

### Detailed Syllabus

|                     |                   |   |   |
|---------------------|-------------------|---|---|
| <b>Subject Code</b> | 15B11CI511        | <b>Semester: Odd<br/>(specify Odd/Even)</b> | <b>Semester V Session 2018-2019<br/>Month from JUL'18 to DEC'18</b> |
| <b>Subject Name</b> | Computer Networks |   |   |
| <b>Credits</b>      | 4                 | <b>Contact Hours</b>                        | 3+1   |

|                            |                       |   |
|----------------------------|-----------------------|---|
| <b>Faculty<br/>(Names)</b> | <b>Coordinator(s)</b> | Dr K. Rajalakshmi, Rupesh Kumar Koshariya   |
|                            | <b>Teacher(s)</b>     | Dr. GagandeepKaur<br>Dr. Kavita Pandey<br>Dr K. Rajalakshmi<br>Ms Kriti Agarwal<br>Dr. Prakash Kumar<br>Dr. Charu Gandhi<br>Mr. Bansidhar Joshi<br>Miss Pushp<br>Mr. Rupesh Kumar 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>          | Assess the performance of the network under various routing mechanisms and IP addressing schemes.                      | Evaluating (Level 5)    |
| <b>C310.5</b>          | Identify various multiple access protocol and perform error detection and correction in data communication             | 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 Techniques, Physical Media. Network Vulnerability and security | 8                                     |
| 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, Introduction to Sockets, Security                        | 6                                     |

|                          |  |  |    |
|--------------------------|--|--|----|
|                          |  | Aspects in Application layer, HTTPS, SFTP etc., Multimedia Aspects of the Application Layer  |    |
| 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, Attack and vulnerability issues in Transport layer: Denial of Service (DoS), Distributed Denial of Service (DDoS) etc., Transport layer Security aspects, SSL, TLS etc., Multimedia aspects of the Transport layer | 8  |
| 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, IPsec Architecture: Authentication Header (AH) and Encapsulating Security Payload (ESP), Multimedia networking aspects and applications   | 10 |
| 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, PPP: the Point-to-Point Protocol, Introduction to ATM, MPLS and Sonet, IEEE MAC Security Standard, MACSec (802.1AE), Multimedia aspects of the DL layer  | 8  |
| 6.                       | Wireless Networks                      | Introduction, Wireless links and characteristics, Architecture, AODV and DSR wireless routing protocols  | 2  |
| Total number of Lectures |  |  | 42 |
| Evaluation Criteria      |  |  |    |
| Components               |  | Maximum Marks  |    |
| T1                       |  | 20   |    |
| T2                       |  | 20   |    |
| End Semester Examination |  | 35   |    |
| TA                       |  | 25 (Assignments, Quiz, 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 | 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  |
| 5 | K. Thramboulidis, A. Mikroyannidis, “Using UML for the Design of Communication Protocols: The TCP Case Study” 11th International Conference on Software, Telecommunications and Computer Networks, October 7-10, 2003.                            |
| 6 | JuhaParssinen, Niklas von Knorring,JukkaHeinonen, MarkkuTurunen, “UML for Protocol Engineering-Extensions and Experiences”, Proceedings of the Technology of Object-Oriented Languages and Systems (TOOLS),. IEEE Computer Society, page 82, 2000 |

### Detailed Syllabus

|                    |                       |                       |  |
|--------------------|-----------------------|-----------------------|--|
| <b>Course Code</b> | 15B17CI571            | <b>Semester : Odd</b> | <b>Semester V Session 2018 -2019</b><br><b>Month: from July to Dec</b> |
| <b>Course Name</b> | Computer Networks Lab |                       |  |
| <b>Credits</b>     | 1                     | <b>Contact Hours</b>  | 2  |

|                        |  |   |
|------------------------|--|---|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Mr. Bansidhar Joshi, Kirti Aggarwal   |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Mr. Bansidhar Joshi, Ms. Kriti Agarwal, Dr. Charu, Mr. Gaurav Nigam, Mr. Rupesh, Mr. Himanshu Agrawal, Ms. Kavita Pandey, Ms. K. Rajalakshmi, Ms. Nisha Chaurasia |

| <b>COURSE OUTCOMES</b> |  | <b>COGNITIVE LEVELS</b>    |
|------------------------|--|----------------------------|
| <b>C370.1</b>          | Classify all the wired/wireless technologies and the basic network building blocks   | Level 2<br>(Understanding) |
| <b>C370.2</b>          | Visualize and analyze the data packets of different TCP/IP layers. Store the data packets as *.pcap files.                       | Level 3<br>(Applying)      |
| <b>C370.3</b>          | Create client and server applications using the "Sockets" and the implementation of various protocols at Data link and TCP layer | Level 4<br>(Analyzing)     |
| <b>C370.4</b>          | Model a communication network and Estimate the delay caused in the network due to congestions and link breakages.                | Level 5<br>(Evaluating)    |
| <b>C370.5</b>          | Simulate and compare different routing algorithms, error detection and correction and buffer management techniques               | Level 3<br>(Applying)      |

| <b>Module No.</b> | <b>Title of the Module</b> | <b>List of Experiments</b>  | <b>CO</b> |
|-------------------|----------------------------|---|-----------|
| 1.                | Basics of Networking       | To Classify all the wired/wireless technologies and the basic network building blocks   | CO1       |
| 2.                | Wireshark                  | To make some simple packet captures and observations.                                   | CO2       |
| 3.                | Wireshark                  | To explore several other aspects of the HTTP protocol                                   | CO2       |
| 4.                | Socket Programming         | To create a socket and bind it to a specific address and port                           | CO3       |
| 5.                | Socket Programming         | To send and receive a HTTP packet and learn some basics of HTTP header format.          | CO3       |
| 6.                | NS2                        | Write program to create network Topologies in NS2                                       | CO4       |
| 7.                | NS2                        | To send some traffic/data in the network topologies created and reading the trace file. | CO4       |
| 8.                | NS2                        | Using Trace File and Plotting using AWK scripts and Xgraph-Trace Analysis               | CO4       |
| 9.                | NS2                        | To Route the packets in the network and study about Network Dynamics                    | CO4       |
| 10.               | Routing                    | Implementation of Routing Algorithms  | CO5       |
| 11.               | Error Correction &         | To Implement various Error Correction and Detection                                     | CO5       |

|                            |                      |            |  |
|----------------------------|----------------------|------------|--|
|                            | Detection            | Algorithms |  |
| <b>Evaluation Criteria</b> |                      |            |  |
| <b>Components</b>          | <b>Maximum Marks</b> |            |  |
| Lab Test 1                 | 20                   |            |  |
| Lab Test 2                 | 20                   |            |  |
| Day to Day Evaluation      | 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.   | Kurose, J. F., Computer networking: A top-down approach featuring the internet, 3/E. Pearson Education India, (2005).                           |
| 2.   | Forouzan, A. B., Data Communication and Networking, (2007).   |
| 3.   | Issariyakul, T., & Hossain, E. Introduction to Network Simulator 2 (NS2). In Introduction to network simulator NS2(pp. 1-18). Springer, (2009). |
| 4.   | Orebaugh, A., Ramirez, G., & Beale, J., Wireshark & Ethereal network protocol analyzer toolkit. Elsevier, (2006).                               |
| 5.   | Goerzen, J., Foundations of Python network programming. Apress, (2004).   |

### Detailed Syllabus

|                     |                      |  |   |
|---------------------|----------------------|--|---|
| <b>Subject Code</b> | 15B11CI513           | <b>Semester<br/>(specify Odd/Even)</b> | <b>Semester Odd Session 2018-2019<br/>Month from July 18 to December 18</b> |
| <b>Subject Name</b> | Software Engineering |  |   |
| <b>Credits</b>      | 4                    | <b>Contact Hours</b>                   | 4(L+T)  |

|                            |  |   |
|----------------------------|--|---|
| <b>Faculty<br/>(Names)</b> | <b>Coordinator(s)</b>                  | Dr. Shruti Jaiswal and Dr. Amarjeet Prajapati       |
|                            | <b>Teacher(s)<br/>(Alphabetically)</b> | Dr. Chetna Gupta, Mr. Himanshu Mittal, Ms. Sangeeta |

| <b>COURSE OUTCOMES</b> |   | <b>COGNITIVE LEVELS</b>       |
|------------------------|---|-------------------------------|
| C311.1                 | Explain software engineering principles and software process models for project development                                       | Remember Level<br>(Level 1)   |
| C311.2                 | Identify functional and non-functional requirements of a software project and design document software requirements specification | Understand Level<br>(Level 2) |
| C311.3                 | Design, represent and document software requirements specification. Plan and execute activities for a software project            | Create Level<br>(Level 6)     |
| C311.4                 | Apply UML modeling for software design from software requirements specification.  | Apply Level<br>(Level 3)      |
| C311.5                 | Analyze code checklist. Perform code Reviews, Code Refactoring, and Code optimization   | Analyze Level<br>(Level 4)    |
| C311.6                 | Apply testing principles, develop and implement various manual and automated testing procedures                                   | Apply Level<br>(Level 3)      |
| C311.7                 | Evaluate software in terms of general software quality attributes and possible trade-offs presented within the given problem      | Evaluate Level<br>(Level 5)   |

| <b>Module No.</b> | <b>Subtitle of the Module</b>        | <b>Topics in the module</b>  | <b>No. of Lectures for the module</b> | <b>Labs</b>               |
|-------------------|--------------------------------------|--|---------------------------------------|---------------------------|
| 1.                | Introduction to Software Engineering | Introduction to software engineering Principles, Software process models (build and fix model, waterfall model, Incremental process model, Evolutionary- Prototype and Spiral models, Agile Models, PSP, TSP, Software Reengineering. Project planning, Project Scheduling: network diagram, Gant Chart, CPM and PERT. | 7                                     | PSP, Reengineering<br>(2) |
| 2.                | Requirement Engineering              | Types of requirement, Requirement Elicitation, Analysis, Specification, SRS, Requirement Verification and Validation.  | 4                                     | SRS<br>(1)                |

|                                 |                       |   |           |  |
|---------------------------------|-----------------------|---|-----------|--|
| 3.                              | Software Design       | Use case diagram, State diagram, Activity Diagram, Class Diagram, Sequence diagram, Collaboration diagram, Deployment Diagram, Component Diagram and Package diagram.<br>Design Modularity: Coupling Cohesion.  | 7         | UML Diagrams (4)   |
| 4.                              | Software Construction | Coding standards and guidelines, Code checklist, Code Reviews, Code Refactoring, Code optimization. Modern programming environments (Code search, Programming using library components and their APIs), Program comprehension; Program correctness, Defensive programming                 | 8         | Code Optimization & Designing of a System from Low-Level to High Level (2) |
| 5.                              | Software Metrics      | Size-Oriented Metric, Functional Point metric, Function-oriented Metric, Halstead's Software Metric, Information Flow Metric, Object-oriented Metric, Class-Oriented Metric, COCOMO Model.  | 7         | Costar Tool (2)  |
| 6.                              | Software Testing      | 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. | 9         | JUNIT Testing Tool And JMeter (3)  |
| <b>Total number of Lectures</b> |                       |   | <b>42</b> | <b>14</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.  | Roger S. Pressman, "Software Engineering: A practitioner approach", Fifth Edition-TMH International .                                 |
| 2.  | Sommerville , "Software Engineering" , Seventh Edition - Addison Wesley   |
| 3.  | GRADYBOOCH, 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 Society Press.                        |
| 5.  | B. Bezier, "Software Testing Techniques", Second Edition- International Thomson Computer Press.                                       |
| 6.  | PankajJalote, "An Integrated Approach to Software Engineering" Third addition , Springer Press  |
| 7.  | Watt S. Humphrey, Introduction to Personal Software Process, Pearson Education.   |
| 8.  | Watt S. Humphrey, Introduction to Team Software Process, Pearson Education.   |
| 9.  | International Journal on Software Tools for Technology Transfer, Springer   |

|            |  |
|------------|--|
| <b>10.</b> | IEEE Transactions on Software Engineering            |
| <b>11.</b> | ACM Transactions on Software Engineering Methodology |
| <b>12.</b> | Springer Journal of Empirical Software Engineering   |
| <b>13.</b> | Springer Journal of Software and Systems Modeling    |

