VI SEMESTER

Semester: VI		
BRAIN COMPUTER INTERFACE		
Course Code: MVJ21AI61		**CIE Marks:100**
Credits: L:T:P:S:3:1:0:0		**SEE Marks: 100**
Hours: 40L+26T		**SEE Duration: 3 Hrs**
Course Learning Objectives: The students will be able to		
1	Discuss different types of BCI signals from instruments	
2	Discuss and compare different types of brain signals used for feature extraction	
3	Discuss the major components of BCI which makes up the system	
4	Explain the applications based on BCI	
5	Use the toolbox BCILAB	

UNIT-I	
BRAIN COMPUTER INTERFACE: What is BCI? How do BCI works, Brain computer interface types-Invasive, Partially invasive, Non-invasive, Brain signal for BCI signal-EEG, MEG, fNIRS, fMRI , Non brain signals for BCI	**8 Hrs**
Video link / Additional online information :	
https://nptel.ac.in/courses/108/108/108108167/	
UNIT-II	
EEG FEATURES USED IN BCI: EEG Process, Temporal characteristics, Spatial Characteristics, Oscillatory EEG activity, event related potentials (ERP), slow cortical potentials (SCP), and neuronal potentials. Motor Imagery BCI	**8 Hrs**
Video link / Additional online information :	
https://www.youtube.com/watch?v=PWRGe3uyS4c	
UNIT-III	
MAJOR COMPONENTS OF BCI: Signal Processing-Spatial, temporal, spectral, spatio-temporal filters, Feature extraction, Machine Learning	**8 Hrs**
Video link / Additional online information :	
https://www.youtube.com/watch?v=PWRGe3uyS4c&t=214	
UNIT-IV	
BCI SYSTEM: BCI monitoring hardware and hardware, BCI application-P300 speller, neuro prosthetic devices	**8 Hrs**
Video link / Additional online information :	
https://www.youtube.com/watch?v=KfaGvb9YfVM	
UNIT-V	

BCI LAB TOOL BOX: Toolbox Architecture, Plug-in concepts, Implementing ERP Based BCI, ERP Analysis in BCI Lab	8 Hrs
Video link / Additional online information :	
https://www.youtube.com/watch?v=PWRGe3uyS4c&t=322	

Course Outcomes: After completing the course, the students will be able to	
CO1	Acquire the brain signal in the format required for the specific application
CO2	Preprocessing the signal for signal enhancement
CO3	Extract the dominant and required features
CO4	Classify and derive the control signals for BCI applications
CO5	Apply the BCI knowledge for medical applications

Reference Books	
1.	R. Wolpaw and Elizabeth Winter Wolpaw, "Review of "Brain- Computer Interfaces, principles and practice", Biomed Engineering online
2.	"Brain Computer Principles and Practices", JonathanWolpaw, Elizabeth Winter Wolpaw, Oxford University Press

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO/PSO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	-	1	1	2	-	-	-	-	-	1	-
CO2	3	3	3	3	2	-	-	-	-	-	-	-	-	-
CO3	1	-	-	1	1	-	2	3	3	3	3	-	2	-
CO4	3	3	2	2	2	-	-	-	-	-	-	3	-	-
CO5	3	3	3	3	3	2	-	-	3	3	3	3	2	1

High-3, Medium-2, Low-1

Semester: VI		
MACHINE LEARNING AND LAB		
Course Code: MVJ21AI62		**CIE Marks:50+50**
Credits: L:T:P: 3:0:1		**SEE Marks: 50 +50**
Hours:40 L+ 26 P		**SEE Duration: 03+03 Hours**
Course Learning Objectives: The students will be able to		
1	Define machine learning and problems relevant to machine learning.	
2	Differentiate supervised, unsupervised and reinforcement learning.	
3	Apply neural networks, Bayes classifier and k nearest neighbor, for problems appear in machine learning.	
4	Perform statistical analysis of machine learning techniques.	
5	Define machine learning and problems relevant to machine learning.	

