

### Detailed Syllabus

#### Lecture-wise Breakup

<b>Course Code</b>	15B1NHS434	<b>Semester</b> Odd (specify Odd/Even)	<b>Semester V Session</b> 2019 -2020 <b>Month from</b> Jan to June 2019
<b>Course Name</b>	Principles of Management		
<b>Credits</b>	<b>3</b>	<b>Contact Hours</b>	(2-1-0)

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Ms Puneet Pannu ( Sect 62) Dr Deepak Verma ( Sect 128)
	<b>Teacher(s) (Alphabetically)</b>	Dr Deepak Verma, Ms Puneet Pannu

COURSE OUTCOMES		COGNITIVE LEVELS
<b>C303-1.1</b>	Describe the functions, roles and skills of managers and illustrate how the manager's job is evolving	Understand Level (C2)
<b>C303-1.2</b>	Examine the relevance of the political, legal, ethical, economic and cultural environments in global business.	Analyze Level (C4)
<b>C303-1.3</b>	Evaluate approaches to goal setting, planning and organizing in a variety of circumstances.	Evaluate Level (C5)
<b>C303-1.4</b>	Evaluate contemporary approaches for staffing and leading in an organization.	Evaluate Level (C5)
<b>C303-1.5</b>	Analyze contemporary issues in controlling for measuring organizational performance.	Analyze 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,	7

		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 .	
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 authority- Benefits and Limitations-De-Centralization and Delegation of Authority Versus, Staffing, Managerial Effectiveness.	6
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.	5
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
<b>Total number of Lectures</b>			<b>28</b>
<b>Evaluation Criteria</b>			
<b>Components</b>		<b>Maximum Marks</b>	
T1		20	
T2		20	
End Semester Examination		35	

TA	25 (Project, Oral Questions)
<b>Total</b>	<b>100</b>

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Robbins S.P., Coulter M & Fernandez A, <i>Management</i> , Fourteenth Edition, Pearson Education India (2019)
2.	Robbins S.P., Coulter M & DeCenzo D., <i>Fundamentals of Management</i> , Ninth Edition, Pearson Education India (2016)
3.	Durai P., <i>Principles of Management Text and Cases</i> , Pearson Education India(2015)
4.	Aryasi A.R., <i>Fundamentals of Management</i> , McGraw Hill Education (2018)
5.	Stoner J, Freeman R.E & Gilbert D.R., <i>Management</i> , Sixth Edition, Pearson Education India (2018)
6.	Weihrich H, Cannice M.V.& Koontz H., <i>Management A Global, Innovative &amp; Entrepreneurial Perspective</i> , Fourteenth Edition, McGraw Hill Education (2017)

## Detailed Syllabus

### Lecture-wise Breakup

<b>Subject Code</b>	15B11CI511	<b>Semester: Odd</b> (specify Odd/Even)	<b>Semester 5<sup>th</sup> Session</b> 2019-2020 <b>Month from JUL'19 to DEC'19</b>
<b>Subject Name</b>	Computer Networks		
<b>Credits</b>	4	<b>Contact Hours</b>	3-1-0
<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Dr. Gagandeep Kaur (J62), Dr. Sanjeev Patel (J128)	
	<b>Teacher(s) (Alphabetically)</b>	J62: Dr. Alka Singhal, Dr. Nisha Chaurasia, Dr. Shilpa Budhkar, Dr. Kavita Pandey J128: Mr. Bansidhar Joshi, Dr. Neeraj Jain, Rupesh K Koshariya	
<b>COURSE OUTCOMES</b>			<b>COGNITIVE LEVELS</b>
<b>C310.1</b>	Defining the basics of networking, delay components and underlying technologies		Remembering (Level 1)
<b>C310.2</b>	Illustrate the various key protocols in OSI model and TCP/IP protocol suite and explain various application protocols.		Understanding (Level 2)
<b>C310.3</b>	Examine various transport protocols and its performance enhancing mechanisms.		Analyzing (Level 4)
<b>C310.4</b>	Determine the shortest path for the network using various routing protocols and evaluate it.		Evaluating (Level 5)
<b>C310.5</b>	Choose IP & MAC addressing mechanisms and data link layer protocols to solve communication, error detection and correction problems.		Applying (Level 3)
<b>Module No.</b>	<b>Subtitle of the Module</b>	<b>Topics in the module</b>	<b>No. of Lectures for the module</b>
1.	Introduction	Network terminologies, Clients and Servers, Network Models, Protocol layers and their services, Connection Oriented and Connectionless services, Switching	7.5

		Techniques, Physical Media.	
2.	The Application Layer	Principles of Application-Layer Protocols, The World Wide Web: HTTP, File Transfer: FTP, The Internet's Directory Service: DNS, Electronic Mail in the Internet	5
3.	The Transport Layer	Transport-Layer Services and Principles, Multiplexing and Demultiplexing Applications, UDP and TCP, Connection Establishment, Transport Layer Protocols (go back N, stop and wait, selective repeat), Flow Control and Error Control, Principles of Congestion Control, TCP  Congestion Control	8.5
4.	The Network Layer	Introduction and Network Service Model, Routing Principles, Hierarchical Routing, IP: the Internet Protocol, Routing in the Internet, Broadcast and multicast routing	11
5.	The Link Layer and Local Area Networks	The Data Link Layer: Introduction, Services, Error Detection and Correction, Multiple Access Protocols and LANs, LAN Addresses and ARP, Ethernet	8.5
6.	Recent Trends in Networks	Introduction to Distributed Systems, Cloud, IoT, FoG SDN etc.	1.5
Total number of Lectures			42
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Assignments-10, Quiz-5, Attendance-10)	
Total		100	

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1	James Kurose, Keith Ross,” Computer Networking: A Top-Down Approach Featuring the Internet “, Addison Wesley
2	Andrew S. Tanenbaum ,”Computer Networks “, Prentice-Hall Publishers
3	Larry Peterson , Bruce Davie ,”Computer Networks a Systems Approach “, Morgan Kaufmann
4	William Stallings ,”Data and Computer Communications”, Prentice Hall

## Detailed Syllabus

### Lecture-wise Breakup

<b>Course Code</b>	15B11CI513	<b>Semester Odd (specify Odd/Even)</b>	<b>Semester 5<sup>th</sup> Session 2019 -2020 Month from July 19 to Dec 19</b>
<b>Course Name</b>	<b>Software Engineering</b>		
<b>Credits</b>	4 (3-1-0)	<b>Contact Hours</b>	3+1
<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Sangeeta (62), Himanshu Agrawal (128)	
	<b>Teacher(s) (Alphabetically)</b>	Anuja Arora, Sarishty Gupta (62) Amritpal Singh, Nitin Shukla (128)	
<b>COURSE OUTCOMES</b>			<b>COGNITIVE LEVELS</b>
<b>C311.1</b>	Explain software engineering principles and software process models for project development.		Remembering(Level 1)
<b>C311.2</b>	Identify functional and non-functional requirements of a software project and design document software requirements specification.		Understand (Level 2)
<b>C311.3</b>	Design, represent and document software requirements specification. Plan and execute activities for a software project.		Create (Level 6)
<b>C311.4</b>	Apply UML modeling for software design from software requirements specification.		Apply(Level 3)
<b>C311.5</b>	Analyze code checklist. Perform code Reviews, Code Refactoring, and Code optimization, design pattern		Analyze(Level 4)
<b>C311.6</b>	Apply testing principles, develop and implement various manual and automated testing procedures, formal methods		Apply(Level 3)
<b>C311.7</b>	Evaluate software in terms of general software quality attributes and possible trade-offs presented within the given problem.		Evaluate(Level 5)

<b>Module No.</b>	<b>Title of the Module</b>	<b>Topics in the Module</b>	<b>No. of Lectures for the module</b>
<b>1.</b>	<i>Unit-I</i>	<b><i>Introduction to Software Engineering:</i></b>  Introduction to software engineering Principles, Software process models(build and fix model,waterfall model,	<b>7</b>

		Incremental process model, Evolutionary- Prototype and Spiral models, Agile Models (tools study), PSP, TSP, Software Reengineering. Project planning, Project Scheduling: network diagram, Gant Chart, CPM and PERT. [7L]	
2.	<b>Unit-2</b>	<b>Requirement Engineering:</b> Types of requirement, Requirement Elicitation, Analysis, Specification, SRS, Requirement Verification and Validation.[4L]	4
3.	<b>Unit-3</b>	<b>Software Design:</b> Use case diagram, State diagram, Activity Diagram, Class Diagram, Sequence diagram, Collaboration diagram, Deployment Diagram, Component Diagram and Package diagram. Design Modularity: Coupling Cohesion. [7L]	5
4.	<b>Unit-4</b>	<b>Software Construction:</b> Coding standards and guidelines, Code checklist, Code Reviews, Code Refactoring, Code optimization. Design pattern  Modern programming environments (Code search, Programming using library components and their APIs), Program comprehension; Program correctness, Defensive programming. [8L]	9
5.	<b>Unit-5</b>	<b>Software Metrics:</b> Size-Oriented Metric, Function-oriented Metric, Halstead's Software Metric, Information Flow Metric, Object-oriented Metric, Class-Oriented Metric, COCOMO Model. [7L]	7
6.	<b>Unit-6</b>	<b>Software Testing:</b> White-Box Testing, Basis Path Testing, Control Structure Testing: Condition Testing, Data Flow Testing, Loop Testing, Black-Box Testing: Equivalence class partitioning, Boundary Value Analysis, Decision table testing, Cause effect graphing, Mutation Testing and regression Testing, formal methods[9L]	10
<b>Total number of Lectures</b>			<b>42</b>
<b>Evaluation Criteria</b>			
<b>Components</b>		<b>Maximum Marks</b>	



T1	20		
T2	20		
End Semester Examination	35		
TA	25 (Assignemnts/Tutorial	: 20	
	Attendance	: 5)	
<b>Total</b>	<b>100</b>		