### Detailed Syllabus

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|--------------------|---------------------------------|---|--|
| <b>Course Code</b> | <b>15B17CI573</b>               | <b>Semester Even<br/>(specify Odd/Even)</b> | <b>Semester 5 Session 2018 -2019<br/>Month from July to December</b> |
| <b>Course Name</b> | <b>Software Engineering Lab</b> |   |  |
| <b>Credits</b>     | 0-0-1                           | <b>Contact Hours</b>                        | <b>2</b>   |

|                        |  |  |
|------------------------|--|--|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Mr. Himanshu Mittal  |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Chetna Gupta, Himanshu Mittal, Mukta Goyal, 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> |
|-------------------|---|--|-----------|
| 1.                | 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 studies, Requirement Elicitation, Analysis, Specification, SRS, Requirement Verification and Validation. | 1         |
| 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, 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, Microsoft 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

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

|                        |                                    |   |
|------------------------|------------------------------------|---|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>              | Dr. Shikha Jain, Dr. Shikha Mehta                                       |
|                        | <b>Teacher(s) (Alphabetically)</b> | Ms. Dhanlakshmi, Dr. GaganmeetKaur, Dr. Satish Chandra, Dr. Shikha Jain |

| 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]     |

| Module No. | Subtitle of the Module                 | Topics in the module  | No. of Lectures for the module |
|------------|--|---|--------------------------------|
| 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,  | 04                             |

|                                 |                             |  |           |
|---------------------------------|-----------------------------|--|-----------|
|                                 |                             | Probabilistic reasoning, Bayesian rule, Bayesian network, Maximum likelihood estimation    |           |
| 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) |   |
| 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

|                    |                             |   |   |
|--------------------|-----------------------------|---|---|
| <b>Course Code</b> | 15B17CI574                  | <b>Semester Odd</b><br>(specify Odd/Even) | <b>Semester 5th Session 2018 -2019</b><br><b>Month from June 18 to Dec 18</b> |
| <b>Course Name</b> | Artificial Intelligence Lab |   |   |
| <b>Credits</b>     | 1                           | <b>Contact Hours</b>                      | 2   |

|                        |                                       |   |
|------------------------|---------------------------------------|---|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                 | Dhanalekshmi G  |
|                        | <b>Teacher(s)</b><br>(Alphabetically) | Ankita Verma, Dhanalekshmi ,Satish Chandra, Shikha Jain |

| <b>COURSE OUTCOMES</b> |  | <b>COGNITIVE LEVELS</b> |
|------------------------|--|-------------------------|
| <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 propositional and first order logic    | Understand(C2)          |

| <b>Module No.</b> | <b>Title of the Module</b>                    | <b>List of Experiments</b>   | <b>No. of Lab hours for the module</b> | <b>CO</b> |
|-------------------|---|--|--|-----------|
| 1                 | <u>Introduction to Programmin g in Python</u> | Familiarize the following concepts of Python programming language like Arrays, Lists, functions, Tuples, Dictionary, Sets, Objects and classes | 2                                      | C2        |
| 2                 | Problem solving                               | Problem solving agents, Uninformed search strategies (BFS, UCS, DFS, DLS, IDS)<br>Informed Search and Exploration (BFS, A*, IDA*, SMA*,IDA*)   | 4                                      | C3        |
| 3                 | Evolutionary Algorithms                       | Genetic Algorithms   | 2                                      | C3        |
| 4                 | Constraint satisfaction problems              | Formulating Problems as constraint satisfaction problems   | 2                                      | C4        |
| 5                 | Adversial Search problems                     | Adversarial Search (optimal decision in games, alpha beta pruning)   | 3                                      | C3        |
| 6                 | Knowledge representatio n                     | Inference using Prolog   | 2                                      | C2        |

#### **Evaluation Criteria**

| <b>Components</b> | <b>Maximum Marks</b> |
|-------------------|----------------------|
| Evaluation 1      | 20                   |
| Lab Test 1        | 20                   |

|                       |            |
|-----------------------|------------|
| Quiz 1                | 20         |
| Day to Day evaluation | 10         |
| Evaluation 2          | 10         |
| Lab Test 2            | 20         |
| <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.  | 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

|                    |                                |   |  |
|--------------------|--------------------------------|---|--|
| <b>Course Code</b> | 15B22CI521                     | <b>Semester Odd</b><br>(specify Odd/Even) | <b>Semester VII Session</b> 2018 -2019<br><b>Month: from July 2018</b> |
| <b>Course Name</b> | Cloud based enterprise systems |   |  |
| <b>Credits</b>     | 3                              | <b>Contact Hours</b>                      | 3+1  |

|                        |                                       |               |
|------------------------|---------------------------------------|---------------|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                 | Vikas Hassija |
|                        | <b>Teacher(s)</b><br>(Alphabetically) | Vikas Hassija |

| <b>COURSE OUTCOMES</b> |   | <b>COGNITIVE LEVELS</b>       |
|------------------------|---|-------------------------------|
| <b>C311.1</b>          | Define all the basic terminologies related to cloud computing and basic nodejs concepts.  | Remember Level<br>(Level 1)   |
| <b>C311.2</b>          | Write basic nodejs programs for creating server, rendering html, routing, get and post methods.   | Understand Level<br>(Level 2) |
| <b>C311.3</b>          | Develop all nodejs programs using nested loops and api methods to restrict post and get requests.   | Apply Level<br>(Level 3)      |
| <b>C311.4</b>          | Test for the issues in the existing code using debugging tools or other exception handling methods.   | Analyze Level<br>(Level 4)    |
| <b>C311.5</b>          | Basic understanding of the importance of various advanced concepts of big data like hadoop, mapreduce, mongodb, combiners, practitioners, pig and hive. | Evaluate Level<br>(Level 5)   |
| <b>C311.6</b>          | Create or design an end to end API using nodejs and store the posted data in a mongodb collection.  | Create Level<br>(Level 6)     |

| <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.                | Module 1: Cloud computing defined | <i>We will introduce and define cloud computing and cloud based enterprise systems, explain the structure and operational aspects of cloud systems, and compare different types of cloud based applications.</i>  | 8                                     |
| 2.                | Module 2: Basics of Node js       | We will discuss the basics of node js programming language. We will be creating web pages, connect them using routing functions and create basic APIs to interact with the data structure.  | 6                                     |
| 3.                | Module 3: Big data                | We will discuss the concept of Big data and the need of Big data storage and analysis. We will be defining various V's in big data and the end to end process of data generation, cleaning, analysis and decision making.   | 5                                     |
| 4.                | Module 4: Hadoop and Mapreduce    | The purpose of this module is to introduce the concept of hadoop and maps reduce in big data. We will be studying the detailed architecture of hadoop, the way files are stored and retrieved from hadoop and the concept of name nodes. We will be studying the algorithms used in map reduce to analyze the data. | 7                                     |
| 5.                | Module 5: Nosql basics            | The purpose of this module is to introduce the basics of Nosql. We will be discussing a lot about the differences of sql and nosql data bases. We will be studying the CAP  | 7                                     |

|                                 |                                  |  |           |
|---------------------------------|----------------------------------|--|-----------|
|                                 |                                  | theorem to form the foundation of nosql data bases. We will be also studying the format of data stored in nosql data bases.  |           |
| 6.                              | Module 6: Mongo db               | We will explore the most commonly used nosql database i:e mongo db. We will be running various basic and complex commands to query the collections in mongodb data base.   | 3         |
| 7.                              | Module 7: AWS, Azure and Dockers | We will explore practically the implementation of web applications on different cloud service providers like AWS and Azure. We will be studying the concept of dockers and will be comparing it to virtual machines. | 5         |
| <b>Total number of Lectures</b> |                                  |  | <b>42</b> |

### Evaluation Criteria

#### Components

#### Maximum Marks

|                          |                                       |
|--------------------------|---------------------------------------|
| T1                       | 20                                    |
| T2                       | 20                                    |
| End Semester Examination | 35                                    |
| TA                       | 25 (Attendance , Assignment and Quiz) |
| <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. | "Cloud Computing: From Beginning to End" written by Mr. Ray J Rafaels   |
| 2. | Big Data: A Revolution That Will Transform How We Live, Work, and Think |
| 3. | Hadoop: The Definitive Guide, 4th Edition by Tom White                  |
| 4. | IEEE Transactions on cloud computing                                    |
| 5  | ACM Transactions on cloud computing                                     |