UNIT-I	
Introduction: Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning.	**10 Hrs**
Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.	
Laboratory Sessions/ Experimental learning:	
To understand purpose, give real time dataset(problem) and ask to students to solve in class room.	
Video link / Additional online information (related to module if any):	
• https://www.youtube.com/watch?v=rQ3oi9g8alY	
• https://www.youtube.com/watch?v=h0e2HAPTGF4	
UNIT-II	
Decision Tree Learning	**10 Hrs**
Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning.	
Laboratory Sessions/ Experimental learning:	
Ask students to design a Decision Tree using freely available dataset or problem in classroom.	
Video link / Additional online information (related to module if any):	
• https://www.youtube.com/watch?v=qDcl-FRnwSU	
• https://www.youtube.com/watch?v=FuJVLsZYkuE	
UNIT-III	

Bayesian Learning and Evaluating Hypotheses	**10 Hrs**
Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm.	
Evaluating Hypotheses: Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis	
Laboratory Sessions/ Experimental learning:	
Ask the students to build Bayes Belief Networks for real time problem in class room.	
Video link / Additional online information (related to module if any): - https://www.youtube.com/watch?v=480a_2jRdK0 - https://www.youtube.com/watch?v=E3l26bTdtxI	

UNIT-IV

Artificial Neural Networks and Instance based Learning	**10 Hrs**
Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptrons, Back propagation algorithm. Instanced Based Learning: Introduction, k-nearest neighbor learning, locally weighted regression.	
Laboratory Sessions/ Experimental learning:	
Give real time problem and ask students to design an ANN using perceptrons.	
Video link: - https://www.youtube.com/watch?v=xbYgKoG4x2g&list=PL53BE265CE4A6C056. - https://www.youtube.com/watch?v=BRMS3T11Cdw&list=PL3pGy4HtqwD2a 57wl7Cl7tmfxfk7JWJ9Y	

UNIT-V

Reinforcement Learning and Deep Learning : Reinforcement Learning: Introduction, Learning Task, Q Learning.	**10 Hrs**
Deep Learning: Introduction to Deep Learning-Reasons to go Deep Learning, Introduction to Convolution Networks ,Restricted Boltzmann Machines, Deep Belief Nets, Recurrent Nets.	
Video link: - https://www.youtube.com/watch?v=TIlDzLZPyhY&list=PLyqSpQzTE6M_FwzHF Ayf4LSkz_IjMyjD9 - https://www.youtube.com/watch?v=iOh7QUZGyiU&list=PLqYmG7hTraZDNJre23 vqCGIVpfZ_K2RZs	

LABORATORY EXPERIMENTS

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file and show the output for test cases. Develop an interactive program by Compareing the result by implementing LIST THEN ELIMINATE algorithm.

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm. Output a description of the set of all hypotheses consistent with the training examples.

3. Demonstrate Pre processing (Data Cleaning, Integration and Transformation) activity on suitable data: For example: Identify and Delete Rows that Contain Duplicate Data by considering an appropriate dataset. Identify and Delete Columns That Contain a Single Value by considering an appropriate dataset

4. Demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

5. Demonstrate the working of the Random forest algorithm. Use an appropriate data set for building and apply this knowledge to classify a new sample

6. Implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

7. Assuming a set of documents that need to be classified, use the naive Bayesian Classifier model to perform this task. Calculate the accuracy, precision, and recall for your data set.

8. Construct aBayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.

9. Demonstrate the working of EM algorithm to cluster a set of data stored in a .CSV file.

10. Demonstrate the working of SVM classifier for a suitable data set

Web Link and Video Lectures(Self Learning)

- https://www.youtube.com/watch?v=rurs7cdT5cc
- https://www.youtube.com/watch?v=jQerVWxOGMc
- https://www.youtube.com/watch?v=X-wAtdGS5No
- https://www.youtube.com/watch?v=Db-tV8JJ3ZQ
- https://www.youtube.com/watch?v=Yb7vcX0inbM

Course Outcomes: After completing the course, the students will be able to	
CO1	Identify the issues in machine learning and Algorithms for solving it.
CO2	Explain theory of probability and statistics related to machine learning.
CO3	Investigate concept learning, ANN, Bayes classifier, k nearest neighbor, Q, Learning.
CO4	Identify the difference between Machine Learning and Deep Learning and using scenario

CO5	Explain the concepts of Q learning and deep learning

Reference Books	
1.	Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.
2.	Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the self -study are 20 (2 presentations are be held for 10 marks each). The marks obtained in test, quiz and self -studies are added to get marks out of 100 and report CIE for 50 marks.

Laboratory- 50 Marks

The laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average of the marks over number of weeks is considered for 30 marks. At the end of the semester a test is conducted for 10 marks. The students are encouraged to implement additional innovative experiments in the lab and are awarded 10 marks. Total marks for the laboratory is 50.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks are executed by means of an examination.