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
<b>Text Book(s):</b>	
1.	Roger S. Pressman, “Software Engineering: A practitioner approach”, Fifth Edition-TMH International .
2.	Sommerville , “Software Engineering” , Seventh Edition - Addison Wesley.
<b>Reference Book(s):</b>	
3.	Grady Booch, James Rumbaugh, Ivar Jacobson, The Unified Modeling Language User Guide, Addison Wesley, Reading, Massachusetts, May 2005
4.	Richard Thayer , “Software Engineering Project Management”, Second Edition -Wiley-IEEE Computer Socie Press.
5.	B. Bezier, “Software Testing Techniques”, Second Edition- International Thomson Computer Press.
6.	Pankaj Jalote, “An Integrated Approach to Software Engineering” Third addition , Springer Press

### Detailed Syllabus

#### Lecture-wise Breakup

<b>Subject Code</b>	15B11CI514	<b>Semester:</b> (specify Odd/Even)	<b>Semester ODD Session 2018-2019</b> <b>Month from</b> June 18 <b>to</b> Dec 18
<b>Subject Name</b>	ARTIFICIAL INTELLIGENCE		
<b>Credits</b>	4	<b>Contact Hours</b>	3+1

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Ambalika Sarkar/ Dr. Parul
	<b>Teacher(s) (Alphabetically)</b>	Ambalika Sarkar ,Ms. Dhanlakshmi, Dr. GaganmeetKaur, Dr. Parul , Pawan Upadhay, Dr. Satish Chandra,

COURSE OUTCOMES		COGNITIVE LEVELS
<b>C312.1</b>	Design, implement and analyze the problem solving agents using various informed, uninformed search strategies.	Analyzing [Level 4]
<b>C312.2</b>	Analyze and apply algorithms to solve problems requiring evolutionary search strategies, constraint satisfaction and game theory.	Analyzing [Level 4]
<b>C312.3</b>	Represent knowledge and Apply inference mechanisms using propositional logic (PL) and first order predicate logic (FOPL).	Apply [Level 3]
<b>C312.4</b>	Apply model of probabilistic reasoning in incomplete and uncertain environment.	Apply [Level 3]
<b>C312.5</b>	Develop the agents with natural language processing and learning capabilities.	Apply [Level 3]

<b>Module No.</b>	<b>Subtitle of the Module</b>	<b>Topics in the module</b>	<b>No. of Lectures for the module</b>
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1.	Introduction	History and foundations of AI	01
2.	Problem solving and intelligent agents	PEAS, Structure of agents, nature of environments, concept of rationality	03
3.	Problem solving-I	Problem solving agents, Uninformed search strategies (BFS, UCS, DFS, DLS, IDS)	04
4.	Problem solving-II	Informed Search and Exploration (GBFS, Heuristic function, A*, RBFS, Hill climbing, Genetic Algorithms)	06
5.	Problem solving-III	Constraint satisfaction problems (backtracking search), Adversarial Search (optimal decision in games, alpha beta pruning)	05
6.	Propositional Logic	Knowledge based agents, Propositional Logic, First order Logic, Syntax and Semantics), Inference in FOPL (Unification, forward and backward chaining, resolution)	05
7.	Knowledge representation	Ontology, actions, situations and events, time and event calculus, mental events,	03
8.	Uncertainty	Inference using full joint distribution, Probabilistic reasoning, Bayesian rule, Bayesian network, Maximum likelihood estimation	04
9.	Learning	decision tree, ensemble learning, K-Nearest Neighbor, K-Means algo, Reinforcement Learning	07
10.	Natural Language Processing	Preprocessing, POS tagging using MLE, Parsing using CYK	04
<b>Total number of Lectures</b>			<b>42</b>

<b>Evaluation Criteria</b>	
<b>Components</b>	<b>Maximum Marks</b>
T1	20
T2	20
End Semester Examination	35
TA	25
<b>Total</b>	<b>100</b>

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
<b>1.</b>	Artificial Intelligence – A modern approach by Stuart Russel and Peter Norvig, PHI, 2008.
<b>2.</b>	Artificial Intelligence: foundations of computational agents, Cambridge University Press, 2017
<b>3.</b>	Artificial Intelligence Review: An International Science and Engineering Journal, Springer
<b>4.</b>	Minds and Machines: Journal for Artificial Intelligence, Philosophy and Cognitive Science, Springer
<b>5.</b>	IEEE Intelligent Systems

## Detailed Syllabus

### Lab-wise Breakup

<b>Subject Code</b>	<b>15B17CI571</b>	<b>Semester</b> <b>Odd</b>	<b>Semester _V __ Session 2019-20</b> <b>Month: from July To Dec 2019</b>
<b>Subject Name</b>	<b>Computer Networks Lab (15B17CI571)</b>		
<b>Credits</b>	<b>1</b>	<b>Contact Hours</b>	<b>0-0-2</b>

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	<b>Taj Alam, Shilpa Budhkar &amp; Rupesh Kumar Koshariya</b>
	<b>Teacher(s)</b>	<b>Nisha Chaurasia, Somya Jain, Sangeeta Mittal, Kavita Pandey , Pawan Singh Mehra, Alka Singhal, Sanjeev Patel, Neeraj Jain, Himanshu Agrawal, Ashish Tripathi, Bansidhar Joshi</b>

<b>S. No.</b>	<b>DESCRIPTION</b>	<b>COGNITIVE LEVEL(BLOOMS TEXONOMY)</b>
C370.1	Classify all the wired/wireless technologies and the basic network building blocks	Understand Level (Level 2)
C370.2	Visualize and analyze the data packets of different TCP/IP layers. Store the data packets as *.pcap files.	Apply Level (Level 3)
C370.3	Create client and server applications using the "Sockets" and the implementation of various protocols at Data link and TCP layer	Analyze Level (Level 4)
C370.4	Model a communication network and Estimate the delay caused in the network due to congestions and link breakages.	Evaluate Level (Level 5)

<b>Module No.</b>	<b>Subtitle of the Module</b>	<b>Topics in the module</b>	<b>CO</b>
<b>1.</b>	<b>Introduction</b>	Introduction to Computer Network devices / UNIX Commands for TCP/IP Protocol	CO1
<b>2.</b>	<b>Wireshark Simulator</b>	Practice on WIRESHARK with tcpdump : Application Layer, Transport Layer	CO2

3.	<b>Socket Programming</b>	Client server programming using TCP and UDP, Implementing a calculator	CO3
3.	<b>Network Simulator (NS2)</b>	Introduction, Implementation of TCP Tahoe and Reno using ns-2, Performance Analysis of TCP Congestion Control Algorithm, Implementation of AQM Algorithm and its performance analysis, and its performance analysis	CO4
4.	<b>Multicasting/Broadcasting</b>	Introduction, Multicast vs Broadcast Routing using ns-2, Estimate the delay caused in the network due to congestions and link breakages	CO4
5.	<b>Modeling a realistic Network</b>	Simulate and compare different routing algorithms, error detection and correction and buffer management techniques	CO5

<b>Evaluation Criteria</b>	
<b>Components</b>	<b>Maximum Marks</b>
<b>Lab Test -1</b>	<b>20</b>
<b>Lab Test -2</b>	<b>20</b>
<b>Lab Evaluations</b>	<b>30</b>
<b>Project</b>	<b>20</b>
<b>Attendance</b>	<b>10</b>
<b>Total</b>	<b>100</b>
<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	James F. Kurose, Keith W. Ross, “ Computer Networking : A Top-Down Approach Featuring the Internet ” 3rd Edition Pearson Education.
2.	Andrew S. Tanenbaum,”Computer Networks” 4th Edition
3.	UNIX Network Programming, Volume 1, Second Edition: Networking APIs: Sockets and XTI, Prentice Hall, 1998, ISBN 0-13-490012-X.
4.	Teerawat Issariyakul, Ekram Hossain, "Introduction to Network Simulator NS2", Springer.
5.	Anish nath, "Packet Analysis with Wireshark Paperback," Packt Publishing
6.	Yoram Orzach, "Network Analysis Using Wireshark Cookbook," Packt Publishing

### Detailed Syllabus

#### Lecture-wise Breakup

<b>Course Code</b>	<b>15B17CI573</b>	<b>Semester Odd</b>	<b>Semester 5 Session 2019 -2020</b> <b>Month from July'19 to December'19</b>
<b>Course Name</b>	<b>Software Engineering Lab</b>		
<b>Credits</b>	<b>1</b>	<b>Contact Hours</b>	<b>2</b>

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Dr. Shruti Jaiswal, Sarishty Gupta
	<b>Teacher(s) (Alphabetically)</b>	Amarjeet Prajapati, Anuja Arora, Himanshu Aggarwal, Nitin Shukla, Sarishty Gupta, Shruti Jaiswal

<b>COURSE OUTCOMES</b>		<b>COGNITIVE LEVELS</b>
<b>C371.1</b>	Explain software engineering principles and software process models for project development, software requirements specification for a software project	Understand Level (Level II)
<b>C371.2</b>	Apply Software Design and modeling.	Apply Level (Level III)
<b>C371.3</b>	Apply Software Optimizing and Refactoring	Apply Level (Level III)
<b>C371.4</b>	Apply testing principles and implement various testing procedures	Apply Level (Level III)
<b>C371.5</b>	Creation of software using software engineering principals	Create (level VI)

<b>Module No.</b>	<b>Title of the Module</b>	<b>List of Experiments</b>	<b>CO</b>
<b>1.</b>	Introduction to Software Engineering Principals	Introduction to software engineering Principles (evolution, failures, changing nature of software, software myths, product, process, software crisis and need of testing), Software process models (build and fix model, waterfall model, Incremental process model, Evolutionary- Prototype and Spiral models, Agile models – extreme programming and scrum, selection of a life cycle model), PSP, TSP. Types of requirement, Feasibility	<b>1</b>

		studies, Requirement Elicitation, Analysis, Specification, SRS, Requirement Verification and Validation.	
2.	Software Design and modeling.	Use case diagram, State diagram, Activity Diagram, Class Diagram, Sequence diagram, Collaboration diagram, Deployment Diagram, Event trace diagram. Size oriented metrics, LOC, token count, Function Count, cost estimation, data structure metrics, Halstead’s Software Metric, Information Flow Metric, Overview of Quality Standards like ISO 9001, SEI-CMM, COCOMO, COCOMO-II, Software risk management	2
3.	Software Optimizing and Refactoring	Coding standards and guidelines, Code checklist, Code Refactoring and Code optimization	3
4.	Software Testing	Black box testing techniques: Equivalence class testing, Boundary value analysis, Decision table testing, Cause effect graphing, White box testing: Path testing, Data flow and mutation testing, Levels of testing- unit testing, integration and system testing, Debugging- techniques, approaches, tools & standards.	4
<b>Evaluation Criteria</b>			
<b>Components</b>		<b>Maximum Marks</b>	
Lab Test 1		20	
Lab Test 2		20	
Day-to-Day(Evaluations, Viva, Quiz, Attendance, Project)		60	
<b>Total</b>		<b>100</b>	

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Pressman, Roger S. Software engineering: a practitioner's approach. Palgrave Macmillan, 2005.
2.	Jalote, Pankaj. An integrated approach to software engineering. Springer Science & Business Media, 2012.