### Detailed Syllabus

|                     |  |                      |   |
|---------------------|--|----------------------|---|
| <b>Subject Code</b> | 15B28CI581                                     | <b>Semester odd</b>  | <b>Semester Sixth Session 2018- 2019</b><br><b>Month from Jan to June</b> |
| <b>Subject Name</b> | CLOUD BASED ENTERPRISE SYSTEMS LAB(15B28CI581) |                      |   |
| <b>Credits</b>      | 1  | <b>Contact Hours</b> | 2   |

|                        |                                    |                  |
|------------------------|------------------------------------|------------------|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>              | Prashant kaushik |
|                        | <b>Teacher(s) (Alphabetically)</b> | Prashant kaushik |

| <b>COURSE OUTCOMES</b> |   | <b>COGNITIVE LEVELS</b>       |
|------------------------|---|-------------------------------|
| <b>C371.1</b>          | Create Server app and its modules         | Create Level<br>(Level 6)     |
| <b>C371.2</b>          | Develop multi core server apps            | Apply Level<br>(Level 4)      |
| <b>C371.3</b>          | Use nodejs for multi core apps            | Apply Level<br>(Level 4)      |
| <b>C371.4</b>          | Design Auto Scale apps for server         | Apply Level<br>(Level 4)      |
| <b>C371.5</b>          | Analyse the VMs for the cloud deployment  | Evaluate Level<br>(Level 6)   |
| <b>C371.6</b>          | Understand the cloud concept for App dev. | Understand Level<br>(Level 2) |

| <b>Module No.</b> | <b>Title of the Module</b>  | <b>List of Experiments</b>                  | <b>CO</b> |
|-------------------|---|---|-----------|
| 1.                | Hypervisor<br>Virtual machine (PAAS, IAAS, VAAS)                    | Use hypervisor scripts to create VMs        | 4         |
| 2.                | Types of virtual machine (compute, storage, etc) AWS EC2            | Create Storage and compute virtual machines | 2         |
| 3.                | Private Clouds and Public clouds software virtualization.<br>Lambda | Install openstack on personal PC            | 1         |
| 4.                | S3cloud orchestration Python scripts for load balancing. DynamoDB   | Use S3to host files                         | 2         |
| 5.                | VPC - cloud networking  | Create a VPC of two node cluster in AWS     | 3         |

|    |   |                                      |   |
|----|---|--------------------------------------|---|
|    | Backup and recovery   |                                      |   |
| 6. | Billing and Alerts<br>OpenStack using dev stack and more python scripts | Install billing policy in Open stack | 5 |

|                            |                      |
|----------------------------|----------------------|
| <b>Evaluation Criteria</b> |                      |
| <b>Components</b>          | <b>Maximum Marks</b> |
| LabTest 1                  | 20                   |
| LabTest 1                  | 20                   |
| Day 2 Day                  | 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.   | <i>Cloud Computing for Complete Beginners: Building and Scaling High-Performance Web Servers on the Amazon Cloud</i> by Ikram Hawaramani                                    |
| 2.   | <i>AWS System Administration: Best Practices for Sysadmins in the Amazon Cloud</i> by Mike Rayan , 2018   |
| 3.   | <i>AWS Scripted: How to Automate the Deployment of Secure and Resilient Websites with Amazon Web Services VPC, ELB, EC2, RDS, IAM, SES and SNS</i> by Christian cerri, 2014 |

### Detailed Syllabus

|                    |                      |  |  |
|--------------------|----------------------|--|--|
| <b>Course Code</b> | 15B17CI579           | <b>Semester Odd<br/>(specify Odd/Even)</b> | <b>Semester 5<sup>th</sup> (ECE) Session 2018 -2019<br/>Month from Jul-Dec</b> |
| <b>Course Name</b> | UNIX Programming Lab |  |  |
| <b>Credits</b>     | 1                    | <b>Contact Hours</b>                       | 2 per week (Total 14 weeks)  |

|                        |  |   |
|------------------------|--|---|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Dr. Adwitiya Sinha, Shariq Murtuza  |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Dr. Adwitiya Sinha, Purtee Kohli, Anubhuti Mohindra, Prof. Krishna Asawa, Dr.Mukta Goel |

| <b>COURSE OUTCOMES</b> |   | <b>COGNITIVE LEVELS</b>          |
|------------------------|---|----------------------------------|
| <b>C373.1</b>          | Demonstrate use of common Unix/Linux commands   | Understanding Level<br>(Level 2) |
| <b>C373.2</b>          | Apply Unix/Linux file redirection and pipelining to combine utilities to perform complex tasks  | Apply Level<br>(Level 3)         |
| <b>C373.3</b>          | Develop shell scripting using Selection, Case & Conditional Statements  | Apply Level<br>(Level 3)         |
| <b>C373.4</b>          | Build shell scripts to solve various problems using commands like grep, line number, test, expressions, compare, command line input, etc. | Apply Level<br>(Level 6)         |
| <b>C373.5</b>          | Create and manage files and directories, file permissions, and navigate the Unix/Linux file system  | Create Level<br>(Level 6)        |

| <b>Module No.</b> | <b>Title of the Module</b>               | <b>List of Experiments</b>  | <b>CO</b> |
|-------------------|--|---|-----------|
| 1.                | The UNIX File System & Basic Commands    | History of UNIX, Introduction, UNIX file system, Executing commands & options   | CO1       |
| 2.                | UNIX Editor & Operations                 | UNIX Processes, Process Utilities, Pipes and Signals  | CO2       |
| 3.                | UNIX File Handling & Regular Expressions | File Handling, File commands, Basic Filters (cat, head, tail, sort, uniq), Use of Regular Expressions, Field Matching, grep, fgrep, egrep   | CO2       |
| 4.                | UNIX Advanced Filters                    | Advanced Pattern Matching, Stream-oriented & Non-Interactive Text Editor (Sed), Programmable Filters, Awk, Gnu Awk (Gawk), Text Processing, Practical Extraction and Report Language (Perl) | CO3       |
| 5.                | UNIX Shell Scripting                     | UNIX Scripting, Variables, Naming Conventions, Conditional Constructs, Looping Statements, Arrays, Functions, Document Handling, Quoting, Arithmetic Operations & Executions, Parsing       | CO4       |
| 6.                | UNIX Administration                      | UNIX Administration, Overview of Linux, Login Process, Users & Permission (chmod, su, mount, cron, NFS), Process Management   | CO5       |
| 7.                | UNIX Case Studies                        | Projects, Application-based Extensions, Security  | CO5       |

| <b>Evaluation Criteria</b> |   |
|----------------------------|---|
| <b>Components</b>          | <b>Maximum Marks</b>  |
| Lab Test-1                 | 20  |
| Lab Test-1                 | 20  |
| Day-to-Day                 | 60 (Quiz + Evaluative Assignment + Class Test + Attendance) |
| <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.   | Sumitabha Das, UNIX Concepts & Applications, 4 <sup>th</sup> Edition, Tata McGraw-Hill Education, 2008  |
| 2.   | Maurice J. Bach, Design of UNIX Operating System, Prentice-Hall, 1986   |
| 3.   | Richards Stevens, Advanced Programming in the UNIX Environment, Pearson Education India, 2005   |
| 4.   | Marc J. Rochkind, Advanced UNIX Programming, 2 <sup>nd</sup> Edition, Pearson Education, 2004   |
| 5.   | Evi Nemeth, Garth Snyder, Trent R. Hein, Unix and Linux System Administration Handbook, 4 <sup>th</sup> Edition Pearson Education India, 2011 |
| 6.   | Richards Stevens, Unix Network Programming, Addison-Wesley Professional, 2004   |

### Detailed Syllabus

|                    |                            |  |   |
|--------------------|----------------------------|--|---|
| <b>Course Code</b> | <b>15B28CI582</b>          | <b>Semester ODD<br/>(specify Odd/Even)</b> | <b>Semester V Session 2018 -2019<br/>Month from July – Dec 2018</b> |
| <b>Course Name</b> | Multimedia Development Lab |  |   |
| <b>Credits</b>     | 1                          | <b>Contact Hours</b>                       | 0-0-2   |

|                        |  |               |
|------------------------|--|---------------|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Dr. Suma Dawn |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Dr. Suma Dawn |

| <b>COURSE OUTCOMES</b> |  | <b>COGNITIVE LEVELS</b>          |
|------------------------|--|----------------------------------|
| <b>C372.1</b>          | Illustrate aesthetics of visual composition.   | Understanding Level<br>(Level 2) |
| <b>C372.2</b>          | Demonstrate various operations in Adobe Photoshop CS5 such as, applying filters and effects, colour and tonal adjustments, automating tasks, image editing, image enhancement, image restoration, etc. | Understanding Level<br>(Level 2) |
| <b>C372.3</b>          | Design graphics & user interfaces using Adobe Photoshop CS5  | Creating Level<br>(Level 6)      |
| <b>C372.4</b>          | Demonstrate various operations in Adobe Illustrator CS5 such as, adding typography, creating, editing & using brushes, applying filters & effects, etc.  | Understanding Level<br>(Level 2) |
| <b>C372.5</b>          | Create graphics layouts, illustrations and vector drawing using Adobe Illustrator CS5.   | Creating Level<br>(Level 6)      |
| <b>C372.6</b>          | Design 2D animations using key framing, interactive animation using action scripting, and fun games.   | Creating Level<br>(Level 6)      |

| <b>Module No.</b> | <b>Title of the Module</b>       | <b>List of Experiments</b>   | <b>CO</b>   |
|-------------------|----------------------------------|--|---|
| <b>1</b>          | Introduction to Digital Graphics | <ul style="list-style-type: none"> <li>• Photoshop, Illustrator, Flash tool study</li> <li>• Poster Design, Game Design, UI Design, Logo Design, Doodle Design</li> <li>• Understanding Storyline</li> </ul>   | Understanding Level<br>(Level 2)                                    |
| <b>2</b>          | Adobe Photoshop CS5              | <ul style="list-style-type: none"> <li>• Poster Creation</li> <li>• Logo Creation</li> <li>• Collage Creation</li> <br/> <li>• Brochure Creation</li> <li>• Photograph Manipulations</li> <li>• UI design in Photoshop</li> </ul>  | Understanding Level<br>(Level 2)<br><br>Creation Level<br>(Level 6) |
| <b>3</b>          | Adobe Illustrator CS5            | <ul style="list-style-type: none"> <li>• 3D Logo Designing</li> <li>• Stylizing Text</li> <li>• Brush designing</li> <li>• Making Illustrative Drawing</li> <br/> <li>• Scene Design as per requirement specification</li> <li>• Designing a Comic Strip based on a given Storyline</li> </ul> | Understanding Level<br>(Level 2)<br><br>Creation Level<br>(Level 6) |
| <b>4</b>          | Animation                        | <ul style="list-style-type: none"> <li>• Introduction to Keyframing, timeline headers, symbols</li> </ul>  | Understanding   |

|                            |                   |   |   |
|----------------------------|-------------------|---|---|
|                            | Concepts & Design | and other Flash Concepts, Extracting a drawing from a picture, Buttons and their usage: Rolling dice, Invisible button, Masking, Zooming, Depth Management With the Display List in AS3, Actionscript usage for simple projects<br><br><ul style="list-style-type: none"> <li>• Designing small games</li> <li>• Designing Animation based on given storyline.</li> </ul> | Level (Level 2)<br><br>Creation Level (Level 6) |
| <b>Evaluation Criteria</b> |                   |   |   |
| <b>Components</b>          |                   | <b>Maximum Marks</b>  |   |
| Lab Test 120               |                   |   |   |
| Lab Test 220               |                   |   |   |
| Day-to-Day- Evaluation45   |                   | ...   |   |
| Day-to-Day- Attendance15   |                   | ...   |   |
| <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)

|   |  |
|---|--|
| <u>Multimedia Photoshop and Illustrator</u> | <ol style="list-style-type: none"> <li>1. "Multimedia – An Introduction" by John Villamil and Louis Molina.</li> <li>2. "Multimedia Magic" by Gokul, S.</li> <li>3. "Real World Illustrator 9" by Deke McClelland and Sandee Cohen.</li> <li>4. "Photoshop 6 Primer" by Jason I. Miletsky.</li> <li>5. "Mastering Photoshop 6" by Steve Romaniello.</li> </ol>   |
| <u>Flash &amp; ActionScript</u>             | <ol style="list-style-type: none"> <li>6. <b>Adobe Flash CS3 Professional Bible</b> by Robert Reinhardt and Snow Dowd</li> <li>7. <b>ActionScript 3.0 in Flash CS3 Professional Beyond the Basics</b> by Todd Perkins</li> </ol> <p>Web links Links:<br/> <a href="http://www.flashandmath.com/flashcs5/index.html">http://www.flashandmath.com/flashcs5/index.html</a><br/> <a href="http://helpx.adobe.com/flash/topics.html">http://helpx.adobe.com/flash/topics.html</a><br/> <a href="http://www.republicofcode.com/tutorials/flash/">http://www.republicofcode.com/tutorials/flash/</a></p> <p>Flash CS4/CS5 Platform Game Tutorials -<br/> 8. <a href="http://www.entheosweb.com/flash/default.asp">http://www.entheosweb.com/flash/default.asp</a></p> |

Additional reading material may be given to the students as and when required.

