Morgan, Richard King, John Weisz, John Schopler, Introduction to Psychology, 7th Ed., McGraw Hill Education, 2017.
5.	James W. Kalat, Introduction to Psychology, 9th Ed., Wadsworth Publishing; 2010
6.	Gregory Feist and Erika Rosenberg, Psychology: Perspectives and Connections, 5th Ed., McGraw-Hill Education, 2021

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B1NHS433	Semester EVEN (specify Odd/Even)		Semester IV Session 2020 -2021 MonthJan2021- June2021	
Course Name	**INTRODUCTION TO SOCIOLOGY**				
Credits	**3(2-1-0)**		**Contact Hours**	3	

Faculty (Names)	Coordinator(s)	Prof Alka Sharma
	Teacher(s) (Alphabetically)	Prof Alka Sharma

COURSE OUTCOMES		COGNITIVE LEVELS
C206-7.1	Demonstrate an understanding of sociological perspectives and concepts.	Remembering (C1)
C206-7.2	Explain the concept of social stratification and types of stratification as class, caste and gender.	Understanding (C2)
C206-7.3	Apply the major sociological perspectives, social concepts and methods in the systematic study of society	Applying(C3)
C206-7.4	Analyze the relevance of various social Institutionsand how it shapes and influences social interactions.	Analyzing (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Emergence of Sociology- forces and historical background, nature and scope, relationship with other social sciences, difference between common sense and sociology, Major sociological perspective and methods, the sociological imagination	5
2.	Basic Concepts of Sociology	Society, Culture, Groups, sub-groups, Communities, Association, Organization, social interaction and social structure: status and role	4
3.	Social stratification	Stratification-concept, theories and type. Basis of stratification caste, class, gender and race, status and Roles	4
4.	Sociology of Institutions	Kinship, Family ,Religion, Education &Economy in Society	5
5.	Process of Change and Mobility	Concept, theories and Agents of Social Change, Process of Social Change in Indian Society: Sanskritization, Westernization, Modernization, Urbanization	6
6.	Politics and Society	Power, Elite, Bureaucracy, Pressure groups, Political parties, nation, state and civil society, protest, agitation and Social Movements	4
		Total number of Lectures	**28**

Evaluation Criteria

Components   **Maximum Marks**

T1	20
T2	20 (Project based)
End Semester Examination	35
TA	25 (Presentation, assignment, quiz and tutorial participation)
Total	**100**

Each student will be assigned a project based on primary data collection through in-depth interviews with their parents, grandparents and other relatives

Topic of the project- the students will conduct a multidimensional analysis of their class with the Occupation, Education, Income, and Wealth variable, using their parents, grandparents, and themselves as examples to find out how do these variables relate to Social Class and social mobility? How has the Social Class of their family changed (or not) over the past three generations?

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	Johnson, Harry M. *Sociology: a systematic introduction*. Routledge, 2013.
2	Rawat, H. K. *Sociology: basic concepts*. Rawat Publications, 2007.
3	Macionis, John J. *Society: the basics*. Pearson/Prentice Hall, 2009.
4	C. Wright. And Mills, *The Sociological Imagination*, Oxford: Oxford University Press, 1959.
5	Peter L Berger, *The Social Construction of Reality: a Treatise in the Sociology of Knowledge. Garden City,* New York: Anchor, 1966.
6	Conley and Dalton, *You May Ask Yourself: An Introduction to Thinking Like a Sociologist*, 2nd Ed, W. W. Norton & Company New York, 2011. ISBN: 0393935175 or 978-0393935172
7	Ballentine and Roberts, *Our Social World: Introduction to Sociology*, 4th Edition, Sage. 2013.
8	Robert Parkinand Linda Stone, (ed.). *Kinship and Family: An Anthropological Reader*, U.S.A.: Blackwell, 2000, selected chapters

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B1NHS434	Semester: Even		Semester IV Session 2020 -2021
				Month from Jan 2021 to June 2021
Course Name	Principles of Management			
Credits	3		**Contact Hours**	2-1-0

Faculty (Names)	Coordinator(s)	Dr. Shirin Alavi
	Teacher(s) (Alphabetically)	Dr. Shirin Alavi