3.	KK Aggarwal, Software Engineering, 2001.
4.	David Solomon and Mark Russinovich ,” Inside Microsoft Windows 2000”, Third Edition, Micorosoft Press
5.	<a href="https://www.tutorialspoint.com/software_engineering/">https://www.tutorialspoint.com/software_engineering/</a>
6.	ACM/IEEE transactions on Software Engineering
7.	ACM Transactions on Software Engineering Methodology
8.	Springer Journal of Empirical Software Engineering
9.	Springer Journal of Software and Systems Modeling

### Detailed Syllabus

#### Lecture-wise Breakup

<b>Course Code</b>	15B17CI574	<b>Semester</b> Odd (specify Odd/Even)	<b>Semester 5th Session</b> 2019 -2020 <b>Month from</b> June 19 to Dec 19
<b>Course Name</b>	Artificial Intelligence Lab		
<b>Credits</b>	1	<b>Contact Hours</b>	2

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Ambalika Sarkar/Pawan Upadhay
	<b>Teacher(s) (Alphabetically)</b>	Ambalika Sarkar, Dhanalekshmi ,Parul Agarwal, Pawan Upadhay

COURSE OUTCOMES		COGNITIVE LEVELS
<b>C372.1</b>	Construct problem solving agent using various Informed and uninformed search strategies	Apply Level (C3)
<b>C372.2</b>	Utilize evolutionary search algorithms to solve the real world complex problems	Apply Level (C3)
<b>C372.3</b>	Analyze and apply algorithms to solve problems requiring constraint satisfaction and game theory	Analyze Level (C4)
<b>C372.4</b>	Demonstrate and understand the inference mechanisms using prepositional and first order logic	Understand(C2)

Module No.	Title of the Module	List of Experiments	No. of Lab hours for the module	CO
1	<i>Introduction to Programming in Python</i>	➤ Familiarize the following concepts of Python programming language like Arrays, Lists, functions, Tuples, Dictionary, Sets, Objects and classes	2	C2

2	Problem solving	<ul style="list-style-type: none"> <li>➤ Problem solving agents, Uninformed search strategies (BFS, UCS, DFS, DLS, IDS)</li> <li>➤ Informed Search and Exploration (BFS, A*, IDA*, SMA*, IDA*)</li> </ul>	4	C3
3	Evolutionary Algorithms	<ul style="list-style-type: none"> <li>➤ Genetic Algorithms</li> </ul>	2	C3
4	Constraint satisfaction problems	<ul style="list-style-type: none"> <li>➤ Formulating Problems as constraint satisfaction problems</li> </ul>	2	C4
5	Adversarial Search problems	<ul style="list-style-type: none"> <li>➤ Adversarial Search (optimal decision in games, alpha beta pruning)</li> </ul>	3	C3
6	Knowledge representation	<ul style="list-style-type: none"> <li>➤ Inference using Prolog</li> </ul>	2	C2

#### Evaluation Criteria

Components	Maximum Marks
Evaluation 1	20
Lab Test 1	20
Quiz 1	20
Day to Day evaluations	10
Evaluation 2	10
Lab Test 2	20
<b>Total</b>	<b>100</b>

**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.	Artificial Intelligence – A modern approach by Stuart Russel and Peter Norvig, PHI, 2008.
2.	Artificial Intelligence: foundations of computational agents, Cambridge University Press, 2017
3.	Artificial Intelligence Review: An International Science and Engineering Journal, Springer

4.	Minds and Machines: Journal for Artificial Intelligence, Philosophy and Cognitive Science, Springer
5.	IEEE Intelligent Systems

## Detailed Syllabus

### Lab-wise Breakup

<b>Course Code</b>	15B17CI575	<b>Semester ODD (specify Odd/Even)</b>	<b>Semester 5<sup>th</sup> Session</b> 2019-2020 <b>Month from</b> July 19 to December 19
<b>Course Name</b>	Open Source Software Lab		
<b>Credits</b>	1	<b>Contact Hours</b>	2 hours

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Ms. Deepti Singh (J62), Mr. Himanshu Mittal (J128)
	<b>Teacher(s) (Alphabetically)</b>	J62: Dr. Ankita Verma, Ms. Deepti Singh, Dr. Indu chawla, Dr. Megha rathi  J128: Ms. Ambalika Sarkar, Dr. Amritpal Singh, Dr. Chetna Gupta, Mr. Himanshu Mittal, Mr. Rupesh Koshariya,

<b>COURSE OUTCOMES</b>		<b>COGNITIVE LEVELS</b>
<b>C375.1</b>	Demonstrate the working of Git repository hosting service through git commands to manage files, support version control and contribute to open source community by providing enhanced versions.	Understand level (Level 2)
<b>C375.2</b>	Apply a mix of Client, Server and Database technologies to solve Open Source Software issues/ to enhance projects.	Apply Level (Level 3)
<b>C375.3</b>	Develop Server-side programs using python with Database Servers-SQL, MongoDB	Apply Level (Level 3)
<b>C375.4</b>	Analyze baseline methods for pre-processing, clustering and classification algorithms using scikit-learn python libraries	Analyze Level (Level 4)
<b>C375.5</b>	Build J2EE Programs using JDBC Connectivity with SQL Database and Apache/ Glassfish as web servers.	Create Level (Level 6)

<b>Module No.</b>	<b>Title of the Module</b>	<b>List of Experiments</b>	<b>CO</b>	<b>#Labs</b>
1.	Introduction to GitHub	<ul style="list-style-type: none"><li>Read and explore the Github and Sustainable</li></ul>	CO1	1

	Sustainable Development Goals (SDG's)	Development Goals. <ul style="list-style-type: none"><li>• Create a simple program and upload it on Github.</li><li>• Extract one open source project from Github. Perform the reverse engineering of the same.</li></ul>		
2.	Introduction To Python	<ul style="list-style-type: none"><li>• Making use of lists, tuples, and dictionaries, indexing and slicing to access data</li></ul>	CO2	1
3.	Python	<ul style="list-style-type: none"><li>• Create user defined functions using built-in functions such as <b>filter (f, a)</b> from python libraries.</li></ul>	CO3	1
4.	Numpy, SciPy, Matplotlib (Python)	<ul style="list-style-type: none"><li>• Write python programs using various functions of Numpy, SciPy and Matplotlib library.</li></ul>	CO4	2
5.	Beautiful Soup (Python), Pandas, MongoDB	<ul style="list-style-type: none"><li>• Write a program using Beautiful Soup for scrapping data from web, store in csv files and process them.</li><li>• Write a program for processing data stored in MongoDB using Pandas.</li></ul>	CO5	2
6.	Java Script, Java Servlet and Java Server Pages.	<ul style="list-style-type: none"><li>• Write programs for building web-pages using java script.</li><li>• Buildweb-based applications using server-side programming – Java Server Pages (JSP) and Java Servlet.</li></ul>	CO5	2
7.	Scikit-Learn (Python)	<ul style="list-style-type: none"><li>• Write python programs for data analysis, feature engineering, clustering and classification.</li></ul>	CO4	2
<b>Evaluation Criteria</b>				
<b>Components</b>		<b>Maximum Marks</b>		
LabTest1		20		
LabTest2		20		
Quiz1		10		
Quiz2		10		
Quiz3		10		
Attendance		15		
Lab record maintenance and submission		15		
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<b>Total</b>		<b>100</b>		

**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. <https://guides.github.com/>

2. <https://sustainabledevelopment.un.org/>

3. Python Cookbook by David Beazley and Brian K. Jones

4. Head First Servlets & Java Server Pages by Bryan Basham, Kathy Sierra, and Bert Bates

5. Python for Data Analysis, by Wes McKinney

### Detailed Syllabus

#### Lecture-wise Breakup

<b>Course Code</b>	15B17CI576	<b>Semester Odd (specify Odd/Even)</b>	<b>Semester 5th Session 2019 -2020</b> Months from July 2019 to December 2019
<b>Course Name</b>	Information Security Lab		
<b>Credits</b>	1	<b>Contact Hours</b>	2

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Amanpreet Kaur, Shariq Murtuza
	<b>Teacher(s) (Alphabetically)</b>	Alka Singhal, Arpita Jadhav, Gagandeep Kaur, P Raghu Vamsi, Vikas Hassija, Kritika Rani, Nitin Shukla

<b>Course Outcomes (CO)</b>	<b>Description</b>	<b>Cognitive Level (Bloom's Taxonomy)</b>
<b>C374.1</b>	Demonstrate and illustrate the different cipher techniques and understand various anti-virus and anti worms	Level-2 (Understanding Level)
<b>C374.2</b>	Develop and make a code to implement various Symmetric key , Asymmetric key cryptographic techniques and steganography techniques	Level-3 (Applying Level)
<b>C374.3</b>	Apply a client server programming for symmetric ,asymmetric algorithms and key exchange algorithms, Application of information security to real world problems	Level-3 (Applying Level)
<b>C374.4</b>	Examine and analyze the packet information for different protocols using Wireshark.	Level-4 (Analyzing Level)