### Detailed Syllabus

|                    |                     |  |   |
|--------------------|---------------------|--|---|
| <b>Course Code</b> | 15B29CI590          | <b>Semester Odd<br/>(specify Odd/Even)</b> | <b>Semester V Session 2018 -2019<br/>Month from July-December</b> |
| <b>Course Name</b> | Minor Project (CSE) |  |   |
| <b>Credits</b>     | 5                   | <b>Contact Hours</b>                       |   |

|                        |  |  |
|------------------------|--|--|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Prakash Kumar  |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Archana Purwar, Indu Chawla, Parul Agarwal, Prakash Kumar, Sakshi Agarwal, Satish Chandra, Suma Dawn |

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

| <b>Evaluation Criteria</b> |                      |
|----------------------------|----------------------|
| <b>Components</b>          | <b>Maximum Marks</b> |
| Synopsis                   | 10                   |
| Mid-Term evaluation        | 30                   |
| Final evaluation           | 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.   | ... |
| 2.   | ... |
| 3.   | ... |
| ...  | ... |
| <i>m.</i>  | ... |

### Detailed Syllabus

|                    |                          |  |  |
|--------------------|--------------------------|--|--|
| <b>Course Code</b> | 15B17CI576               | <b>Semester Odd<br/>(specify Odd/Even)</b> | <b>Semester 5th Session 2018 -2019<br/>Month from July 2018 to December<br/>2018</b> |
| <b>Course Name</b> | Information Security Lab |  |  |
| <b>Credits</b>     | 1                        | <b>Contact Hours</b>                       | 2  |

|                        |  |                                 |
|------------------------|--|---------------------------------|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Kritika Rani                    |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Himanshu Agrawal, Sanjeev Patel |

| <b>COURSE OUTCOMES</b> |   | <b>COGNITIVE LEVELS</b> |
|------------------------|---|-------------------------|
| <b>C374.1</b>          | Demonstrate and illustrate the different cipher techniques                          | Understand (C2)         |
| <b>C374.2</b>          | Develop and make a code to implement the Symmetric key and Public key cryptography. | Apply (C3)              |
| <b>C374.3</b>          | Apply a client server programming for DES and RSA algorithm.                        | Apply (C3)              |
| <b>C374.4</b>          | Examine and analyze the packet information for different protocols using Wireshark. | Analyze (C4)            |

| <b>Module No.</b> | <b>Title of the Module</b> | <b>List of Experiments</b>   | <b>CO</b> |
|-------------------|----------------------------|--|-----------|
| 1.                | Cryptography               | Introduction to Cryptography   | CO1       |
| 2.                | Ciphers                    | Implementation of Cipher using Transposition techniques and Caesar Cipher    | CO1       |
| 3.                | Ciphers                    | Implementation of Substitution Cipher: Hill Cipher and Polyalphabetic Cipher | CO1       |
| 4.                | Symmetric key cryptography | Introduction to Symmetric key cryptography                                   | CO2       |
| 5.                | Data Encryption Standard   | Implementation of Data Encryption Standard ( DES)                            | CO2       |
| 6.                | Public key cryptography    | Introduction to Public key cryptography and Digital signature                | CO2       |
| 7.                | Public key cryptography    | Implementation of Public key cryptography: RSA                               | CO2       |
| 8.                | Client server programming  | Client server programming using TCP  | CO3       |
| 9.                | Client server programming  | Implementation of DES and RSA using Client server programming                | CO4       |
| 10.               | Steganography              | Introduction to Steganography  | CO4       |
| 11.               | Antivirus and Anti-Worms   | Introduction to Antivirus and Anti-Worms, and Wireshark tool                 | CO4       |
| 12.               | Wireshark                  | Understanding of Secure-socket layer, Application Layer                      | CO4       |

(HTTP, FTP, DNS) using Wireshark tool

**Evaluation Criteria**

| <b>Components</b> | <b>Maximum Marks</b> |
|-------------------|----------------------|
| Lab Test -1       | 20                   |
| Lab Test -2       | 20                   |
| Quiz              | 20                   |
| Assignment        | 10                   |
| Project           | 15                   |
| Attendance        | 15                   |
| <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. | Information Security, Principles and Practice, Mark Stamp, Wiley                          |
| 2. | Security in Computing 5thEdition , Charles P Fleeger 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

|                    |                          |  |  |
|--------------------|--------------------------|--|--|
| <b>Course Code</b> | 15B17CI575               | <b>Semester ODD<br/>(specify Odd/Even)</b> | <b>Semester V Session</b> 2019-2020<br>July-December |
| <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>                  | Mr. Himanshu Mittal   |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Dr. Amritpal Singh, Dr. Chetna Gupta, Mr. Rupesh Koshariya, Ms. Ambalika Sarkar |

| <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 & Sustainable Development Goals (SDG's) | <ul style="list-style-type: none"> <li>Read and explore the Github and Sustainable Development Goals.</li> <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> | CO1       | 1            |
| 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 |

### Evaluation Criteria

| Components                            | Maximum Marks |
|---------------------------------------|---------------|
| LabTest1                              | 20            |
| LabTest2                              | 20            |
| Quiz1                                 | 10            |
| Quiz2                                 | 10            |
| Quiz3                                 | 10            |
| Attendance                            | 15            |
| Lab record maintenance and submission | 15            |
| -----                                 |               |
| <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> | 15B1NHS434               | <b>Semester: Odd</b> | <b>Semester V Session 2018 -2019</b><br><b>Month from July 2018 to December 2018</b> |
| <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>              | Dr. Shirin Alavi (Sector 62) and Dr. Ruchi Gautam (Sector 128) |
|                        | <b>Teacher(s) (Alphabetically)</b> | Dr. Praveen Sharma , Dr. Ruchi Gautam and Dr. Shirin Alavi     |

| <b>COURSE OUTCOMES</b> |  | <b>COGNITIVE LEVELS</b>  |
|------------------------|--|--------------------------|
| 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)     |

| <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 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 authority- Benefits and Limitations-De-Centralization and Delegation of Authority Versus, Staffing, Managerial Effectiveness.   | 7                                     |
| 4.                | Directing                               | Scope, Human Factors, Creativity and Innovation, Harmonizing Objectives, Leadership, Types of Leadership  | 4                                     |

|                                 |             |   |           |
|---------------------------------|-------------|---|-----------|
|                                 |             | Motivation, Hierarchy of Needs, Motivation theories, Motivational Techniques, Job Enrichment, Communication, Process of Communication, Barriers and Breakdown, Effective Communication, Electronic media in Communication.  |           |
| 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> |

**Evaluation Criteria**

| <b>Components</b>        | <b>Maximum Marks</b>        |
|--------------------------|-----------------------------|
| T1                       | 20                          |
| T2                       | 20                          |
| End Semester Examination | 35                          |
| TA                       | 25 (Project: Report & Viva) |
| <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. | Robbins, S.P. & Coulter, Mary, Management, 14 <sup>th</sup> ed., Pearson , 2009                   |
| 2. | Robbins, S.P. & Decenzo, David A., Fundamentals of Management, 7 <sup>th</sup> ed., Pearson, 2010 |
| 3. | Principles of Management Text and Cases, Pravin Durai, Pearson ,2015                              |

**Detailed Syllabus**  
**Lecture-wise Breakup**

|                        |                                     |  |   |
|------------------------|-------------------------------------|--|---|
| <b>Subject Code</b>    | 18B12HS311                          | <b>Semester ODD</b>                                  | <b>Semester 5 Session 2018-19</b><br><b>Month from July 2018 to December 2018</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>               | Praveen Sharma (Sec-128), Santoshi Sengupta (Sec-62) |   |
|                        | <b>Teacher(s) (Alphabetically)</b>  | Praveen Sharma, Santoshi Sengupta                    |   |

| <b>COURSE OUTCOMES</b> |   | <b>COGNITIVE LEVELS</b> |
|------------------------|---|-------------------------|
| 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)     |

| <b>Module No.</b> | <b>Subtitle of the Module</b>  | <b>Topics in the module</b>   | <b>No. of Hours for the module</b> |
|-------------------|--|---|------------------------------------|
| 1.                | Introduction   | Role of HR in strategy; Evolution of SHRM; Strategic fit: Conceptual Framework; Theoretical Perspectives on SHRM; SHRM approaches in Indian context   | 4                                  |
| 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;   | 4                                  |

|                                 |  |    |
|---------------------------------|--|----|
|                                 | IHRM practices                                 |    |
| <b>Total number of Lectures</b> |  | 28 |
| <b>Evaluation Criteria</b>      |  |    |
| <b>Components</b>               | <b>Maximum Marks</b>                           |    |
| T1                              | 20   |    |
| T2                              | 20   |    |
| End Semester Examination        | 35   |    |
| TA                              | 25 (Projects -Report and Viva, 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.  | 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            |

**Detailed Syllabus**  
**Lecture-wise Breakup**

|                    |                        |   |   |
|--------------------|------------------------|---|---|
| <b>Course Code</b> | 17B1NHS531             | <b>Semester ODD</b><br>(specify Odd/Even) | <b>Semester 5 Session 2018 -2019</b><br><b>Month from July 2018-Dec2018</b> |
| <b>Course Name</b> | Technology and Culture |   |   |
| <b>Credits</b>     | 3                      | <b>Contact Hours</b>                      | (2-1-0)   |

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

| <b>CO Code</b> | <b>COURSE OUTCOMES</b>  | <b>COGNITIVE LEVELS</b> |
|----------------|---|-------------------------|
| C303-5.1       | Understand and apply the main theories in cultural management,  | Applying (C4)           |
| C303-5.2       | Identify 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 choosing appropriate concepts, logic and selecting the apt IT tools. | Analyzing(C4)           |
| C303-5.4       | Application 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 Strodtbeck, Hofstede, Trompenaars and Schwartz</li> <li>▪ Cultural Diversity and cross cultural literacy</li> </ul>   | 8                                     |
| 3.                              | Cross cultural communication in physical and virtual teams | <ul style="list-style-type: none"> <li>▪ The Communication Process</li> <li>▪ Language and Culture</li> <li>▪ Non Verbal Communication</li> <li>▪ Barriers to Cross Cultural Understanding</li> <li>▪ Marketing and Culture</li> </ul>  | 8                                     |
| 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                                     |
| <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, and Oral Viva) |
| <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.  | 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.                               |