The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Laboratory- 50 Marks

Experiment Conduction with proper results is evaluated for 40 marks and Viva is for 10 marks. Total SEE for laboratory is 50 marks.

CO-PO/PSO Mapping													
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	1	-	-	-	-	-	-	2	-	-
CO2	3	3	3	-	-	-	-	-	1	-	1	2	1	-
CO3	2	2	2	1	3	-	-	-	-	-	1	3	-	1
CO4	3	2	3	-	-	-	-	-	-	2	3	2	-	-
CO5	3	2	3	-	-	-	-	-	-	2	3	2	2	-

High-3, Medium-2, Low-1

Semester: VI		
WEB TECHNOLOGIES AND LAB		
Course Code: MVJ21AI 63		CIE Marks:50+50
Credits: L:T:P: 3:0:1		SEE Marks: 50 +50
Hours:40 L+ 26 P		SEE Duration: 03+03 Hours

Course Learning Objectives: The students will be able to

1	To understand different Internet Technologies.
2	To learn java-specific web services architecture
3	To understand the SQL and JDBC
4	To learn the AJAX and JSON
5	To understand different Internet Technologies.

UNIT-I	
Website Basics, HTML5, CSS 3, Web 2.0: Web Essentials: Clients, Servers and Communication ,The Internet, Basic Internet protocols, World wide web, HTTP Request Message , HTTP Response Message, Web Clients, Web Servers, HTML5 : Tables, Lists, Image, HTML5 control elements , Semantic elements , Drag and Drop, Audio, Video controls, CSS3: Inline, embedded and external style sheets, Rule cascading, Inheritance, Backgrounds, Border Images, Colours, Shadows, Text, Transformations	**10 Hrs**

Laboratory Sessions/ Experimental learning:

1. Design HTML form for keeping student record.
2. Write a HTML code to generate following output.

    Create an html page with following specifications

    a. Title should be about my college

    b. Put the image in the background

    c. Place your College name at the top of the page in large text followed by address in smaller size

    d. Add names of courses offered each in a different color, style and typeface

    e. Add scrolling text with a message of your choice

Video link / Additional online information:

- https://www.youtube.com/watch?v=QEtWL4lWlL4
- https://www.youtube.com/watch?v=JsbxB2l7QGY&list=PLVlQHNRLflP_hIZuBNjr6rZzqa2HZFkny
- https://www.youtube.com/watch?v=h_RftxdJTzs

UNIT-II	
Client side Programming: An Introduction to java Script, JavaScript DOM Model, Date and Object, Regular Expression, Exception Handling, Validation, Built-in Objects, Event Handling, DHTML with JavaScript, JSON introduction, Syntax, Function Files, Http Request, SQL.	**10 Hrs**
Laboratory Sessions/ Experimental learning: 1. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient. 2. Write a JavaScript code that displays text "TEXT-GROWING" with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays "TEXT-SHRINKING" in BLUE color. Then the font size decreases to 5pt. **Video link / Additional online information:** • https://www.youtube.com/watch?v=uDwSnnhl1Ng&list=PLsyeobzWxl7qtP8Lo9TRe qUMkiOp446cV https://www.youtube.com/watch?v=zPTY1hKq3SU&list=PLVlQHNRLflP-ByWEVjCZAj79kJdshKQwu	
UNIT-III	
Server Side Programming: Java Servlet Architecture, Servlet Life Cycle, Form GET and POST actions, Session handling, Installing and Configuring Apache Tomcat Web Server, Database Connectivity: JDBC perspectives, JDBC Program Example, JSP: Understanding Java server page, JSP Standard Tag Library (JSTL), Creating HTML form using JSP Code.	**10 Hrs**

Laboratory Sessions/ Experimental learning:
1. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet for doing the following.
    a. Create a Cookie and add these four user id's and passwords to this Cookie.
    b. Read the user id and passwords entered in the Login form and authenticate with the values available in the cookies.
2. Write a JSP which insert the details of the 3 or 4users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.
Video link / Additional online information:
• https://www.youtube.com/watch?v=7TOmdDJc14s&list=PLsyeobzWxl7pUPF2xjjJiG 4BKC9x_GY46
• https://www.youtube.com/watch?v=xve6QEgIR-0&list=PL0zysOflRCel5BSXoslpfDawe8FyyOSZb
• https://www.youtube.com/watch?v=0pzR2FGTEhk	