<b>Module No.</b>	<b>Title of the Module</b>	<b>List of Experiments</b>	<b>CO</b>
1.	Cryptography	Introduction to Cryptography	C374.1
2.	Ciphers	Implementation of Cipher using Transposition techniques and Caesar Cipher	C374.2



3.	Ciphers	Implementation of Substitution Ciphers: Hill Cipher and Polyalphabetic Cipher	C374.2
4.	Symmetric key cryptography	Introduction to Symmetric key cryptography	C374.1
5.	Data Encryption Standard	Implementation of Data Encryption Standard ( DES)	C374.2
6.	Public key cryptography	Introduction to Public key cryptography and Digital signature	C374.2
7.	Key Exchange Algorithm	Implementation of Diffie Hellman Key Exchange Algorithm	C374.3
8.	Client server programming	Client server programming using TCP	C374.3
9.	Client server programming	Implementation of DES and RSA using Client server programming	C374.3
10.	Steganography	Introduction to Steganography	C374.2
11.	Antivirus and Anti-Worms	Introduction to Antivirus and Anti-Worms, and Wireshark tool	C374.1
12.	Applications of Information Security	Applications of Information Security to real world problems	C374.3
13.	Wireshark	Understanding of Secure-socket layer, Application Layer (HTTP, FTP, DNS) using Wireshark tool	C374.4
<b>Evaluation Criteria</b>			
<b>Components</b>		<b>Maximum Marks</b>	
Lab Test -1		20	
Lab Test -2		20	
Quiz 1		15	
Quiz 2		15	
Project		15	
Attendance		15	
<b>Total</b>		<b>100</b>	

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Information Security, Principles and Practice, Mark Stamp, Wiley
2.	Security in Computing 5 <sup>th</sup> Edition , Charles P Fleege et. al. - Prentice Hall
3.	The InfoSec Handbook: An Introduction to Information Security- Apress Open
4.	Information Security: The Complete Reference, Second Edition- Mark Rhodes Ousley
5.	Cracking Codes with Python: An Introduction to Building and Breaking Ciphers- Al Sweigart

### Detailed Syllabus

#### **Lecture-wise Breakup**

<b>Course Code</b>	15B19CI591	<b>Semester Odd (specify Odd)</b>	<b>Semester V Session 2019 -2020 Month from July to December</b>
<b>Course Name</b>	Minor Project-1		
<b>Credits</b>	2	<b>Contact Hours</b>	4

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	ANKIT VIDHYATHI, MUKESH SARASWAT
	<b>Teacher(s) (Alphabetically)</b>	ALL FACULTY

<b>COURSE OUTCOMES</b>		<b>COGNITIVE LEVELS</b>
C350.1	Analyze chosen literature addressing real world research problem to identify the requirements	Analyzing Level (4)
C350.2	Build technical report detailing the software specification, design, test plan, and implementation details.	Creating Level (6)
C350.3	Build a practicable solution for the research problem	Creating Level (6)
C350.4	Evaluate results to test the effectiveness of the proposed solution	Evaluating Level (5)
C350.5	Develop effective communication skills for presentation of project related activities	Apply Level (3)

<b>Evaluation Criteria</b>	
<b>Components</b>	<b>Maximum Marks</b>
Viva-1	20
Viva-2	20
D2D	60
<b>Total</b>	<b>100</b>

## Detailed Syllabus

### Lecture-wise Breakup

Course Code	16B1NHS 531	Semester : Odd (specify Odd/Even)	Semester : v Session:2019 -2020 Month from: July to December
Course Name	Sociology of Youth		
Credits	3	Contact Hours	(2-1-0)

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

COURSE OUTCOMES		COGNITIVE LEVELS
C303-2.1	Understand Youth and youth culture in sociological perspectives	Understanding(C 2)
C303-2.2	Explain the ethical, cultural& social issues concerning Youth	Evaluating(C 5)
C303-2.3	Understand and interpret the youth culture	Analyzing(C 4)
C303-2.4	Analyze societal problems related to youth in the evolving society.	Evaluating(C 5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Youth	Meaning, characteristics, Youth for Development, Challenges faced by Youth, Youth's roles and responsibilities in society	2
2.	Youth Culture	Concept of Youth Culture	2
3.	Perspectives on Youth Culture	Functionalist, Conflict, Interactionist and Feminist Perspective on Youth Culture, Youth and Gender	3
4.	Youth Development	Principles of Youth Development, Learning theory, Constructivist theory, collaborative learning , Relationships	6

		theories, Theories as a tool to understand Youth Culture	
5.	Socialization of Youth	Role of family, Community, religion, kin and neighborhood, Changing social structures in family, marriage, Youth and changing identities	6
6.	Emerging problems of Youth	Role and Value conflicts, Generation Gap, Career decisions and Unemployment, Emotional adjustment, Coping with pressures of living, Unequal Gender norms, Crime (Social Strain theories),	6
7.	Changing perceptive of Youth and Youth Culture in 21 <sup>st</sup> century	Role of popular culture and social media, involvement of youth in major decision making institutions, Post-modernity and Youth	3
<b>Total number of Lectures</b>			<b>28</b>
<b>Evaluation Criteria</b>			
<b>Components</b>		<b>Maximum Marks</b>	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Project, Presentation, Assignment)	
<b>Total</b>		<b>100</b>	

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Tyyskä, V. <i>Youth and Society: The long and winding road</i> , 2nd Ed., Canadian Scholars' Press, Inc. (2008).
2.	White, Rob, Johanna Wyn and Patrizia Albanese. <i>Youth &amp; Society: Exploring the Social Dynamics of Youth Experience</i> . Don Mills, ON: Oxford University Press. (2011).
3.	Bansal, P. <i>Youth in contemporary India: Images of identity and social change</i> . Springer Science & Business Media. (2012).
4.	Furlong, Andy. <i>Youth studies: An introduction</i> . Routledge, (2012).
5.	Blossfeld, Hans-Peter, et al., eds. <i>Globalization, uncertainty and youth in society: The losers in a globalizing world</i> . Routledge, (2006).

6.	Ruhela, Satya Pal, ed. Sociology of the teaching profession in India. National Council of Educational Research and Training, (1970).
7.	Frith, S. "The sociology of youth. Themes and perspectives in sociology." Ormskirk, Lancashire: Causeway Books (1984).

### Detailed Syllabus

#### **Lecture-wise Breakup**

<b>Course Code</b>	16B1NHS532	<b>Semester: Odd</b>	<b>Semester V Session 2019-2020</b> <b>Month from: July 2019 –Dec 2019</b>
<b>Course Name</b>	Planning and Economic Development		
<b>Credits</b>	03	<b>Contact Hours</b>	2-1-0

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Dr. Amba Agarwal (JIIT-128), Mr. Manas R. Behera (JIIT-62)
	<b>Teacher(s) (Alphabetically)</b>	Dr. Amba Agarwal, Mr. Manas R. Behera

<b>COURSE OUTCOMES</b>		<b>COGNITIVE LEVELS</b>
After pursuing the above mentioned course, the students will be able to:		
<b>C303-4.1</b>	Understand the issues and approaches to economic development.	Understanding Level (C2)
<b>C303-4.2</b>	Apply the concepts of national income accounting, human development index and sustainable development.	Applying Level (C3)
<b>C303-4.3</b>	Analyze the structural characteristics of the economy.	Analyzing Level (C4)
<b>C303-4.4</b>	Analyze the role of Macroeconomic policies in the development process.	Analyzing Level (C4)
<b>C303-4.5</b>	Assess the importance of federal development and decentralization	Evaluating Level (C5)

<b>Module No.</b>	<b>Title of the Module</b>	<b>Topics in the Module</b>	<b>No. of Lectures for the module</b>
1.	Economic Development and its Determinants	Economic growth and development. Indicators of development. Rostows Stages of Growth. Approaches to economic development.	2
2.	National Income Accounting	National Income Accounting, Green GNP and Sustainable development	4

3.	Indicators of development	Physical Quality Life Index, Human Development Index (HDI) and gender development indices.	3
4.	Demographic Features, Poverty and Inequality	Demographic features of Indian population; Rural-urban migration; Growth of Primary, Secondary and Tertiary Sector.	3
5.	Inflation and Business Cycles	Inflation. Business cycle. Multiplier and Accelerator Interaction.	4
6.	Macro Economic Stability & Policies	Monetary Policy. Fiscal Policy. Role of Central Bank & Commercial banks in the development of the country. Balance of payments; currency convertibility and Issues in export-import policy.	5
7.	Federal Development	The Federal Set-up - The Financial Issues in a Federal Set-up, Principles for Efficient Division of Financial Resources between Governments.  Financial Federalism under Constitution. Finance Commissions in India, Terms of References and its Recommendations	4
8.	Planning and Development	Need for planning-Niti Aayog, Decentralisation, Rural and Urban local bodies.	3
Total number of Lectures			28
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Assignment, Quiz)	
Total		100	

Recommended Reading material:	
1.	Todaro, M.P., Stephen C. Smith, Economic Development, Pearson Education, 2017
2.	Thirwal, A.P., Economics of Development, Palgrave, 2011

3.	<b>Ahuja, H. L.</b> , Development Economics, S Chand publishing, 2016
4.	<b>Ray, Debraj</b> , Development Economics, Oxford University Press, 2016



### Detailed Syllabus

#### Lecture-wise Breakup

<b>Course Code</b>	16B1NMA533	<b>Semester - Odd (specify Odd/Even)</b>	<b>Semester 5<sup>th</sup> Session 2019 -2020 Month from July 2019 - Dec 2019</b>
<b>Course Name</b>	Matrix Computations		
<b>Credits</b>	4	<b>Contact Hours</b>	3+1

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Dr. Pato Kumari and Dr. Amita Bhagat
	<b>Teacher(s) (Alphabetically)</b>	Dr. Amita Bhagat Dr. Neha Singhal Dr. Pato Kumari