## Detailed Syllabus

### Lecture-wise Breakup

|                    |                                   |                      |   |
|--------------------|-----------------------------------|----------------------|---|
| <b>Course Code</b> | 16B1NHS532                        | <b>Semester:</b> Odd | <b>Semester V Session</b> 2018-2019<br><b>Month from:</b> July 2018 –Dec 2018 |
| <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), Dr. Monica Chaudhary (JIIT-62) |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Dr. Amba Agarwal, Dr. Monica Chaudhary, Mr. Manas R. Behera |

| COURSE OUTCOMES  |  | COGNITIVE LEVELS         |
|--|--|--------------------------|
| 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>  | Evaluate National income accounting, human development index and sustainable development.        | Evaluating Level (C5)    |
| <b>C303-4.3</b>  | Apply an analytical framework to understand the structural characteristics of development.       | Applying Level (3)       |
| <b>C303-4.4</b>  | Analyze the role of Macroeconomic stability & policies and Inflation in the development process. | Analyzing Level (C4)     |
| <b>C303-4.5</b>  | Evaluate the importance of federal development and decentralization.                             | Evaluating Level (C5)    |

| Module No. | Title of the Module                          | Topics in the Module   | No. of Lectures for the module |
|------------|--|--|--------------------------------|
| 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                    | PQLI, 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.<br>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, Viva & Attendance)

**Total**

**100**

**Recommended Reading material:**

1. **Meier, G.M.**, Leading Issues in Economic Development, Oxford University Press, New Delhi, 1970

2. **Todaro, M.P., Stephen C. Smith**, Economic Development, Pearson Education, 2017

3. **Thirwal, A.P.**, Economics of Development, Palgrave, 2011

4. **Ghatak, S.**, An Introduction to Development Economics, Allen and Unwin, London, 1973

5. **Ahuja, H. L.**, Development Economics, S Chand publishing, 2016

**Detailed Syllabus**  
**Lecture-wise Breakup**

|                    |                      |                      |   |
|--------------------|----------------------|----------------------|---|
| <b>Course Code</b> | 17B1NHS533           | <b>Semester: Odd</b> | <b>Semester V Session 2018 -2019</b><br><b>Month from: July 2018 to Dec. 2018</b> |
| <b>Course Name</b> | Marketing Management |                      |   |
| <b>Credits</b>     | 3                    | <b>Contact Hours</b> | 2-1-0   |

|                        |  |                  |
|------------------------|--|------------------|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Dr. Deepak Verma |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Dr. Deepak Verma |

| <b>COURSE OUTCOMES:</b><br>After pursuing the above mentioned course, student will be able to: |  | <b>COGNITIVE LEVELS</b>  |
|--|--|--------------------------|
| <b>C304-7.1</b>  | To illustrate the fundamentals of marketing, marketing environment and market research   | Understanding Level (C2) |
| <b>C304-7.2</b>  | To model the dynamics of marketing mix   | Applying Level (C3)      |
| <b>C304-7.3</b>  | To demonstrate the implications of current trends in social media marketing and emerging marketing trends.                                   | Understanding Level (C2) |
| <b>C305-7.4</b>  | To appraise the importance of marketing ethics and social responsibility   | Evaluating(C5)           |
| <b>C305-7.5</b>  | To conduct environmental analysis, design business portfolios and develop marketing strategies for businesses to gain competitive advantage. | Creating (C6)            |

| <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.                | <b>Understanding New Age Marketing</b>                        | Defining Marketing For 21 <sup>st</sup> Century<br>The importance of marketing and marketing's role in business and society.<br>Introduction to Digital Marketing.<br>Online Communication Tools.<br>The Social Media-Conversations, Community and Content.<br>Affiliate Marketing and Mobile Engagement.<br>The Digital Campaigns | 5                                     |
| 2                 | <b>Marketing Environment and Market Research and insights</b> | Internal and external forces impacting marketers.<br>Marketing and Customer Value.<br>Gathering Information and Scanning the environment.<br>Company's Micro and Macro Environment<br>Responding to the Marketing Environment  | 3                                     |
| 3                 | <b>Strategic Planning and the marketing Process</b>           | Explore the impact of social forces on marketing actions.<br>Describe how technological change affects marketing.  | 5                                     |



**Detailed Syllabus**  
**Lecture-wise Breakup**

|                     |                                  |   |   |
|---------------------|----------------------------------|---|---|
| <b>Subject Code</b> | <b>16BINHS536</b>                | <b>Semester: ODD<br/>(specify Odd/Even)</b> | <b>Semester: V    Session: 2018-2019<br/>Month: JULY-DECEMBER</b> |
| <b>Subject Name</b> | <b>TECHNOLOGY AND GOVERNANCE</b> |   |   |
| <b>Credits</b>      | <b>3</b>                         | <b>Contact Hours</b>                        | <b>(2-1-0)</b>  |

|                            |  |                        |
|----------------------------|--|------------------------|
| <b>Faculty<br/>(Names)</b> | <b>Coordinator(s)</b>                  | <b>Dr. Santosh Dev</b> |
|                            | <b>Teacher(s)<br/>(Alphabetically)</b> | <b>Dr. Santosh Dev</b> |

| <b>Co Code</b> | <b>Course Objective</b>  | <b>Cognitive Level</b> |
|----------------|--|------------------------|
| C303-3.1       | Understand the concepts and processes of governance in Indian context          | Understanding (C2)     |
| C303-3.2       | Critically appraise the importance of technological intervention in governance | Evaluating (C5)        |
| C303-3.3       | Examine and appraise Digital India campaign and design solution                | Creating (C6)          |
| C303-3.4       | Design technological intervention to solve society problems                    | Creating (C6)          |

| <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 to the Course  | What is Governance? General Introduction about the importance and usability   | 3                                     |
| 2.                | Relation of Technology and Governance                               | The beginnings of technology<br>Technology and society<br>Technology and culture<br>Technology and Economy<br>Technology and Individual   | 4                                     |
| 3.                | How Information Technology and the Internet Have Changed the World; | Development of technology and globalization   | 3                                     |
| 4.                | E-Frameworks  | A Framework for E-Government: E-Government Principals, E-Services, E-Democracy, E-Management; Strategic Planning  | 5                                     |
| 5                 | Digital India   | What is Digital India? DeitY, Vision of Digital India, Nine Pillars of Digital India, Institutional Mechanisms at National Level, Composition of Monitoring Committee on Digital India, Challenges & Changes Needed | 5                                     |
| 6                 | Governance Models   | Collaborative Governance Model, Good Governance Model   | 2                                     |
| 7.                | Different Uses and the  | Governance as Process, Public   |                                       |

|                                 |  |   |    |
|---------------------------------|--|---|----|
|                                 | Governance Analytical Framework                        | Governance, Private Governance, Global Governance, Non Profit Governance, Corporate Governance.   | 4  |
| 8.                              | Different Uses and the Governance Analytical Framework | Project Governance, Environmental Governance, Internet Governance, Information Technology Governance, Regulatory Governance, Participatory Governance, Multilevel Governance, Meta-Governance and Collaborative Governance. | 2  |
| <b>Total number of Lectures</b> |  |   | 28 |

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. | Mark Bevir, <i>Governance: A very short introduction.</i> , Oxford University Press Oxford, UK (2013)  |
| 2. | <p>Research Papers:</p> <p>Alexandra Mateescu, Alex Rosenblat and danah boyd, Policy Body-Worn Cameras <a href="http://www.datasociety.net/pubs/dcr/PoliceBodyWornCameras.pdf">http://www.datasociety.net/pubs/dcr/PoliceBodyWornCameras.pdf</a>, February 2015.</p> <p>Fung, Archon; Graham Mary, Weil David, Full Disclosure: The Perils and Promise of Transparency, 2008.</p> <p>Gurstein, M. B., Open data: Empowering the empowered or effective data use for everyone? First Monday, (2011) 16(2)</p> <p>Veeraraghavan, Rajesh, Introduction &amp; Conclusion in Open Governance and Surveillance: A Study of the National Rural Employment Guarantee Program in Andhra Pradesh, India. (2015).</p> <p>Li, Tania, The Will to Improve: Governmentality, Development, and the Practice of Politics. 2007</p> <p>Benjamin, S., Bhuvanewari, R., &amp; Rajan, P., Bhoomi : ‘ E-Governance ’, Or , An Anti-Politics Machine Necessary to Globalize Bangalore ? (2007). (January), 1-53.</p> |

**Detailed Syllabus**  
**Lecture-wise Breakup**

|                    |                           |  |   |
|--------------------|---------------------------|--|---|
| <b>Course Code</b> | <b>16B1NHS 531</b>        | <b>Semester : Odd</b><br><b>(specify Odd/Even)</b> | <b>Semester : v Session:2018 -2019</b><br><b>Month from: July to December</b> |
| <b>Course Name</b> | <b>Sociology of Youth</b> |  |   |
| <b>Credits</b>     | <b>3</b>                  | <b>Contact Hours</b>                               | <b>(2-1-0)</b>  |

|                        |  |   |
|------------------------|--|---|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                        | <b>Prof Alka Sharma</b>                     |
|                        | <b>Teacher(s)</b><br><b>(Alphabetically)</b> | <b>Prof Alka Sharma</b><br><b>Ms Shikha</b> |

| <b>CO Code</b> | <b>COURSE OUTCOMES</b>  | <b>COGNITIVE LEVELS</b> |
|----------------|---|-------------------------|
| C303-2.1       | Understand youth and youth culture in sociological perspectives     | Understanding(C 2)      |
| C303-2.2       | Appraise the ethical, cultural& social issues concerning Youth      | Evaluating(C 5)         |
| C303-2.3       | Appraise the youth culture and interprets the same                  | Analyzing(C 5)          |
| C303-2.4       | Analyze societal problems related to youth in the evolving society. | Evaluating(C 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> |
|---------------------------------|--|---|---------------------------------------|
| 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 theories, Theories as a tool to understand Youth Culture                  | 6                                     |
| 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 and attendance) |
| <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).                             |

**Detailed Syllabus**  
**Lecture-wise Breakup**

|                    |   |                       |  |
|--------------------|---|-----------------------|--|
| <b>Course Code</b> | 18B12HS612  | <b>Semester : Odd</b> | <b>Semester: V Session: 2018-19</b><br><b>Month: JULY-DECEMBER</b> |
| <b>Course Name</b> | <b>Indian Polity and Constitutional Democracy in India.</b> |                       |  |
| <b>Credits</b>     | 3   | <b>Contact Hours</b>  | (2-1-0)  |