UNIT-IV	
PHP: Introduction to PHP, PHP using PHP, Variables, Program Control, Built-in Functions, Form Validation, Basic command with PHP examples, Connection to server, creating Database, Selecting Database, Listing Database, listing table names Creating a table, Inserting data, deleting data and tables, altering tables. **Laboratory Sessions/ Experimental learning:** 1. Write a PHP program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings. 2. Write a PHP program to display a digital clock which displays the current time of the server. 3. Write a PHP program to sort the student records which are stored in the database using selection sort. 4. Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, and Name of the College, Branch, Year of Joining, and email id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document. **Video link / Additional online information :** • https://www.youtube.com/watch?v=itRkLa2kq6w • https://www.youtube.com/watch?v=KJHYdkKtafU https://www.youtube.com/watch?v=G_CFRAdbXfI&list=PL_RGaFnxSHWrjkpK2zD4TWK WMWVfeYK-b	**10 Hrs**
UNIT-V	
AJAX: Ajax client server architecture, Xml HTTP request object, Call back methods. Advanced JavaScript and jQuery, JavaScript Pseudo-Classes, jQuery Foundations, Web Services: Introduction, Java web services Basics, Creating, Publishing, Testing and Describing a web services, Database driven web service from an application. **Laboratory Sessions/ Experimental learning:** 1. Creating simple application to access data base using JDBC Formatting HTML with CSS. 2. Write a Program for manipulating Databases and SQL with real time application. 3. Write a Java applet to display the Application Program screen i.e. calculator and other. **Video link / Additional online information** • https://www.youtube.com/watch?v=qk9MWbyRlhE • https://www.youtube.com/watch?v=0pzR2FGTEhk • https://www.youtube.com/watch?v=HgvIox6ehkM	**10 Hrs**

LABORATORY EXPERIMENTS

1. Create a web page with the following.

   a. Cascading style sheets.

   b. Embedded style sheets.

   c. Inline style sheets.

Use our college information(Department of CSE) for the web pages.

2. Design HTML form for keeping student record and validate it using Java script.

3. Write an HTML program to design an entry form of student details and send it to store at database server like SQL, Oracle or MS Access.

4. Write a JavaScript code that displays text "TEXT-GROWING" with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays "TEXT-SHRINKING" in BLUE color. Then the font size decreases to 5pt.

5. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet for doing the following.

i. Create a Cookie and add these four user id's and passwords to this Cookie.

ii. Read the user id and passwords entered in the Login form and authenticate with the values available in the cookies.

6. Write a JSP which insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

7. Validate the form using PHP regular expression. PHP stores a form data in to database

8. Write a PHP program to display a digital clock which displays the current time of the server.

9. Creating simple application to access data base using JDBC Formatting HTML with CSS.

10. Write a Program for manipulating Databases and SQL with real time application

Course Outcomes: After completing the course, the students will be able to	
CO1	Construct a basic website using HTML and Cascading Style Sheets.
CO2	Build dynamic web page with validation using Java Script objects and by applying different event handling mechanism.
CO3	Develop server side programs using Servlets and JSP.
CO4	Construct simple web pages in PHP and to represent data in XML format.
CO5	Use AJAX and web services to develop interactive web applications.

Reference Books	
1.	Deitel and Deitel and Nieto,Internet and World Wide Web, How to Program, Prentice Hall, 5th Edition, 2011.
2.	Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 1stEdition, Pearson Education India. (ISBN:978-9332575271)
3.	Stephen Wynkoop and John Burke ―Running a Perfect Website‖, QUE, 2nd Edition,1999
4.	Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.

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maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

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CO4	3	3	1	-	-	-	-	-	-	-	-	1	-	2
CO5	3	3	1	-	-	-	-	-	-	-	-	2	1	1