<b>COURSE OUTCOMES</b>		<b>COGNITIVE LEVELS</b>
<b>C301-3.1</b>	explain the basics of matrix algebra and inverse of a matrix by partitioning.	<b>Understanding level (C2)</b>
<b>C301-3.2</b>	solve the system of linear equations using direct and iterative methods.	<b>Applying Level (C3)</b>
<b>C301-3.3</b>	explain the vector spaces and their dimensions, inner product space, norm of a vector and matrix.	<b>Understanding level (C2)</b>
<b>C301-3.4</b>	apply the Gram-Schmidt process to construct orthonormal basis and Q-R decomposition of a matrix.	<b>Applying Level (C3)</b>
<b>C301-3.5</b>	construct Gershgorin's circles and solve eigenvalue problem using Jacobi, Givens, Housholder, power and inverse power methods.	<b>Applying Level (C3)</b>
<b>C301-3.6</b>	analyze systems of differential and difference equations arising in dynamical systems using matrix calculus.	<b>Analyzing Level (C4)</b>

<b>Module No.</b>	<b>Title of the Module</b>	<b>Topics in the Module</b>	<b>No. of Lectures for the module</b>
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1.	Matrix Algebra	Review of matrices, partitioning, block diagonal matrix, elementary matrices, Inverse of a matrix by partitioning	6
2.	Linear System of equations	Existence and uniqueness of solution for system of linear equations, Gauss Siedel, Gauss Jacobi and partial pivoting	6
3.	Vector and Inner Product Spaces	Vector spaces, Subspaces, dimension and basis, $p$ -norms of vector, Inner product, Norm using inner product and norms of a matrix	6
4.	Eigen value Problems	Eigen values and Eigenvectors, spectral radius, Greshgorin's theorem, Jacobi method, Givens rotations method and Householder's method, Power and Inverse power methods, LU decomposition, Crout's and Doolittle's method, Cholesky factorization.	10
5.	Orthogonality	Orthogonal and orthonormal sets, Gram-Schmidt process, QR factorization, Q-R algorithm	6
6.	Matrix Calculus	Powers and functions of matrices, application to solve discrete dynamical systems $x(t+1) = Ax(t)$ , $x(0) = \alpha$ and a system of differential equations of the form $dx/dt = Ax$ , $x(0) = \alpha$ .	8
<b>Total number of Lectures</b>			<b>42</b>
<b>Evaluation Criteria</b>			
<b>Components</b>		<b>Maximum Marks</b>	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Assignments, Quizzes and Tutorial)	
<b>Total</b>		<b>100</b>	

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	<b>Bronson, R.</b> , Matrix Methods an Introduction, Academic Press, 1991.
2.	<b>Golub, G. H.</b> , Matrix Computations, Johns Hopkins University Press, 1996.
3.	<b>Datta, K. B.</b> , Matrix and Linear Algebra, Prentice Hall of India, 1990.
4.	<b>David, W. Lewis.</b> , Matrix Theory, World Scientific, 1991.

## Detailed Syllabus

### Lecture-wise Breakup

<b>Course Code</b>	16B1NMA731	<b>Semester ODD (specify Odd/Even)</b>	<b>Semester 5<sup>th</sup> Session 2019 -2020 Month from June 19 to Dec 19</b>
<b>Course Name</b>	Theory of Numbers		
<b>Credits</b>	4	<b>Contact Hours</b>	3-1-0
<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Dr. Puneet Rana	
	<b>Teacher(s) (Alphabetically)</b>	Dr. Puneet Rana	
<b>COURSE OUTCOMES</b>			<b>COGNITIVE LEVELS</b>
<b>C301-4.1</b>	explain Euclid algorithm, linear Diophantine equations and prime numbers.		Explain [Level 2]
<b>C301-4.2</b>	solve system of linear congruences using properties of congruences.		Apply [Level 3]
<b>C301-4.3</b>	explain numbers of special form and number theoretic functions.		Explain [Level 2]
<b>C301-4.4</b>	apply the concepts of order, primitive roots and indices to solve congruences.		Apply [Level 3]
<b>C301-4.5</b>	apply Legendre symbol and quadratic reciprocity theorem to solve quadratic congruences.		Apply [Level 3]
<b>C301-4.6</b>	apply and analyse the concepts of number theory in hashing, cryptography, calendar and ISBN check digits problems.		Analyzing [Level 4]
<b>Module No.</b>	<b>Title of the Module</b>	<b>Topics in the Module</b>	<b>No. of Lectures for the module</b>
<b>1.</b>	Divisibility and Primes	Division algorithm, Greatest common divisor, Euclid's algorithm, gcd as a linear combination of coprime integers, Linear Diophantine equations, primes, The fundamental theorem of arithmetic, The Sieve of Eratosthenes, Canonical prime factorization, Least common multiple, Prime number theorem(statement only), Goldbach and twin primes conjectures.	8
<b>2.</b>	Theory of Congruences	Definitions and basic properties, Residue classes, complete residue systems, reduced residue systems, Linear congruences in one variable, Simultaneous linear congruences, Chinese remainder theorem and its applications, Linear congruences in more than one variable, Fermat's theorem, Pseudoprimes and carmichael numbers, Wilson's Theorem	8
<b>3.</b>	Number Theoretic	Greatest integer function, The number-of-divisors function, The sum-of-divisors function, Multiplicative	7

	Functions and Numbers of Special Form:	function, The Mobius function, Mobius inversion formula, The Euler’s totient function, Euler's theorem, Perfect numbers, characterization of even perfect numbers, Mersenne primes, Fermat primes	
4.	Primitive Roots and Indices	The order of an integer, Primitive roots, Theory of indicies, Solution of non-linear congruences.	7
5.	Quadratic Residues	Quadratic residues and non-residues, Euler's Criterion, The Legendre symbol, Gauss Lemma, Quadratic reciprocity, Solution of quadratic congruences.	6
6.	Applications	Hashing functions, Cyptosystem, Calendar problem, ISBN check digits	6
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.	James Strayer, Elementary Number Theory, Waveland Press,,2001		
2.	Kenneth Rosen, Elementary Number Theory and its Applications, 5th Edition, 2005		
3.	I. Niven, H. Zuckerman, H. Montgomery, An Introduction to the Theory of Numbers, 5th Edition, Wiley, 2013.		
4.	David M. Burton, Elementary Number Theory, 7 <sup>th</sup> Edition, McGraw Hill Education (India) Private Limited, 2006		

### Detailed Syllabus

#### Lecture-wise Breakup

Course Code	16B1NPH531	Semester : ODD	Semester: 5 <sup>th</sup> Session: 2019 -2020 Month from July 19 to December 19
Course Name	Quantum Mechanics for Engineers		
Credits	4	Contact Hours	3+1

Faculty (Names)	Coordinator(s)	Vikas Malik and Anuraj Panwar
	Teacher(s) (Alphabetically)	Vikas Malik and Anuraj Panwar

COURSE OUTCOMES		COGNITIVE LEVELS
C301-10.1	Remember basics of Quantum Mechanics and its applications.	Remembering (C1)
C301-10.2	Explain postulates of quantum mechanics, Dirac notation, Schrödinger Equation, Perturbation theory and Qubits.	Understanding (C2)
C301-10.3	Solve various problems related to different quantum systems and construct quantum circuits using quantum gates.	Applying (C3)
C301-10.4	Analyse the results obtained for various physical systems and to establish the advantages of some simple protocols of quantum information processing.	Analyzing (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Wave particle duality, quantum physics (Planck and Einstein's ideas of quantized light), postulates of quantum mechanics, time dependent and time independent Schrodinger equation, operators, probability theory, expectation values, and uncertainty principle and its implications, no cloning applications	8

2.	Measurement Theory with Applications	Matrix and linear algebra, Eigen values and eigenfunctions Hilbert space, Kets, Bras and Operators, Bras Kets and Matrix representations, Measurements, Stern Gerlach Experiment, Observables and Uncertainty Relations, No-cloning theorem, Pauli Spin Matrices.	10
3.	Potential problems	1-D, 2-D, and 3-D potential problems (including infinite and finite square well). Tunneling, harmonic oscillator, separation in spherical polar coordinates, hydrogen atom, etc.),	08
4.	Approximation methods	Time independent perturbation theory for nondegenerate and degenerate energy levels.	4
5.	Advanced Applications	Kronig Penny model, Basic ideas of quantum computing, Qubit, Gate model of quantum computing : H, CNOT, Pauli Gates, BB84 protocol, Advantages of quantum computing, Quantum wire, Quantum dot and realization of CNOT using Quantum dot.	10
Total number of Lectures			40
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 [2 Quiz (10 M), Attendance (10 M) and Cass performance (5 M)]	
Total		100	

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	The new quantum universe by Toney Hey and Patrick Walters, Cambridge University Press.
2.	Quantum mechanics a new introduction by Kenichi Konishi and G Paffuti, OUP., 2009
3.	Quantum physics by Eyvind H Wichman (Berley Physics course Vol 4) Tata McGraw Hill 2008
4.	Elements of quantum computation and quantum communication by A Pathak, CRC Press 2013.

5.

Introduction to Quantum Mechanics by David J. Griffiths, Second Edition, Pearson, 2015.