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

| <b>CO Codes</b> | <b>COURSE OUTCOMES</b>   | <b>COGNITIVE LEVELS</b> |
|-----------------|--|-------------------------|
| C303-7.1        | Explain the importance of Polity and Constitution.                     | Understand(C2)          |
| C303-7.2        | Interpret the Fundamental Rights and Duties.                           | Understand (C2)         |
| C303-7.3        | Analyze the unity in diversity concept of our Nation                   | Analyze(C4)             |
| C303-7.4        | Analyze various concepts useful to understand the system of governance | 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> |
|---------------------------------|--|---|---------------------------------------|
| 1.                              | The Constituent Assembly and the Constitution. | The formation of the Constituent Assembly; the philosophy of the Constitution and its main features.<br>Fundamental Rights and Directive Principles.<br>Concept of Power and Politics<br>Concept of Nation- State   | 8                                     |
| 2.                              | Federalism and Decentralization                | Centre - state relations;<br>Constitutional provisions regarding emergency and centre-state relations<br>Special provisions for some states and the fifth and sixth schedule areas<br>Third tier of government: Panchayati Raj; urban local bodies<br>Regionalism<br>Ethnicity<br>Globalizations.<br>Gender and Caste | 14                                    |
| 3.                              | Organs of Government                           | The Legislature: Parliament<br><br>The Executive: President, Prime Minister and Governor<br>The Judiciary: The Supreme Court  | 6                                     |
| <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 (5- attendance, 20-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.  | Bhargava,R. (2008). <i>Politics and Ethics of the Indian Constitution</i> . New Delhi: Oxford University Press   |
| 3.  | 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    |
| 4.  | Kapur, D.& Mehta, P.B. (ed.) (2005) <i>Public Institutions in India: Performance and Design</i> , New Delhi: Oxford University Press   |
| 5.  | Shankar, B.L., & Rodrigues, V. (2011) <i>The Indian Parliament: A Democracy at Work</i> , New Delhi: Oxford University Press   |
| 6.  | 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 |

**Detailed Syllabus**  
**Lecture-wise Breakup**

|  |  |   |  |
|--|--|---|--|
| <b>Course Code</b>   | 17BINMA531   | <b>Semester - Odd</b>   | <b>Semester V Session 2018 -2019</b><br><b>Month from July 2018 - Dec 2018</b> |
| <b>Course Name</b>   | Basic Numerical Methods  |   |  |
| <b>Credits</b>   | 4  | <b>Contact Hours</b>  | 3-1-0  |
| <b>Faculty (Names)</b>   | <b>Coordinator(s)</b>  | Dr. Yogesh Gupta  |  |
|  | <b>Teacher(s)<br/>(Alphabetically)</b>   | Dr. Puneet Rana<br>Dr. Yogesh Gupta   |  |
| <b>COURSE OUTCOMES</b>   |  |   | <b>COGNITIVE LEVELS</b>  |
| After pursuing the above mentioned course, the students will be able to: |  |   |  |
| <b>C301-5.1</b>  | explain the concepts of approximation and errors in computation.                               |   | Understanding level (C2)   |
| <b>C301-5.2</b>  | construct numerical methods for algebraic and transcendental equations and their convergence.  |   | Applying Level (C3)  |
| <b>C301-5.3</b>  | outline the methods of interpolation using finite differences and divided difference formulas. |   | Understanding level (C2)   |
| <b>C301-5.4</b>  | make use of numerical differentiation and integration.   |   | Applying Level (C3)  |
| <b>C301-5.5</b>  | solve the system of linear equations using direct and iterative methods.                       |   | Applying Level (C3)  |
| <b>C301-5.6</b>  | solve ordinary differential equations using different numerical methods.                       |   | 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.   | Approximation and Errors in Computation  | Errors, relative error, absolute error, order of approximation.   | 02   |
| 2.   | Algebraic and Transcendental Equations   | Bisection Method, Regula- Falsi Method, Secant Method, Iterative method, Newton-Raphson Method, , convergence, Horner's method  | 07   |
| 3.   | Interpolation  | Finite Differences, Relation between difference operators, Newton's Forward and Backward Interpolation, Gauss Backward Interpolation, Bessel's and Sterling's central difference operators, Laplace-Everett's formula, Newton's divided difference formula  | 08   |
| 4.   | Numerical Differentiation and Integration  | Derivatives using Newton's Forward and Backward Interpolation, Bessel's and Sterling's central difference operators, Maxima and minima of a tabulated function. Boole's and Weddle's rule, Romberg's method, Euler-Maclaurin formula, Gaussian Integration. | 11   |
| 5.   | System of Equations  | Gauss Elimination method, Given's method, Gauss-Seidel Method, House holder's method.   | 05   |
| 6.   | Numerical Solution of Ordinary Differential  | Picard's method, Euler's method, Modified Euler's method, Fourth order Runge-Kutta method, Milne's method for fixed order, second order and simultaneous differential equations, Finite-Difference Method   | 09   |

|  |   |                                       |           |
|--|---|---------------------------------------|-----------|
|  | Equations   |                                       |           |
| <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 (Quiz, Assignments, and Tutorials) |           |
| <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>  | <b>C. F. Gerald and P. O. Wheatley</b> , Applied Numerical Analysis, 6 <sup>th</sup> Ed., Pearson Education, 1999.  |                                       |           |
| <b>2.</b>  | <b>M.K. Jain, S.R.K. Iyengar and R. K. Jain</b> , Numerical Methods for Scientific and Engineering Computation 6 <sup>th</sup> Ed., New Age International, New Delhi, 2014. |                                       |           |
| <b>3.</b>  | <b>R.S. Gupta</b> , Elements of Numerical Analysis by 1st Ed., (2009) Macmillan.  |                                       |           |
| <b>4.</b>  | <b>S.D. Conte and C. deBoor</b> , Elementary Numerical Analysis, An Algorithmic Approach, 3 <sup>rd</sup> Ed., McGraw-Hill, New York, 1980.                                 |                                       |           |

**Detailed Syllabus**  
**Lecture-wise Breakup**

|  |  |  |   |
|--|--|--|---|
| <b>Course Code</b>   | 17BINMA532   | <b>Semester Odd</b><br><b>(specify Odd/Even)</b> | <b>Semester V Session 2018 -2019</b><br><b>Month from July – Dec 2018</b> |
| <b>Course Name</b>   | Computer Based Numerical Techniques  |  |   |
| <b>Credits</b>   | 4  | <b>Contact Hours</b>                             | 3-1-0   |
| <b>Faculty (Names)</b>   | <b>Coordinator(s)</b>  | Dr. Pankaj Kumar Srivastava                      |   |
|  | <b>Teacher(s)</b><br><b>(Alphabetically)</b>   | Dr. Pankaj Kumar Srivastava                      |   |
| <b>COURSE OUTCOMES</b>   |  |  | <b>COGNITIVE LEVELS</b>   |
| After pursuing the above mentioned course, the students will be able to: |  |  |   |
| <b>C301-6.1</b>  | explain the concepts of approximation and errors in computation.   | Understanding Level (C2)                         |   |
| <b>C301-6.2</b>  | apply numerical methods for solving algebraic and transcendental equations along with their convergence. | Applying Level (C3)                              |   |
| <b>C301-6.3</b>  | apply divided difference, finite difference and splines formulae for numerical interpolation.            | Applying Level (C3)                              |   |
| <b>C301-6.4</b>  | solve ordinary differential and integral equations using numerical methods.                              | Applying Level (C3)                              |   |
| <b>C301-6.5</b>  | explain the basics of MATLAB software and its applications in finding numerical solutions.               | Understanding Level (C2)                         |   |

| <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.                              | Errors in numerical computation and Approximation         | Accuracy of numbers, Errors and its types, Error in numerical computations, Error in series approximation, Floating point representation of numbers, Arithmetic operations with normalized floating point representation of numbers, Machine computation, Synthetic division of a polynomial, Diminish of the root of equation by a constant value, Horner's method to find positive root, Evaluation of negative root by changing polynomial | 9                                     |
| 2.                              | Solution of Algebraic and Transcendental Equations        | Locating roots, Bisection method, Regular-Falsi method, Newton Raphson method, Rate of convergence of Newton Raphson method, Secant method, Comparison of Secant method and Newton Raphson method   | 8                                     |
| 3.                              | Interpolation   | Forward, Backward and central Finite Difference Operators, Fundamental theorem of finite difference, Finite Difference Tables, Factorial function and Reciprocal factorial function, Approximation of function by Taylor's series, Curve fitting, Spline Interpolation, Cubic Spline and Approximation, Errors in cubic spline and its derivatives.   | 8                                     |
| 4.                              | Numerical Solution of Differential and Integral Equations | Runge-Kutta method to solve ODE, Solution of Laplace Equation, Solution of Fredholm equations, Method of degenerate Kernels, Spline method  | 8                                     |
| 5.                              | Application using MATLAB                                  | MATLAB Introduction, Matrix operations, Solution of System of Linear Equations, Polynomial evaluation, Polynomial roots and operations, Polynomial Derivatives, Differentiation of functions, Polynomial Curve fitting, Integration, Standard numerical techniques in MATLAB  | 9                                     |
| <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 (Quiz , Assignments, Tutorials)  |
| <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>M. K. Jain, S. R. K. Iyengar and R. K. Jain, <i>Numerical Methods for Scientific and Engineering Computations</i>, New Age International Publishers, 2008.</b> |
| 2.  | <b>Gerald and Wheatley, <i>Applied Numerical Analyses</i>, AW, 1970.</b>  |
| 3.  | <b>V. Rajaraman, <i>Computer Oriented Numerical Methods</i>, PHI Learning Pvt. Ltd., 2018</b>   |
| 4.  | <b>P. Niyogi, <i>Numerical Analysis and Algorithms</i>, Tata McGraw-Hill Education India, 2003</b>  |
| 5.  | <b>B. S. Grewal, <i>Numerical methods in Engineering and Science</i>, Khanna Publishers, Delhi, 2013.</b>   |
| 6.  | <b>S. S. Ray, <i>Numerical Analysis with Algorithms and Programming</i>, CRC Press, 2016.</b>   |

**Detailed Syllabus**  
**Lecture-wise Breakup**

|                        |   |  |  |
|------------------------|---|--|--|
| <b>Course Code</b>     | 18B12MA311  | <b>Semester - odd<br/>(specify Odd/Even)</b>   | <b>Semester V Session 2018 -2019<br/>Month from June 2019 to December<br/>2019</b> |
| <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)<br/>(Alphabetically)</b>  | Dr. Pinkey Chauhan   |  |
| <b>COURSE OUTCOMES</b> |   |  | <b>COGNITIVE LEVELS</b>  |
| <b>CO1</b>             | Explain the concept of decision making under various environments   |  | Knowledge level C1   |
| <b>CO2</b>             | Apply various methods for solving single stage optimal problems in uncertainty and risk environments                          |  | Applying Level C3  |
| <b>CO3</b>             | Apply decision tree analysis for solving multiple stage optimal problems.   |  | Applying Level C3  |
| <b>CO4</b>             | Describe principle of optimality and formulation of dynamic programming problems.   |  | Understanding Level C2   |
| <b>CO5</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 certainty, uncertainty and risk environments.  | 4  |
| 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   |

|   |   |           |
|---|---|-----------|
| <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 (Quiz , Assignments, Tutorials)  |           |
| <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>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.   |           |