COURSE OUTCOMES		COGNITIVE LEVELS
C303-1.1	Describe the functions, roles and skills of managers and illustrate how the manager's job is evolving.	Understanding Level (C2)
C303-1.2	Examine the relevance of the political, legal, ethical, economic and cultural environments in global business.	Analyzing Level (C4)
C303-1.3	Evaluate approaches to goal setting, planning and organizing in a variety of circumstances.	Evaluating Level (C5)
C303-1.4	Evaluate contemporary approaches for staffing and leading in an organization.	Evaluating Level (C5)
C303-1.5	Analyze contemporary issues in controlling for measuring organizational performance.	Analyzing Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Managers and Management	Management an Overview: Introduction, Definition of Management, Role of Management, Functions of Managers, Levels of Management, Management Skills and Organizational Hierarchy, Social and Ethical Responsibilities of Management: Arguments for and against Social Responsibilities of Business, Social Stakeholders, Measuring Social Responsiveness and Managerial Ethics, Omnipotent and Symbolic View, Characteristics and importance of organizational culture, Relevance of political,legal,economic and Cultural environments to global business, Structures and techniques organizations use as they go international .	7
2.	Planning	Nature & Purpose, Steps involved in Planning, Objectives, Setting Objectives, Process of Managing by Objectives, Strategies, Policies & Planning Premises, Competitor Intelligence, Benchmarking, Forecasting, Decision-Making.	5
3.	Organizing	Nature and Purpose, Formal and Informal Organization, Organization Chart, Structure and Process, Departmentalization by difference strategies, Line and Staff	7

		authority- Benefits and Limitations-De-Centralization and Delegation of Authority Versus, Staffing, Managerial Effectiveness.	
4.	Directing	Scope, Human Factors, Creativity and Innovation, Harmonizing Objectives, Leadership, Types of Leadership Motivation, Hierarchy of Needs, Motivation theories, Motivational Techniques, Job Enrichment, Communication, Process of Communication, Barriers and Breakdown, Effective Communication, Electronic media in Communication.	4
5.	Controlling	System and process of Controlling, Requirements for effective control, The Budget as Control Technique, Information Technology in Controlling, Productivity, Problems and Management, Control of Overall Performance, Direct and Preventive Control, Reporting, The Global Environment, Globalization and Liberalization, International Management and Global theory of Management.	5
		Total number of Lectures	**28**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Project, Viva, 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.	Koontz H, Weihrich H. Essentials of management: an international, innovation, and leadership perspective. McGraw-Hill Education; 10th Edition 2018.
2.	Tripathi PC. Principles of management. Tata McGraw-Hill Education; 6th Edition 2017.
3.	Principles of Management Text and Cases, Pravin Durai , Pearson ,2015
4.	Robbins, S.P. & Decenzo, David A. Fundamentals of Management,7th ed., Pearson, 2010
5.	Robbins, S.P. & Coulter, Mary Management; 14 ed.,Pearson , 2009

Lecture-wise Breakup

Course Code	15B1NHS435	Semester: Even	Semester Session:2020-21 Month from: Jan-June 2021
Course Name	Financial Accounting		
Credits	3	Contact Hours	3 (2,1,0)

Faculty (Names)	Coordinator(s)	Dr. Mukta Mani (Sec-62), Dr. Sakshi Varshney (Sec-128)
	Teacher(s) (Alphabetically)	Dr. Mukta Mani, Dr. Sakshi Varshney

COURSE OUTCOMES		COGNITIVE LEVELS
C206-8.1	Understand the basic concepts of Accounting.	Understanding level (C2)
C206-8.2	Apply accounting concepts for recording of business transactions.	Applying level (C3)
C206-8.3	Compare and reconcile the accounting records with other sources of information	Analyzing level (C4)
C206-8.4	Evaluate the accounting records to identify and rectify the errors made during accounting process.	Evaluating level (C5)
C206-8.5	Construct the final accounts and cash flow statement of a business	Creating (C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Accounting	Meaning of Accounting, Objectives of Accounting, Understanding Company Management, Stakeholders versus Shareholders, Financial Reporting Standards, Financial Reporting	2
2.	Understanding Accounting Elements	Elements of Financial Statements- Assets, Current assets, Liabilities, Current liabilities, Equity, Income, Expenses, Accounting Equation	2
3.	Accounting Concepts	Business entity concept, Money measurement concept, Going concern, Consistency, Matching concept, Cost concept, Dual aspect concept, Materiality,Full disclosure,Generally Accepted Accounting Principles (GAAP)	2
4.	Journal Transactions	Journal, Rules of Debit and Credit, Compound Journal entry, Opening entry	2

5.	Ledger Posting and Trial Balance	Ledger, Posting, relationship between Journal and Ledger, Rules regarding Posting, Trial balance	3
6.	Rectification of Errors	Different types of errors, their effect on trial balance, rectification and preparation of suspense account	5
7.	Bank Reconciliation Statement	Meaning of Bank Reconciliation Statement, technique of preparing BRS, Causes of difference	2
8.	Final Accounts	Trading account, Profit and Loss account, Balance sheet, Adjustment entries	6
9.	Cash Flow Statement	Introduction of Cash Flow Statement,Classification of Cash inflows and Cash Outflows Activities,prepare the statement of cash flows using direct and Indirect method	4
		Total number of Lectures	**28**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Project+ Class test/Quiz+Class Participation)
Total	**100**

Project Based learning: Students form a group of 4-5 students. Each group is required to choose a company listed in Indian stock exchange and download its latest annual report. Students are required to describe the company,composition of board of directors, number of company's executives,independent directors,background of independent directors. They are required to find outfinancing, investing and operating activities and examines the change in total assets, sales and net profit of the company. As per auditor's report, company's position and future plans for growth of the company is also analyzed.