### Detailed Syllabus

#### Lecture-wise Breakup

<b>Course Code</b>	16B1NPH532	<b>Semester: ODD</b>	<b>Semester: 5<sup>th</sup> Session: 2019 -2020</b> <b>Month from July 19 to December 19</b>
<b>Course Name</b>	Materials Science		
<b>Credits</b>	4	<b>Contact Hours</b>	3+1

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	R. K. Dwivedi and Sandeep Chhoker
	<b>Teacher(s) (Alphabetically)</b>	R. K. Dwivedi and Sandeep Chhoker

COURSE OUTCOMES		COGNITIVE LEVELS
<b>C301-11.1</b>	Recall variety of engineering materials for their applications in contemporary devices	Remembering (C1)
<b>C301-11.2</b>	Explain dielectric, optical, magnetic, superconducting, polymer and thermoelectric properties	Understanding (C2)
<b>C301-11.3</b>	Apply properties of dielectric, optical, magnetic, superconducting, polymer and thermoelectric materials to solve related problems	Applying (C3)
<b>C301-11.5</b>	Prove and estimate solution of numerical problems using physical and mathematical concepts involved with various materials	Evaluating (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Dielectric Materials	Polarization mechanism & Dielectric Constant, Behavior of polarization under impulse and frequency switching, Dielectric loss, Spontaneous polarization, Ferroelectrics, Piezoelectric effect; Applications of Dielectric Materials	10
2.	Magnetic Materials	Concept of magnetism, Classification – dia-, para-, ferro-, antiferro- and ferri-magnetic materials, Their properties and Applications; Hysteresis; Magnetic Storage and Surfaces.	10
3.	Super conducting Materials	Meissner effect, Critical field, type-I and type-II superconductors; Field penetration and London equation; BCS Theory, High temperature Superconductors and their	5



		Applications	
4.	Polymers and Ceramics	Various types of Polymers and their applications; Mechanical behavior of Polymers, synthesis of polymers; Structure, Types, Properties and Applications of Ceramics; Mechanical behavior and Processing of Ceramics.	6
5.	Optical Materials	Basic Concepts, Light interactions with solids, Optical properties of nonmetals: refraction, reflection, absorption, Beer-Lambert law, transmission, Photoconductivity. Drude Model, relation between refractive index and relative dielectric constant, Optical absorption in metals, insulators and semiconductors. Introduction to Photonic band gap (PBG) materials and its applications	6
6.	Thermoelectric Materials	Thermoelectric (TE) effects and coefficients (Seebeck, Peltier, Thompson); TE materials and devices, Heat conduction, Cooling, Figure of Merit; TE power generation (efficiency), refrigeration (COP), Examples and applications.	3
		Total number of Lectures	40
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 [2 Quiz (10), Attend. (10) and Class performance (5 )]	
Total		100	

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	S.O. Pillai, Solid State Physics, New Age International Publishers.
2.	B. B. Laud, Laser and Non-linear Optics, John Wiley & Sons
3.	Van Vlack, Elements of Material Science and Engineering, Pearson Education.

4.	Srivastava and Srinivasan, Material Science and Engineering,
5	W.D. Callister Jr., Material Science and Engineering: An Introduction, John Wiley.

### Detailed Syllabus

#### Lecture-wise Breakup

<b>Course Code</b>	16B1NPH533	<b>Semester: ODD</b>	<b>Semester: 5<sup>th</sup> Session: 2019 -2020</b> <b>Month from July 19 to December 19</b>
<b>Course Name</b>	Laser Technology and Applications		
<b>Credits</b>	4	<b>Contact Hours</b>	3+1

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Navneet Kumar Sharma and Amit Verma
	<b>Teacher(s) (Alphabetically)</b>	Navneet Kumar Sharma and Amit Verma

<b>COURSE OUTCOMES</b>		<b>COGNITIVE LEVELS</b>
<b>C301-12.1</b>	Define the coherent properties, high brightness of laser, population inversion and optical feedback to laser technology	Remember Level (C1)
<b>C301-12.2</b>	Extend the knowledge of lasers in some applications like LIDAR, laser tracking, bar code scanner, lasers in medicine and lasers in industry	Understand Level (C2)
<b>C301-12.3</b>	Apply the optical ray transfer matrix to determine the stability of a laser resonator	Apply Level (C3)
<b>C301-12.4</b>	Distinguish the operational principles of CW, Q-switched, mode locked lasers; laser rate equations for three & four level lasers; different types of laser systems	Analyze Level (C4)

<b>Module No.</b>	<b>Title of the Module</b>	<b>Topics in the Module</b>	<b>No. of Lectures for the module</b>
1.	Fundamentals of Lasers	Laser idea and properties; Monochromaticity, directionality, brightness, Temporal and spatial Coherence. Interaction of radiation with matter; Absorption, spontaneous and stimulated emission of radiation, Rates equations, Einstein's A and B coefficients. Laser rate equations: Four level and three level systems. Conditions	12

		for producing laser action, population inversion, saturation intensity, threshold condition and gain optimization. Experimental techniques to characterize laser beam.	
2.	Types of Lasers	Pumping processes; optical and electrical pumping. Optical Resonators; The quality factor, transverse and longitudinal mode selection; Q switching and Mode locking in lasers. Confocal, planar and spherical resonator systems. Types of Lasers; Solid state Lasers; Ruby Laser, Nd:YAG laser. Gas lasers; He-Ne laser, Argon laser, CO <sub>2</sub> , N <sub>2</sub> and Excimer Laser. Dye (liquid) Laser, Chemical laser (HF), Semiconductor Lasers; Heterostructure Lasers, Quantum well Lasers. Free electron laser, X-ray laser and Ultrafast Laser.	16
3.	Applications of Lasers	Image processing; Spatial frequency filtering and Holography, Laser induced fusion; Fusion reactor, creation of Plasma. Lightwave communications. Use in optical reader (CD player) and writer. Nonlinear optics; harmonic generation, self focusing. Lasers in industry; Material processing, Cutting, welding and hole drilling. Precision length measurement, velocity measurement, Laser Tracking, Metrology and LIDAR. Lasers in medicines and surgery. Lasers in defense, Lasers in space sciences, Lasers in sensors.	12
Total number of Lectures			40

Evaluation Criteria	
Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 [2 Quiz (10 M), Attendance (10 M) and Cass performance (5 M)]
Total	100

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Thyagarajan and Ghatak, <i>Lasers Theory and Applications</i> , Macmilan India.
2.	W. T. Silfvast, <i>Laser Fundamentals</i> , Cambridge Univ-Press.
3.	O. Svelto, <i>Principles of Lasers</i> , Springer.

4.	Saleh and Teich, <i>Fundamentals of Photonics</i> , John Wiley & Sons.
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### Detailed Syllabus

#### Lecture-wise Breakup

<b>Course Code</b>	16B1NPH535	<b>Semester: ODD</b>	<b>Semester: 5<sup>th</sup> Session: 2019 -2020</b> <b>Month from July 19 to December 19</b>
<b>Course Name</b>	NUCLEAR SCIENCE AND ENGINEERING		
<b>Credits</b>	4	<b>Contact Hours</b>	3+1

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Vivek Sajal
	<b>Teacher(s) (Alphabetically)</b>	Vivek Sajal

<b>COURSE OUTCOMES</b>		<b>COGNITIVE LEVELS</b>
<b>C301-14.1</b>	Relate terminology and concepts of nuclear science with various natural phenomenon and engineering applications.	Remembering (C1)
<b>C301-14.1</b>	Explain various nuclear phenomenon, nuclear models, mass spectrometers, nuclear detectors, particle accelerators. and classify elementary particles.	Understanding (C2)
<b>C301-14.1</b>	Solve mathematical problems for various nuclear phenomenon and nuclear devices.	Applying (C3)
<b>C301-14.1</b>	Analyze the results obtained for various physical problems and draw inferences from the results.	Analyzing (C4)

<b>Module No.</b>	<b>Title of the Module</b>	<b>Topics in the Module</b>	<b>No. of Lectures for the module</b>
<b>1.</b>	Nuclear Constituents and their properties, Nuclear Forces	Rutherford scattering and estimation of nuclear size, Constituents of the nucleus and their properties, Nuclear Spin, Moments and statistics, Magnetic dipole moment, Electric quadruple moment. Nuclear forces, Two body problem - Ground state of deuteron, Central and non-central forces, Exchange forces: Meson theory, Yukawa potential, Nucleon-nucleon scattering, Low energy n-p scattering, Effective range theory, Spin dependence, charge independence and charge symmetry of nuclear forces, Isospin formalism.	07
<b>2.</b>	Nuclear Models	Binding energies of nuclei, Liquid drop model: Semi-	05

		empirical mass formula, Mass parabolas, Prediction of Nuclear stability, Bohr-Wheeler theory of fission, Shell model, Spin-orbit coupling. Magic numbers, Angular momenta and parities of nuclear ground state, Magnetic moments and Schmidt lines, Collective model of a nucleus.	
3.	Nuclear decay and Nuclear reactions	Alpha decay, Beta decay, Pauli's Neutrino hypothesis-Helicity of neutrino, Theory of electron capture, Non-conservation of parity, Fermi's theory, Gamma decay: Internal conversion, Multipole transitions in nuclei, Nuclear isomerism, Artificial radioactivity, Nuclear reactions and conservation laws, Q-value equation, Centre of mass frame in nuclear Physics, Scattering and reaction cross sections, compound nucleus, Breit-Wigner one level formula	08
4.	Interaction of nuclear radiation with matter	Interaction of charge particles with matters: Bohr's ionization loss formula and estimation of charge, mass and energy. Interaction of electromagnetic radiation with matter, Linear absorption coefficient. Nuclear particle detectors and neutron counters.	07
5.	Accelerator and reactor Physics	Different types of reactors, tracer techniques, activation analysis. Radiation induced effects and their applications: Accelerators: Linear accelerators, Van de Graff generator, LINAC, Cyclotrons, Synchrotrons, Colliders.	06
6.	Cosmic radiation and Elementary Particles	Cosmic radiation: Discovery of cosmic radiation, its sources and composition, Latitude effect, altitude effect and east-west asymmetry, secondary cosmic rays, cosmic ray shower, variation of cosmic intensity and Van Allen radiation belt. Elementary particles: Classification of particles, K-mesons, Hyperons, particles and antiparticles, fundamental interactions, conservation laws, CPT theorem, resonance particles and hypernucleus, Quark model.	07
<b>Total number of Lectures</b>			<b>40</b>
<b>Evaluation Criteria</b>			

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 [2 Quiz (10 M), Attendance (10 M) and Cass performance (5 M)]
<b>Total</b>	<b>100</b>

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
<b>1.</b>	K.S. Krane, 1987, Introductory Nuclear Physics, Wiley, New York.
<b>2.</b>	I. Kaplan, 1989, Nuclear Physics, 2nd Edition, Narosa, New Delhi.
<b>3.</b>	B.L. Cohen, 1971, Concepts of Nuclear Physics, TMH, New Delhi.
<b>4.</b>	R.R. Roy and B.P. Nigam, 1983, Nuclear Physics, New Age International, New Delhi.
<b>5.</b>	H.A. Enge, 1975, Introduction to Nuclear Physics, Addison Wesley, London.
<b>6.</b>	Y.R. Waghmare, 1981, Introductory Nuclear Physics, Oxford-IBH, New Delhi.
<b>7.</b>	R.D. Evans, 1955, Atomic Nucleus, McGraw-Hill, New York.