## Detailed Syllabus

### Lecture-wise Breakup

|                    |                        |  |  |
|--------------------|------------------------|--|--|
| <b>Course Code</b> | 16B1NMA532             | <b>Semester Odd<br/>(specify Odd/Even)</b> | <b>Semester V Session 2018 -2019<br/>Month from July 2018-Dec 2018</b> |
| <b>Course Name</b> | Finite Element Methods |  |  |
| <b>Credits</b>     | 4                      | <b>Contact Hours</b>                       | 3-1-0  |

|                        |  |                    |
|------------------------|--|--------------------|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Dr. Lokendra Kumar |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> |                    |

| <b>COURSE OUTCOMES</b>   |   | <b>COGNITIVE LEVELS</b>  |
|--|---|--------------------------|
| After pursuing the above mentioned course, the students will be able to: |   |                          |
| <b>C301-2.1</b>  | explain different numerical methods for the solution of simultaneous linear equations.                        | Understanding Level (C2) |
| <b>C301-2.2</b>  | solve ordinary differential equations using 4th order Runge-Kutta and finite difference methods.              | Applying Level (C3)      |
| <b>C301-2.3</b>  | apply methods of weighted residuals for the solutions of boundary value problems.                             | Applying Level (C3)      |
| <b>C301-2.4</b>  | construct the weak formulation and derivation of shape functions for one and two dimensional problems.        | Applying Level (C3)      |
| <b>C301-2.5</b>  | organise the elementwise assembly to solve the two point boundary value problems using finite element method. | Applying Level (C3)      |
| <b>C301-2.6</b>  | apply finite element method on partial differential equations with given boundary conditions.                 | 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.                | Basic Numerical Methods        | Gauss-elimination, Gauss Seidel, Thomas algorithm, Gaussian quadrature formula for numerical integration, Runge-Kutta method for IVPs, Finite difference method for BVPs.   | 10                                    |
| 2.                | Finite Element Method          | Introduction to finite element method, comparison with finite difference method.  | 3                                     |
| 3.                | Method of Weighted Residuals   | Collocation, Subdomain, Method of least squares and Galerkin's method.  | 8                                     |
| 4.                | Variational Formulation        | Variational formulation of boundary value problems. Equivalence of Galerkin and Ritz method in some cases. Applications to solve simple problems of ODEs. One dimensional linear, quadratic and higher order elements. Derivation of element equations and their assembly, imposition of boundary conditions and solution of assembled equations. | 12                                    |
| 5.                | Partial Differential Equations | Two dimensional, triangular, rectangular, quadrilateral, serendipity and isoperimetric elements and their assembly. Discretization with curved boundaries. Solution of two dimensional partial differential equations under different   | 9                                     |

|                                 |                                   |                       |           |
|---------------------------------|-----------------------------------|-----------------------|-----------|
|                                 |                                   | Geometric conditions. |           |
| <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 (Quiz, Assignments, Tutorials) |                       |           |
| <b>Total</b>                    | <b>100</b>                        |                       |           |

|                                      |  |
|--------------------------------------|--|
| <b>Recommended Reading material:</b> |  |
| <b>1.</b>                            | <b>J. N. Reddy</b> , An Introduction to the Finite Element Method, McGraw-Hill, New York, 1993.  |
| <b>2.</b>                            | <b>L. J. Segerlind</b> , Applied Finite Element Analysis, 2 <sup>nd</sup> Edition, John Wiley and Sons, 1984.  |
| <b>3.</b>                            | <b>O. C. Zienkiewicz and R. L. Taylor</b> , The Finite Element Method, 3 <sup>rd</sup> Edition, McGraw-Hill, 1989.   |
| <b>4.</b>                            | <b>D. L. Logan</b> , A First Course in the Finite Element Method, 2 <sup>nd</sup> Edition, PWS Publishing Company, Boston, 1993.                                       |
| <b>5.</b>                            | <b>R. D. Cook, D. S. Malkus and M. E. Plesha</b> , Concepts and Applications of Finite Element Analysis, 3 <sup>rd</sup> Edition, John Wiley and Sons, New York, 1989. |
| <b>6.</b>                            | <b>K. J. Bathe</b> , Finite Element Procedures in Engineering Analysis, Prentice-Hall, Englewood Cliffs, NJ, 1982.   |
| <b>7.</b>                            | <b>Gupta, R.S.</b> , Elements of Numerical Analysis, 1st Ed., Macmillan 2009.  |

**Detailed Syllabus**  
**Lecture-wise Breakup**

|  |   |   |   |
|--|---|---|---|
| <b>Course Code</b>   | 18B12MA312  | <b>Semester</b> Odd   | <b>Semester V Session</b> 2018 -2019<br><b>Month from</b> July 2018 to Dec 2018 |
| <b>Course Name</b>   | Logical Reasoning and Inequalities  |   |   |
| <b>Credits</b>   | 4   | <b>Contact Hours</b>  | 3-1-0   |
| <b>Faculty (Names)</b>   | <b>Coordinator(s)</b>   | Dr. Amit Srivastava   |   |
|  | <b>Teacher(s) (Alphabetically)</b>  | Dr. Amit Srivastava   |   |
| <b>COURSE OUTCOMES</b>   |   |   | <b>COGNITIVE LEVELS</b>   |
| After pursuing the above mentioned course, the students will be able to: |   |   |   |
| <b>C301-9.1</b>  | interpret the mathematical foundation of various inequalities.                    |   | Understanding level(C2)   |
| <b>C301-9.2</b>  | examine inequalities in the field of information theory and cryptography.         |   | Analyzing level(C4)   |
| <b>C301-9.3</b>  | apply the concepts of permutation and combination of multi sets in combinatorics. |   | Applying level(C3)  |
| <b>C301-9.4</b>  | apply special numbers in combinatorial and number theoretic problems.             |   | Applying level(C3)  |
| <b>C301-9.5</b>  | explain the basic concepts of logical reasoning and solve related problems.       |   | Understanding level(C2)   |
| <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.   | Inequalities  | Basic Inequalities, Inequalities between means with special reference to AGM inequality, Jensen inequality for concave and convex functions, Hermite hadamard inequality, Karamata's inequality, Popoviciu's inequality, Weighted AGM inequality and Young's inequality.      | 12  |
| 2.   | Basics of Counting  | Pigeon Hole Principle, Binomial Theorem, Properties of binomial coefficients, combinatorial identities, Permutation of Multisets, Multinomial Theorem, Combinations of Multisets, Sterling's Formula, Generalization of Binomial coefficients, Inclusion exclusion principle. | 12  |
| 3.   | Special numbers   | Catalan numbers, Partition numbers, difference sequences, Sterling Numbers, Perfect numbers.  | 10  |
| 4.   | Logical Reasoning   | Clocks, calendars, binary logic, seating arrangement, blood relations, logical sequence, assumption, premise, conclusion, linear and matrix arrangement, Syllogism, Binary Logic, Logical sequence & Matching, Mathematical Puzzles with applications.                        | 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 (Quiz, Assignments, Tutorials)   |   |
| <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. | <b>Cerone, P. and Dragomir, S. S.</b> , Mathematical Inequalities, CRC Press, Boca Raton, FL, 2011            |
| 2. | <b>Praveen, R. V.</b> , Quantitative Aptitude and Reasoning, Second Edition, Prentice Hall India, 2013.       |
| 3. | <b>Rosen &amp; Kenneth H</b> , Discrete Mathematics and its Applications, Tata Mc-Graw Hill, New Delhi, 2007. |
| 4. | <b>Kolman B., Busby R. C. and Ross S.</b> , Discrete Mathematical Structures, Prentice Hall, 1996.            |
| 5. | <b>Simmons, G. J.</b> , The Great Book of Puzzles & Teasers, 1999.  |

## Detailed Syllabus

### Lecture-wise Breakup

|  |  |   |  |
|--|--|---|--|
| <b>Course Code</b>   | 16BINMA533   | <b>Semester - Odd<br/>(specify Odd/Even)</b>  | <b>Semester V Session 2018 -2019<br/>Month from July 2018 - Dec 2018</b> |
| <b>Course Name</b>   | Matrix Computations  |   |  |
| <b>Credits</b>   | 4  | <b>Contact Hours</b>  | 3-1-0  |
| <b>Faculty (Names)</b>   | <b>Coordinator(s)</b>  | Dr. Pato Kumari and Dr. Amita Bhagat  |  |
|  | <b>Teacher(s)<br/>(Alphabetically)</b>   | Dr. Amita Bhagat<br>Dr. Pato Kumari   |  |
| <b>COURSE OUTCOMES</b>   |  |   | <b>COGNITIVE LEVELS</b>  |
| After pursuing the above mentioned course, the students will be able to: |  |   |  |
| <b>C301-3.1</b>  | explain the basics of matrix algebra and inverse of a matrix by partitioning.  | Understanding level (C2)  |  |
| <b>C301-3.2</b>  | solve the system of linear equations using direct and iterative methods.   | Applying Level (C3)   |  |
| <b>C301-3.3</b>  | explain the vector spaces and their dimensions, norm of a vector and matrix.   | Understanding level (C2)  |  |
| <b>C301-3.4</b>  | apply the concepts of inner product space to construct Q-R decomposition and orthonormal basis using Gram-Schmidt process. | Applying Level (C3)   |  |
| <b>C301-3.5</b>  | construct Gershgorin's circles and solve eigenvalue problems including power and inverse power methods.                    | Applying Level (C3)   |  |
| <b>C301-3.6</b>  | analyze systems of differential and difference equations arising in dynamical systems using matrix calculus.               | Analyzing 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.   | Matrix Algebra   | Basics of matrices, Submatrices, rank of a matrix, Normal Form, Inverse of a matrix by Gauss Jordan Method, Inverse of a matrix by partitioning method and by elementary matrices   | 6  |
| 2.   | Linear System of equations   | Existence and uniqueness of solution for system of linear equations, Gauss elimination method, Pivoting strategies, Gauss Jacobi and Gauss Siedel method, LU decomposition, Crout's and Doolittle's method  | 9  |
| 3.   | Vector and Inner Product Spaces  | Vector spaces, Subspaces, Linearly independent and dependent set of vectors, dimension and basis of vector space, Norms of vectors and matrix, Inner product space, orthogonal and orthonormal sets, Projections, Gram-Schmidt process, Q-R decomposition | 10   |
| 4.   | Eigen value Problems   | Eigen values and Eigenvectors, Greshgorin's circle, Power and Inverse power methods, Similar, modal and diagonalizable matrices, Quadratic, positive definite and Canonical forms   | 9  |
| 5.   | Matrix Calculus  | Powers and functions of matrices, Application to solve discrete dynamical systems, solution of initial value problems   | 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 (Quiz, Assignments, and Tutorials)  |
| <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>   | <b>Bronson, R.</b> , Matrix Methods an Introduction, Academic Press, 1991.       |
| <b>2.</b>   | <b>Golub, G. H.</b> , Matrix Computations, Johns Hopkins University Press, 1996. |
| <b>3.</b>   | <b>Datta, K. B.</b> , Matrix and Linear Algebra, Prentice Hall of India, 1990.   |
| <b>4.</b>   | <b>David, W. Lewis.</b> , Matrix Theory, World Scientific, 1991.                 |