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.	Maheshwari S. N., Financial and Management Accounting, 5th Ed., S. Chand & Sons Publication, 2014. ISBN No.: 978-81-8054-529-0
2.	Ghosh, T.P., Financial Accounting for Managers, 4th Ed., Taxmann Publications, 2009
3.	Tulsian,P., Financial Accounting,1st Ed., Pearson Education India,2002
4.	Bhattacharya, A., Financial Accounting for Business Managers, 4th Ed., Prentice Hall of India,2012
5.	Weygandt.J., Kimmel, P., Kieso,D., Accounting Principles, 12th Edition, John Wiley & Sons,2015
6.	Barton,M., Bhutta, P.,S. O'Rourke,J.,Satyam Computer Services Ltd: Accounting fraud in India,London,SAGE Publications Ltd, 2017,

Detailed Syllabus
Lecture-wise Breakup

Subject Code	15B11HS111		Semester: EVEN	Semester IV Session 2020-2021 Month from Jan to June
Subject Name	LIFE SKILLS			
Credits	2		Contact Hours	2 (1 1 0)
Faculty (Names)	Coordinator(s)		Dr. Praveen Sharma & Dr. Deepak Verma	
	Teacher(s) (Alphabetically)		Dr.Akarsh Arora,Dr. Amandeep Kaur, Dr. Badri Bajaj, Dr. Kanupriya Bakhru, Dr Praveen Sharma, Dr. Anshu Banwari, Dr. Deepak Verma, Dr. Ekta Shrivastava, Dr. Nilu Choudhary	

COURSE OUTCOMES		COGNITIVE LEVELS
C209.1	Understand Life Skill required to manage self and one's environment	Understand (C2)
C209.2	Apply comprehensive set of skills for life success for self and others	Apply (C3)
C209.3	Analyze group dynamics for its effective functioning	Analysing (C4)
C209.4	Evaluate the role of women leadership and gender issues	Evaluate (C5)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Introduction	Introduction to Life Skills; basic Concepts and Relevance for Engineers	1
2.	Individual-1	Emotional Intelligence, Stress Management, Goal Setting	4
3.	Individual-II	Dimensions of Personality, Values and Attitudes, Assertiveness, Well being,	3
4.	Group Dynamics	Group, Group types, Group Relationship, Social Loafing, Social Facilitation	3
5.	Women Leadership	Gender Sensitization, Women Leadership.	3
Total number of Hours			14

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment & Project)

Total	100	

Project Based Learning: Students are supposed to form a group (Maximum 5 students in each group) and identify a Women leader of their choice. They are supposed to do the in-depth study on the leadership style of their identified leader and explain it. They are also supposed to explain identified women leader's personality traits by referring the Big five personality traits model. The project provides understanding to students on Women leadership and personality traits.

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.	Stephen P. Robbins, Organizational Behaviour, 9th Edition, Prentice-Hall India 2001
2.	Smith, E., Hoeksema, S., Fredrickson, B., & Loftus, G. Introduction to Psychology. Thompsons and Wadsworth Co, 2003
3.	Daniel Goleman, Working With Emotional Intelligence, Bantom Books 1998
4.	Sue Bishop, Assertiveness Skills Training, Viva Books, New Delhi, 2004
5.	Adele B. Lynn 50 Activities for Developing Emotional Intelligence, Ane Books, 2003
6.	Sivasailam Thiagarajan, Glenn M. Parker; Teamwork and Teamplay, Games and Activities for Building and Training Teams., Jossey-Bass, 1999
7.	Kaul A.& Singh M., *"New Paradigms for Gender Inclusivity"*, PHI Pvt Ltd 2012

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NHS332	Semester:Even (specify Odd/Even)	Semester: IV Session 2020-21 Month from: Jan-June		
Course Name	Quantitative Methods for Social Sciences				
Credits	03		Contact Hours	2-1-0	
Faculty (Names)	Coordinator(s)	Manas Ranjan Behera			
	Teacher(s) (Alphabetically)	Manas Ranjan Behera			