### Detailed Syllabus

#### Lecture-wise Breakup

<b>Course Code</b>	17B1NHS531	<b>Semester ODD (specify Odd/Even)</b>	<b>Semester V Session 2019 -2020 Month from July - Dec</b>
<b>Course Name</b>	Technology and Culture		
<b>Credits</b>	3	<b>Contact Hours</b>	<b>2-1-0</b>

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Dr Swati Sharma
	<b>Teacher(s) (Alphabetically)</b>	Dr Swati Sharma

<b>COURSE OUTCOMES</b>		<b>COGNITIVE LEVELS</b>
C303-5.1	Understand the main theories in cultural management,	Applying (C 2)
C303-5.2	Appraise technological convergence and cultural divergence, relate the differences to the literature and suggest solutions	Evaluating(C 5)
C303-5.3	Interpret and communicate effectively in physical and virtual teams by evaluating appropriate concepts, logic and selecting the apt IT tools.	Evaluating (C5)
C303-5.4	Evaluation of the theoretical knowledge to adapt to cultural differences in global work environment.	Evaluating(C 5)

<b>Module No.</b>	<b>Title of the Module</b>	<b>Topics in the Module</b>	<b>No. of Lectures for the module</b>
1.	Introduction	<ul style="list-style-type: none"> <li>▪ Genealogy of the concept</li> <li>▪ The Information Technology Revolution</li> <li>▪ The concept of Network societies</li> </ul>	5
2.	Dimensions of Culture	<ul style="list-style-type: none"> <li>▪ Evolution of Culture</li> <li>▪ Principal theories of Culture: Kluckhohn and Strodbeck, Hofstede, Trompenaars and Schwartz</li> <li>▪ Cultural Diversity and cross cultural literacy</li> </ul>	8
3.	Cross cultural communication in	<ul style="list-style-type: none"> <li>▪ The Communication Process</li> <li>▪ Language and Culture</li> </ul>	8

	physical and virtual teams	<ul style="list-style-type: none"><li>▪ Non Verbal Communication</li><li>▪ Barriers to Cross Cultural Understanding</li></ul>	
4.	Negotiation and Decision Making	<ul style="list-style-type: none"><li>▪ Theories of Negotiation</li><li>▪ Negotiation and Intercultural Communication</li><li>▪ Decision making in cross cultural environment</li></ul>	2
5.	Cross Culture and Leadership	<ul style="list-style-type: none"><li>▪ Leadership and Culture</li><li>▪ Theories of Culture centric leadership and their Global Relevance</li><li>▪ Developing Competencies for Global citizens</li><li>▪ Women as International Leaders</li><li>▪ Cross Cultural Training</li><li>▪ Ethical Guidelines for Global Citizens</li></ul>	5
Total number of Lectures			28
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Project, Assignment and Oral Viva )	
Total		100	

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Maidenhead. Riding the Waves of Culture: Understanding Cultural Diversity in Business (2012). 3rd edition. McGraw Hill.
2.	Edgar, Andrew and Peter Sedgwick (eds.) Key concepts in Cultural Theory. London. Routledge. 1999
3.	Gerard Bannon, J. (red.). Mattock, Cross-cultural Communication: The Essential Guide to International Business. 2003
4.	Grossberg, L., C. Nelson and P. Treichler (eds.) Cultural Studies. London. 1992
5.	Robertson, Ronald. Globalization: Social theory and global culture, London: Sage, 1992.
6.	Madhavan, S., Cross Cultural Management: Concepts and Cases (2 <sup>nd</sup> Ed), Oxford University Press 2016.
7.	Coyle, D., The Culture Code: The Secrets of Highly Successful Groups, Bantam, 2018

### Detailed Syllabus

#### Lecture-wise Breakup

<b>Course Code</b>	17B1NMA533	<b>Semester</b> ODD	<b>Semester 5<sup>th</sup> Session</b> 2019-2020 <b>Month from</b> July 2019 to December 2019
<b>Course Name</b>	STATISTICAL INFORMATION THEORY WITH APPLICATIONS		
<b>Credits</b>	4	<b>Contact Hours</b>	3+1

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Dr. AMIT SRIVASTAVA
	<b>Teacher(s) (Alphabetically)</b>	Dr. AMIT SRIVASTAVA

COURSE OUTCOMES		COGNITIVE LEVELS
<b>C301-8.1</b>	explain the notions of information, entropy, relative entropy and mutual information.	Understanding Level(C2)
<b>C301-8.2</b>	explain fuzzy sets and compare the various measures of discrepancy.	Analyzing Level (C4)
<b>C301-8.3</b>	develop and compare Shannon-Fano and Huffman source codes using measures of uncertainty.	Analyzing Level (C4)
<b>C301-8.4</b>	analyse the notion of distance measure in pattern recognition generated in Intuitionistic fuzzy environment.	Analyzing Level (C4)
<b>C301-8.5</b>	apply information theoretic concepts in encryption and decryption.	Applying Level (C3)

<b>Module No.</b>	<b>Title of the Module</b>	<b>Topics in the Module</b>	<b>No. of Lectures for the module</b>
1.	Information Theoretic Measures	Review of Probability theory, Average information, Shannon and Renyi Entropy, Mutual information. Introduction to concepts of directed divergence, inaccuracy and information improvement	10

2.	Fuzzy Sets and Measures of Fuzzy Uncertainty.	Fuzzy Sets. Fuzzy Uncertainty and Fuzzy Information Measure, Similarity Measures, Fuzzy Measures of Directed Divergence, Total Ambiguity and Information Improvement, R-Norm Fuzzy Information Measure and its Generalizations.	10
3.	Source Coding	Data compression, Kraft-Mcmillan Equality and Compact Codes, Encoding of the source output, Shannon-Fano coding, Huffman coding, Lempel-Ziv (LZ) coding, Shannon-Fano-Elias Coding and Introduction to Arithmetic Coding. rate distortion theory, Lossy Source coding.	10
4.	Applications of information theory in Cryptography	Basic concepts of cryptography and secure data, Mathematical Overview and Shannon theory of Cryptography, perfect secrecy and the one time pad, Spurious Keys & Unicity Distance, Classical and Product Cryptosystems. semantic security and Stream ciphers, Characteristics for perfect security, Limitations of perfectly secure encryption, Block and Stream ciphers, Cipher Modes, Substitution Ciphers, Mono-alphabetic Substitution and Poly-alphabetic Substitution, Polygram, Transposition Ciphers, Rail Fence, Scytale, Book cipher, Vernam cipher, Vigenere Tabluae, Playfair, Hill Cipher, Cryptanalysis of Classical Cryptosystems,	12
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

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	<b>Bose, R.</b> , Information Theory Coding and Cryptography, 3 <sup>rd</sup> Ed, Tata McGraw-Hill, 2016.
2.	<b>Jain, K. C., and Srivastava, A.</b> , Information Theory & Coding, 3 <sup>rd</sup> Ed, Genius Publications, 2009
3.	<b>Stallings, W.</b> , Cryptography and Network Security Principles and Practices, Prentice Hall, 2003

<b>4.</b>	<b>Cover, T.M. and Thomas, J. A.,</b> Elements of Information Theory, 2nd Edition, Wiley, 2006.
<b>5.</b>	<b>Haykin, S.,</b> Communication Systems, John Willey & Sons, Inc, Newyork, 4th Ed, 2006
<b>6.</b>	<b>Behrouz, A. F.,</b> Introduction to Cryptography and Network Security, McGraw-Hill International Edition, 2008

### Detailed Syllabus

#### Lecture-wise Breakup

<b>Subject Code</b>	18B12HS311	<b>Semester ODD</b>	<b>Semester 5 Session 2019-20</b> <b>Month from July 2019 to December 2019</b>
<b>Subject Name</b>	STRATEGIC HUMAN RESOURCE MANAGEMENT		
<b>Credits</b>	3	<b>Contact Hours</b>	2-1-0
<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Ruchi Gautam (Sec-128), Santoshi Sengupta (Sec-62)	
	<b>Teacher(s) (Alphabetically)</b>	Ruchi Gautam (Sec-128), Santoshi Sengupta (Sec-62)	

COURSE OUTCOMES		COGNITIVE LEVELS
C303-6.1	Understand human resource management from a strategic perspective and analyze environmental challenges that impact HRM of an organization	Analyze Level (C4)
C303-6.2	Assess the human resource needs of the organization and design recruitment and selection strategies for an organization	Evaluate Level (C5)
C303-6.3	Evaluate the processes of training and development, mentoring, performance management, compensation and reward management in an organization and design effective strategies for the same	Evaluate Level (C5)
C303-6.4	Critically assess career management system, work-life initiatives and other HRM practices of the organization	Evaluate Level (C5)

Module No.	Subtitle of the Module	Topics in the module	No. of Hours for the module
1.	Introduction	Role of HR in strategy; Evolution of SHRM; Strategic fit: Conceptual Framework; Theoretical Perspectives on SHRM; SHRM approaches in	4

		Indian context	
2.	Strategic Human Resource Environment and Evaluation	Overview of the environment; SHRM in Knowledge Economy; HRM and Firm Performance; Rationale for HR Evaluation; Approaches to HR Evaluation	4
3.	Strategic Human Resource Planning and Acquiring	Overview of HRP; Objectives of HRP; Job Analysis and SHRM; External and Internal Influences on Staffing; Recruitment: Sources, Methods and Approaches; Selection: Methods and Approaches; Strategic Recruitment and Selection	6
4.	Training, Development, Mentor Relationships	Basic Concepts, Purposes & Significance of Training and Development; HRM Approaches; Linkage between Business Strategy and training; Process; new Developments; Concept and outcomes of mentoring; Strategic approach of Mentoring relationships	4
5.	Strategic Performance Management; Compensations and Reward Management; Career Management	Developing performance management systems; Technology and performance management; Strategic Linkage of performance management; Determinants and approaches of compensation and rewards; New Developments; Business Strategy and compensation; Career Management systems; SHRM approach to career management	6
6.	Work Life Integration and International HRM	HRD Approaches to work-life integration; Development of work-life initiatives; Strategic approach to work-life integration; External HRM; IHRM practices	4
Total number of Lectures			28
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 [Assignments (10) Project (10) Attendance (5)]	
Total		100	

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Tanuja Agarwala, Strategic Human Resource Management, 1 <sup>st</sup> edition, Oxford University Press, 2007
2.	Stephen J. Perkins, Susan M. Shortland, Strategic International Human Resource Management: Choices and Consequences, Kogan Page, 2010
3.	John storey, Patrick Wright and Dave Ulrich, Strategic Human Resource Management, Routledge Taylor and Francis Group, 2009
4.	Amberg, J. J., & McGaughey, S. L. (2019). Strategic human resource management and inertia in the corporate entrepreneurship of a multinational enterprise. <i>The International Journal of Human Resource Management</i> , 30(5), 759-793.
5.	Stewart, G. L., & Brown, K. G. (2019). <i>Human resource management</i> . Wiley.
6.	Deshati E. Social media, a strategic tool for the recruitment process. <i>J Fin Mark</i> . 2017;1(1):3-4.