**Detailed Syllabus**  
**Lecture-wise Breakup**

|   |  |   |   |
|---|--|---|---|
| <b>Course Code</b>  | 17BINMA533   | <b>Semester</b> Odd   | <b>Semester V Session</b> 2018 -2019<br><b>Month from</b> July 2018 to Dec 2018 |
| <b>Course Name</b>  | Statistical Information Theory with Applications   |   |   |
| <b>Credits</b>  | 4  | <b>Contact Hours</b>  | 3-1-0   |
| <b>Faculty (Names)</b>  | <b>Coordinator(s)</b>  | Dr. Priyanka Sangal   |   |
|   | <b>Teacher(s)<br/>(Alphabetically)</b>   | Dr. Anuj Dubey and Dr. Priyanka Sangal  |   |
| <b>COURSE OUTCOMES</b>  |  |   | <b>COGNITIVE LEVELS</b>   |
| After pursuing the above mentioned course, the student will be able to: |  |   |   |
| <b>CO533.1</b>  | explain the notions of information, entropy, relative entropy and mutual information.                        | Understanding Level(C2)   |   |
| <b>CO533.2</b>  | explain fuzzy sets and compare the various measures of discrepancy.  | Analyzing Level (C4)  |   |
| <b>CO533.3</b>  | develop and compare Shannon-Fano and Huffman source codes using measures of uncertainty.                     | Analyzing Level (C4)  |   |
| <b>CO533.4</b>  | analyse the notion of distance measure in pattern recognition generated in Intuitionistic fuzzy environment. | Analyzing Level (C4)  |   |
| <b>CO533.5</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.  | Basics of probability and information theory   | Review of Probability theory, Average information, Shannon and Renyi Entropy, Mutual information. Introduction to concepts of directed divergence, inaccuracy and information improvement   | 10  |
| 2.  | Information theoretic measures on fuzzy sets   | Fuzzy Sets and Intuitionistic 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.  | Basics of coding theory with source coding techniques  | 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 Tabulae, Playfair, Hill Cipher, Cryptanalysis of | 12  |

|   |  |           |
|---|--|-----------|
|   | Classical Cryptosystems,   |           |
| <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 (Quiz, Assignments, Tutorials)  |           |
| <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>   | <b>Bose, R.,</b> Information Theory Coding and Cryptography, 3 <sup>rd</sup> Ed, Tata McGraw-Hill, 2016.           |           |
| <b>2.</b>   | <b>Jain, K. C., and Srivastava, A.,</b> Information Theory & Coding, 3 <sup>rd</sup> Ed, Genius Publications, 2009 |           |
| <b>3.</b>   | <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>Course Code</b>     | 16BINMA731   | <b>Semester</b> Odd<br>(specify Odd/Even)   | <b>Semester V Session</b> 2018 -2019<br><b>Month from</b> July to December |
| <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. Himanshu Agarwal  |  |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b>   | Dr. Himanshu Agarwal  |  |
| <b>COURSE OUTCOMES</b> |  |   | <b>COGNITIVE LEVELS</b>  |
| <b>C301-4.1</b>        | explain Euclid algorithm, linear Diophantine equations and prime numbers.  |   | Explain Level (C2)   |
| <b>C301-4.2</b>        | solve system of linear congruences using properties of congruences.  |   | Solve Level(C3)  |
| <b>C301-4.3</b>        | explain numbers of special form and number theoretic functions.  |   | Explain Level (C2)   |
| <b>C301-4.4</b>        | apply the concepts of order, primitive roots and indices to solve congruences.                                     |   | Apply Level (C3)   |
| <b>C301-4.5</b>        | apply Legendre symbol and quadratic reciprocity theorem to solve quadratic congruences.                            |   | Apply Level (C3)   |
| <b>C301-4.6</b>        | apply and analyse the concepts of number theory in hashing, cryptography, calendar and ISBN check digits problems. |   | Analyse 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.                     | 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  |
| 2.                     | 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  |
| 3.                     | Number Theoretic Functions and Numbers of Special Form:  | Greatest integer function, The number-of-divisors function, The sum-of-divisors function, Multiplicative 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  | 7  |
| 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         |
| <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 (Quiz, Assignments, Tutorials)                                   |           |
| <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>James Strayer</b> , <i>Elementary Number Theory</i> , Waveland Press,,2001   |   |           |
| 2.  | <b>Kenneth Rosen</b> , <i>Elementary Number Theory and its Applications</i> , 5th Edition, 2005   |   |           |
| 3.  | <b>I. Niven, H. Zuckerman, H. Montgomery</b> , <i>An Introduction to the Theory of Numbers</i> , 5th Edition, Wiley, 2013.              |   |           |
| 4.  | <b>David M. Burton</b> , <i>Elementary Number Theory</i> , 7 <sup>th</sup> Edition, McGraw Hill Education (India) Private Limited, 2006 |   |           |

**Detailed Syllabus**  
**Lecture-wise Breakup**

|                    |  |                       |   |
|--------------------|--|-----------------------|---|
| <b>Course Code</b> | 16B1NPH531                             | <b>Semester : Odd</b> | <b>Semester V Session 2019 -2020</b><br><b>Month from : July to Dec</b> |
| <b>Course Name</b> | <b>Quantum Mechanics for Engineers</b> |                       |   |
| <b>Credits</b>     | 04                                     | <b>Contact Hours</b>  | <b>04</b>   |

|                        |  |                                     |
|------------------------|--|-------------------------------------|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Dr. Vikas Malik and Dr. Swati Rawal |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Dr. Vikas Malik and Dr. Swati Rawal |

| <b>COURSE OUTCOMES</b> |   | <b>COGNITIVE LEVELS</b> |
|------------------------|---|-------------------------|
| <b>C301-10.1</b>       | Remember basics of Quantum Mechanics and its applications.  | Remembering (C1)        |
| <b>C301-10.2</b>       | Explain postulates of quantum mechanics, Dirac notation, Schrödinger Equation, Perturbation theory and Qubits.  | Understanding (C2)      |
| <b>C301-10.3</b>       | Solve various problems related to different quantum systems and construct quantum circuits using quantum gates.                                       | Applying (C3)           |
| <b>C301-10.4</b>       | Analyse the results obtained for various physical systems and to establish the advantages of some simple protocols of quantum information processing. | 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> |
|---------------------------------|--------------------------------------|--|---------------------------------------|
| 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                                    |
| <b>Total number of Lectures</b> |                                      |  | <b>40</b>                             |
| <b>Evaluation Criteria</b>      |                                      |  |                                       |

| <b>Components</b>        | <b>Maximum Marks</b>   |
|--------------------------|--|
| 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) |   |
|---|---|
| 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: V Session 2018 -2019</b><br><b>Month: July-Dec</b> |
| <b>Course Name</b> | Materials Science |                      |   |
| <b>Credits</b>     | 4                 | <b>Contact Hours</b> | 4   |

|                        |  |   |
|------------------------|--|---|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Dr. Manoj Kumar and Dr. Sandeep Chhoker |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Dr. Manoj Kumar and Dr. Sandeep Chhoker |

| <b>COURSE OUTCOMES</b> |  | <b>COGNITIVE LEVELS</b> |
|------------------------|--|-------------------------|
| <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)         |

| <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.                | 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 Applications   | 5                                     |
| 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. | 6                                     |

|    |                          |   |           |
|----|--------------------------|---|-----------|
|    |                          | Introduction to Photonic band gap (PBG) materials and its applications  |           |
| 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         |
|    |                          | <b>Total number of Lectures</b>   | <b>40</b> |

#### Evaluation Criteria

##### Components

##### Maximum Marks

|                          |   |
|--------------------------|---|
| T1                       | 20  |
| T2                       | 20  |
| End Semester Examination | 35  |
| TA                       | 25 [2 Quiz (10), Attend. (10) and Class performance (5 )] |
| <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. 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 V Session 2018 -2019</b><br><b>Month from July to December</b> |
| <b>Course Name</b> | Laser Technology and Applications |                      |  |
| <b>Credits</b>     | 4                                 | <b>Contact Hours</b> | 4  |

|                        |  |                                     |
|------------------------|--|-------------------------------------|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Navneet Kumar Sharma and Amit Verma |
|                        | <b>Teacher(s)<br/>(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 for producing laser action, population inversion, saturation intensity, threshold condition and gain optimization. Experimental techniques to characterize laser beam.  | 12                                    |
| 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  | 12                                    |

|  |  |   |  |
|--|--|---|--|
|  |  | 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. |  |
|--|--|---|--|

|                                 |  |           |
|---------------------------------|--|-----------|
| <b>Total number of Lectures</b> |  | <b>40</b> |
|---------------------------------|--|-----------|

|                            |  |
|----------------------------|--|
| <b>Evaluation Criteria</b> |  |
| <b>Components</b>          | <b>Maximum Marks</b>   |
| 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>   |

**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. | 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.          |

**Detailed Syllabus**  
**Lecture-wise Breakup**

|                    |                                 |                      |   |
|--------------------|---------------------------------|----------------------|---|
| <b>Course Code</b> | 16B1NPH535                      | <b>Semester</b> Odd  | <b>Semester V Session</b> 2019 -2020<br><b>Month from:</b> July-Dec |
| <b>Course Name</b> | NUCLEAR SCIENCE AND ENGINEERING |                      |   |
| <b>Credits</b>     | 4                               | <b>Contact Hours</b> | 4   |

|                        |  |                 |
|------------------------|--|-----------------|
| <b>Faculty (Names)</b> | <b>Coordinator(s)</b>                  | Dr. Vivek Sajal |
|                        | <b>Teacher(s)<br/>(Alphabetically)</b> | Dr. 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> |
|-------------------|---|--|---------------------------------------|
| 1.                | 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                                    |
| 2.                | Nuclear Models  | Binding energies of nuclei, Liquid drop model: Semi-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.   | 05                                    |
| 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,   | 08                                    |

|                                 |  |  |           |
|---------------------------------|--|--|-----------|
|                                 |  | compound nucleus, Breit-Wigner one level formula   |           |
| 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> |

#### Evaluation Criteria

| Components               | Maximum Marks   |
|--------------------------|---|
| T1                       | 20  |
| T2                       | 20  |
| End Semester Examination | 35  |
| TA                       | 25 [2 Quiz (10 M), Attendance (10 M) and Class performance (5 M)] |
| <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. | K.S. Krane, 1987, Introductory Nuclear Physics, Wiley, New York.                  |
| 2. | I. Kaplan, 1989, Nuclear Physics, 2nd Edition, Narosa, New Delhi.                 |
| 3. | B.L. Cohen, 1971, Concepts of Nuclear Physics, TMH, New Delhi.                    |
| 4. | R.R. Roy and B.P. Nigam, 1983, Nuclear Physics, New Age International, New Delhi. |
| 5. | H.A. Enge, 1975, Introduction to Nuclear Physics, Addison Wesley, London.         |
| 6. | Y.R. Waghmare, 1981, Introductory Nuclear Physics, Oxford-IBH, New Delhi.         |
| 7. | R.D. Evans, 1955, Atomic Nucleus, McGraw-Hill, New York.                          |