COURSE OUTCOMES		COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:		
C206-3.1	*Demonstrate* the key concepts of different quantitative methods used in social sciences.	Understanding Level- (C2)
C206-3.2	*Classify and summarize the* data to be used for analysis.	Understanding Level- (C2)
C206-3.3	*Apply* the theoretical concept toperform basic data analysis in social sciences.	Apply Level –(C3)
C206-3.4	*Examine* different statistical methods and be able to discuss the merits and limitations of a particular method	Analyze Level –(C4)
C206-3.5	*Recommend* appropriate conclusions following empirical analysis	Evaluation Level- (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Introduction to Quantitative Methods, Classification & Presentation of Data: Tabulation-Types of Table, Diagrammatical and Graphical presentation.	3
2.	Mathematical Concepts	Mathematical basis of Managerial Decision-Concepts, Frequency Distribution and their Analysis	3
3.	Statistical Concepts	Measures of Central Tendency, Measures of Dispersion, Measures of Association, Sampling and sample size estimation, Point estimation, Statistical Intervals based on Single sample.	4
4.	Hypothesis Testing	Hypothesis Testing based on single sample, Inferences based on Two samples, t, Z and chi- square and F tests	8
5.	Regression Analysis	Simple Linear Regression and Correlation, Multiple Regression Model	3
6.	Time Series Analysis	Trend Projection, Moving averages and Exponential smoothing Techniques, Index Numbers	3
7.	Multivariate Analysis	ANOVA, MANOVA, Factor Analysis, Discriminant Analysis	4
		Total number of Lectures	28

Evaluation Criteria

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

Project based Learning: Students have to form a group (maximum 5 students in each group) and have to do a project on quantitative research techniques and strategies. The project emphasizes on objective measurement and the statistical analysis of data collected through surveys, questionnaires and polls. The students will gain a first-hand experience of data analysis which will help them in entering an analytical or research career.

	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.	Sirkin, RM. Statistics for the Social sciences. 3rd ed. Thousand Oaks, Calif: Sage Publications; 2006.
2.	Montgomery, DC. , George C. Runger. Applied statistics and probability for engineers. 3rd ed. Hoboken, NJ: Wiley.,2007
3.	Healey, JF. Statistics: A Tool for Social Research. 9th ed. Calif: Wadsworth Cengage Learning; 2012.
4.	Stockemer, D.Quantitative Methods for Social Sciences: A Practical Introduction with examples in SPSS and STATA 1st ed., Springer International Publishing, 2019
5.	Kaplan, DW. The SAGE Handbook of Quantitative Methodology for the Social Sciences. 1st ed. SAGE Publications Inc,2004

Course Code	16B1NHS431	Semester **Even** (specify Odd/Even)	Semester **IV** Session **2020-21** Month from **Jan-June**
Course Name	HUMAN RESOURCE MANAGEMENT		
Credits	3	**Contact Hours**	3(2-1-0)

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

COURSE OUTCOMES		COGNITIVE LEVELS
C206-1.1	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)
C206-1.2	Apply various tools and techniques in making sound human resource decisions.	Apply level (C3)
C206-1.3	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)
C206-1.4	Critically assess and evaluate different human resource & industrial relation practices 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**

Project-based learning: Each student in a group 4 to 5 will select a company which is registered in India. To make subject application based, the student will analyze Human Resource management policies and employed performing different functions at various levels related to recruitment, training, development, performance appraisal, compensation and industry relation.

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.	G. Dessler and B. Varrkey, *Human Resource Management, 15e*. Pearson Education India, 2005.
2.	V. S. P. Rao and V. H. Krishna, *Management: Text and cases*. Excel Books India, 2009.
3.	K. Aswathappa, *Human resource management: Text and cases*. Tata McGraw-Hill Education, 2013.
4.	P. M. Noe, R. A., Hollenbeck, J. R., Gerhart, B. A., & Wright, *Fundamentals of Human Resource Management*. Tata McGraw-Hill Education, 2019.
5.	B. Pattanayak, "Human Resource Management, PHI Learning Pvt," *Ltd., New Delhi*, vol. 2, 2018.
6.	D. A. DeCenzo, S. P. Robbins, and S. L. Verhulst, *Fundamentals of human resource management*. John Wiley & Sons, 2016.

Probability and Random Processes (15B11MA301)

Course Description

Course Code	15B11MA301	Semester Even	Semester IV Session 2020-2021
			Month from Jan 2020- June 2020

Course Name	Probability and Random Processes			
Credits	4		**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Pato Kumari		
	Teacher(s) (Alphabetically)	Dr. Pato Kumari, Dr. Neha Singhal, Prof. B.P. Chamola, Dr. Himanshu Agarwal, Dr. Amita Bhagat, Dr. Pinkey Chauhan, Dr. Mohd. Sarfaraz		

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	7

		averages. Random walk, Wiener 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, 3rd Ed. Tata McGraw-Hill, 2008.
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.