**Detailed Syllabus**

**Lecture-wise Breakup**

<b>Course Code</b>	<b>18B12HS612</b>	<b>Semester : Odd</b>	<b>Semester: V Session: 2019-20</b> <b>Month: JULY-DECEMBER</b>
<b>Course Name</b>	<b>Indian Polity and Constitutional Democracy in India.</b>		
<b>Credits</b>	<b>3</b>	<b>Contact Hours</b>	<b>(2-1-0)</b>

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Dr. Chandrima Chaudhuri
	<b>Teacher(s) (Alphabetically)</b>	Dr. Chandrima Chaudhuri

<b>COURSE OUTCOMES</b>		<b>COGNITIVE LEVELS</b>
C303-7.1	Demonstrate an understanding about the current Indian political scenario by knowing about the structure of government in place	Understand(C2)
C303-7.2	Demonstrate an understanding of the role of Indian President, Prime Minister, Governor and other members of the legislature as representatives of the common masses	Understand (C2)
C303-7.3	Analyze the working of Indian federalism with reference to centre-state relations	Analyze(C4)
C303-7.4	Analyze the impact of the contemporary challenges such as caste, gender, regionalism to the working of Indian democracy	Analyze(C4)

<b>Module No.</b>	<b>Title of the Module</b>	<b>Topics in the Module</b>	<b>No. of Lectures for the module</b>
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1.	The Indian Constitution	<ul style="list-style-type: none"> <li>• Background to the Constitution</li> <li>• Fundamental Rights and Duties</li> <li>• Directive Principles</li> </ul>	6
2.	Organs of the Government	<ul style="list-style-type: none"> <li>• The Executive: President, Prime Minister and Governor- appointment, powers and functions</li> <li>• The Legislature: Parliament and its components- Lok Sabha and Rajya Sabha (composition and functions)</li> <li>• The Judiciary: Supreme Court-composition, functions and jurisdiction</li> </ul>	6
3.	Nature of Federalism	<ul style="list-style-type: none"> <li>• Centre-State Legislative Relations</li> <li>• Centre-State Administrative Relations</li> <li>• Centre-State Financial Relations</li> <li>• Special Provisions of some state and the 5<sup>th</sup> and 6<sup>th</sup> schedule</li> </ul>	8
4.	Local Governments	<ul style="list-style-type: none"> <li>• Municipality- Structure &amp; Functions</li> <li>• Panchayat-Organization and Powers</li> </ul>	4
4.	Challenges to Indian Democracy	<ul style="list-style-type: none"> <li>• Caste</li> <li>• Gender</li> <li>• Ethnicity</li> <li>• Politics of regionalism</li> </ul>	4
<b>Total number of Lectures</b>			<b>28</b>
<b>Evaluation Criteria</b>			
<b>Components</b>		<b>Maximum Marks</b>	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Quiz )	
<b>Total</b>		<b>100</b>	

<b>Recommended Reading material:</b> Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Austin, G. (1979). <i>The Constituent Assembly: Microcosm in Action in The Indian Constitution: Cornerstone of a Nation</i> . New Delhi: Oxford University Press
2.	Awasthi, A. & Awasthi, A.P. (2017). <i>Indian Administration</i> . Agra: L.N. Aggarwal Educational Publishing
3.	Basu, D.D. (2018). <i>Introduction to the Constitution of India</i> . 23 <sup>rd</sup> Edition. Gurgaon: LexisNexis

4.	Bhargava, R. (2008). <i>Politics and Ethics of the Indian Constitution</i> . New Delhi: Oxford University Press
5.	Jha, S. (2008). Rights versus Representation: Defending Minority Interests in the Constituent Assembly, in R. Bhargava. (ed.), <i>Politics and Ethics of the Indian Constitution</i> , New Delhi: Oxford University Press
6.	Johari, J.C. (2013). <i>The Constitution of India: A Politico-Legal Study</i> . Noida: Sterling Publishers
7.	Kapur, D. & Mehta, P.B. (ed.) (2005) <i>Public Institutions in India: Performance and Design</i> , New Delhi: Oxford University Press
8.	Maheshwari, S.R. (2001). <i>Indian Administration</i> . Hyderabad: Orient Blackswan
9.	Manor, J. (1994). The Prime Minister and the President, in B.D. Dua, and J. Manor (eds.) <i>Nehru to the Nineties: The Changing Office of the Prime Minister in India</i> . Vancouver: University of British Columbia Press
10.	Pylee, M.V. (1962). <i>India's Constitution</i> . Bombay: Asia Publishing House
11.	Shankar, B.L., & Rodrigues, V. (2011) <i>The Indian Parliament: A Democracy at Work</i> , New Delhi: Oxford University Press
12.	Sharma, B.K. (2002). <i>Introduction to the Constitution of India</i> . New Delhi: Prentice Hall of India
13.	Singh, M.P. & Saxena, R. (2008). <i>Indian Politics: Contemporary Issues and Concerns</i> . New Delhi: PHI Learning
14.	Singh, M.P. & Roy, H. (2018). <i>Indian Political System</i> . 4 <sup>th</sup> Edition. Bengaluru: Pearson Education

### Detailed Syllabus

#### Lecture-wise Breakup

<b>Course Code</b>	18B12MA311	<b>Semester - odd (specify Odd/Even)</b>	<b>Semester V Session 2019 -2020</b> <b>Month from</b> June 2019 to December 2019
<b>Course Name</b>	<b>Decision making using mathematical and statistical approaches</b>		
<b>Credits</b>	4	<b>Contact Hours</b>	3-1-0

<b>Faculty (Names)</b>	<b>Coordinator(s)</b>	Dr. Pinkey Chauhan
	<b>Teacher(s) (Alphabetically)</b>	Dr. Pinkey Chauhan

<b>COURSE OUTCOMES</b>		<b>COGNITIVE LEVELS</b>
<b>C301-7.1</b>	Explain the concept of decision making under various environments	Remembering level C1
<b>C301-7.2</b>	Apply various methods for solving single stage optimal problems in uncertainty and risk environments.	Applying Level C3
<b>C301-7.3</b>	Apply decision tree analysis for solving multiple stage optimal problems.	Applying Level C3
<b>C301-7.4</b>	Describe principle of optimality and formulation of dynamic programming problems	Understanding Level C2
<b>C301-7.5</b>	Identify, formulate and solve problems arising in financial and industrial applications using dynamic programming techniques	Applying Level C3

<b>Module No.</b>	<b>Title of the Module</b>	<b>Topics in the Module</b>	<b>No. of Lectures for the module</b>
1.	Introduction to decision making under different environments	Introduction to decision making process,  Components of decision making with examples:  Courses of action, States of nature, Pay-off and Pay-off matrix; Definition and examples of decision making under	4

		certainty, uncertainty and risk environments.	
2.	Optimal Decision analysis for Single stage problems	Decision making under uncertainty: Maximin, Maximax, Minimax regret, Laplace Criteria and Hurwitz criterion,  Decision making under Risk: Formulation of Payoff Matrix. Expected Monetary Value (EMV); Examples based on EMV, Expected Opportunity Loss (EOL), Expected Value under Perfect Information(EVPI) , Expected Profit under Perfect Information (EPPI), Expected Cost under Perfect Information (ECPI).	12
2.	The Scientific Approach and its applications	Introduction to decision tree analysis for multiple stages, Construction of decision tree diagram, Applications for optimal decision making of multi point decision problems.	6
3.	Introduction to dynamic programming	Introduction to optimization and dynamic programming, Bellmen’s principle of optimality: definition with examples, Formulation of dynamic programming problems for continuous and discrete variables.	6
4.	Applications of dynamic programming for optimal decision analysis	Optimal subdivision problems, Shortest route or network problems, Solving linear programming problems using dynamic programming, Applications of Dynamic Programming to cargo loading problems, employment smoothening problems, capital budgeting problems, inventory control problems, product allocation problems.	14
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.	<b>Bertsekas, D.P.</b> , Dynamic Programming and Optimal Control, 3 <sup>rd</sup> Ed., Vol 1, Athena Scientific, 2005.
2.	<b>Anthony, M. and Biggs, N.</b> , Mathematics for Economics and Finance Methods and Modelling, Cambridge University Press, Cambridge low-priced edition, 2000.
3.	<b>Sharma, S.D.</b> , Operation Research, fourteenth edition, Kedarnath & Ramnath Publications, 2003-2004.
4.	<b>Hiller, F. S. and Leiberman, G. J.</b> , Introduction to Operations Research, 7 <sup>th</sup> ed., 2001
5	<b>Taha, H.A.</b> , Operations Research
6.	<b>Pearles, B. and Sullivan, C.</b> , Modern Business Statistics - (Revised)- –Prentice Hall of India.