High-3, Medium-2, Low-1

<table>
<tr><td colspan="3" align="center">Semester: VI</td></tr>
<tr><td colspan="3" align="center">Open Elective I</td></tr>
<tr><td colspan="3" align="center">CLOUD COMPUTING</td></tr>
<tr><td>Course Code:MVJ21AI641</td><td></td><td>CIE Marks:100</td></tr>
<tr><td>Credits: L:T:P:S:3:1:0:0</td><td></td><td>SEE Marks: 100</td></tr>
<tr><td>Hours: 40L+26T</td><td></td><td>SEE Duration: 3 Hrs</td></tr>
<tr><td colspan="3">Course Learning Objectives: The students will be able to</td></tr>
<tr><td>1</td><td colspan="2">To understand the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges;</td></tr>
<tr><td>2</td><td colspan="2">To introduce the basic ideas and principles in data center design; cloud management techniques and cloud software deployment considerations;</td></tr>
<tr><td>3</td><td colspan="2">To discuss the different CPU, memory and I/O virtualization techniques that serve in offering software, computation and storage services on the cloud; Software Defined Networks (SDN) and Software Defined Storage (SDS);</td></tr>
<tr><td>4</td><td colspan="2">To introduce cloud storage technologies and relevant distributed file systems, NoSQL databases and object storage;</td></tr>
<tr><td>5</td><td colspan="2">To discuss the variety of programming models and develop working experience in several of them.</td></tr>
</table>

<table>
<tr><td colspan="2" align="center">UNIT-I</td></tr>
<tr><td>Introduction to Cloud Computing: Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Clouds, Desired Features of a Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud

Applications:
Microsoft Azure, Amazon Web Services
Video link / Additional online information :
https://www.youtube.com/watch?v=PW-V-72MJNY</td><td>10 Hrs</td></tr>
<tr><td colspan="2" align="center">UNIT-II</td></tr>
<tr><td>Integration as a Service' Paradigm for the Cloud Era:
An Introduction, The Onset of Knowledge Era, The Evolution of SaaS , The Challenges of SaaS Paradigm, Approaching the SaaS Integration Enigma, New Integration Scenarios, The Integration Methodologies, SaaS Integration Products and Platforms , SaaS Integration Services, Businesses-to-Business Integration (B2Bi) Services, A Framework of Sensor- Cloud Integration,</td><td>10 Hrs</td></tr>
</table>

SaaS Integration Appliances, Issues for Enterprise Applications on the Cloud, Transition Challenges, Enterprise Cloud Technology and Market Evolution, Business Drivers Toward a Marketplace for Enterprise Cloud Computing, The Cloud Supply Chain

Laboratory Sessions/ Experimental learning:

1. Installation and Configuration of Hadoop.

Applications: PAAS (Facebook, Google App Engine)

Video link / Additional online information :

https://www.youtube.com/watch?v=ifZh5SJAujA

UNIT-III	
Virtual Machines Provisioning and Migration Services: Introduction and Inspiration- Background and Related Work-Virtual Machines Provisioning and Manageability- Virtual Machine Migration Services- VM Provisioning and Migration in Action–Provisioning in the Cloud Context- The Anatomy of Cloud Infrastructures-Distributed Management of Virtual Infrastructures - Scheduling Techniques for Advance Reservation of Capacity- Capacity Management to meet SLA Commitments- RVWS Design and Cluster as a Service: The Logical Design	**10 Hrs**

Laboratory Sessions/ Experimental learning:

Implementation of Para-Virtualization using VM Ware's Workstation/ Oracle's Virtual Box and Guest O.S

Applications:

Hardware Virtualization, Operating system Virtualization, Server Virtualization, Storage Virtualization

Video link / Additional online information :

https://www.youtube.com/watch?v=7m3f-P-WWbg

UNIT-IV	
Platform and Software as a Service**:** Technologies and Tools for Cloud Computing- Aneka Cloud Platform- Aneka Resource Provisioning Service- Hybrid Cloud Implementation – Comet Cloud Architecture- Autonomic Behavior of Comet Cloud- Overview of Comet Cloud-based Applications- Implementation and Evaluation- Workflow Management Systems and Clouds-Architecture of Workflow Management Systems - Utilizing Clouds for Workflow Execution-Case Study: Evolutionary Multi objective Optimizations- Visionary thoughts for Practitioners	**10 Hrs**

Laboratory Sessions/ Experimental learning:

Create an application (Ex: Word Count) using Hadoop Map/Reduce.

Applications: Schedule book

Video link / Additional online information :

https://www.youtube.com/watch?v=3KJjKY8k9Lk

UNIT-V	
MapReduce Programming Model and Implementations: MapReduce Programming Model- Major MapReduce Implementations for the Cloud- The Basic Principles of Cloud Computing-A Model for Federated Cloud Computing- Traditional Approaches to SLO Management- Types of SLA- Life Cycle of SLA- SLA Management in Cloud- Automated Policy-based Management- The Current State of Data Security in the Cloud-Data Privacy and Security Issues- Producer_Consumer Relationship-Cloud Service Life Cycle	**10 Hrs**

Laboratory Sessions/ Experimental learning:

Create your resume in a neat format using google and zoho cloud Programs on PaaS

Applications: Network Storage,Google Apps and Microsoft office online

Video link / Additional online information :

https://www.youtube.com/watch?v=uj2Sb7b_Do0

Course Outcomes: After completing the course, the students will be able to	
CO1	Recall the recent history of cloud computing, illustrating its motivation and evolution.
CO2	List some of the enabling technologies in cloud computing and discuss their significance
CO3	Articulate the economic benefits as well as issues/risks of the cloud paradigm for businesses as well as cloud providers
CO4	Define SLAs and SLOs and illustrate their importance in Cloud Computing.
CO5	List some of the common cloud providers and their associated cloud stacks and recall popular cloud use case scenarios.

Reference Books	
1.	Cloud Computing, Principles and Paradigms, Rajkumar Buyya, James Broberg, Wiley Publication
2.	Dan C Marinescu: Cloud Computing Theory and Practice. Elsevier(MK) 2013.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be

more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO/PSO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	-	1	1	2	-	-	-	-	-	1	-
CO2	3	3	3	3	2	-	-	-	-	-	-	-	-	-
CO3	1	-	-	1	1	-	2	3	3	3	3	-	2	-
CO4	3	3	2	2	2	-	-	-	-	-	-	3	-	-
CO5	3	3	3	3	3	2	-	-	3	3	3	3	2	1

High-3, Medium-2, Low-1

Semester: VI		
Open Elective I		
FOUNDATION OF DATA SCIENCE		
Course Code: MVJ21AI642		CIE Marks:100
Credits: L:T:P:S:3:1:0:0		SEE Marks: 100
Hours: 40L+26T		SEE Duration: 3 Hrs
Course Learning Objectives: The students will be able to		
1	To provide strong foundation for data science and application area related to information technology and understand the underlying core concepts and emerging technologies in data science	

UNIT-I	
INTRODUCTION TO DATA SCIENCE: Definition – Big Data and Data Science Hype – Why data science – Getting Past the Hype – The Current Landscape – Who is Data Scientist? - Data Science Process Overview – Defining goals – Retrieving data – Data preparation – Data exploration – Data modeling – Presentation. **Video Links :** https://www.youtube.com/watch?v=KMj49syT8JM&list=PLyqSpQzTE6M-sBjDcT21Gpnj8grR2fDgc	**10 Hrs**
UNIT-II	
BIG DATA: Problems when handling large data – General techniques for handling large data – Case study – Steps in big data – Distributing data storage and processing with Frameworks – Case study. **Video Links:** https://nptel.ac.in/courses/106/101/106101163/	**10 Hrs**
UNIT-III	
MACHINE LEARNING: Machine learning – Modeling Process – Training model – Validating model – Predicting new observations –Supervised learning algorithms – Unsupervised learning algorithms. **Video Links:** https://nptel.ac.in/courses/106/101/106101163/	**10 Hrs**
UNIT-IV	
DEEP LEARNING: Introduction – Deep Feedforward Networks – Regularization – Optimization of Deep Learning – Convolutional Networks – Recurrent and Recursive Nets – Applications of Deep Learning. **Video Links**: https://nptel.ac.in/courses/106/101/106101163/	**10 Hrs**
UNIT-V	
DATA VISUALIZATION : Introduction to data visualization – Data visualization	**10 Hrs**

options – Filters – MapReduce – Dashboard development tools – Creating an interactive dashboard with dc.js-summary.

Video Links: https://nptel.ac.in/courses/106/101/106101163/

Course Outcomes: After completing the course, the students will be able to	
CO1	Explore the fundamental concepts of data science.
CO2	Understand data analysis techniques for applications handling large data
CO3	Understand various machine learning algorithms used in data science process
CO4	Visualize and present the inference using various tools
CO5	Learn to think through the ethics surrounding privacy, data sharing and algorithmic decision-making

Reference Books	
1.	Introducing Data Science, Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co., 1st edition, 2016
2.	An Introduction to Statistical Learning: with Applications in R, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 1st edition, 2013
3.	Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press, 1st edition, 2016
4.	Ethics and Data Science, D J Patil, Hilary Mason, Mike Loukides, O' Reilly, 1st edition, 2018

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO/PSO Mapping													
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CO3	3	3	2	3	1	-	-	-	-	-	-	2	3	-
CO4	3	3	2	3	2	-	-	-	-	-	-	2	3	-
CO5	3	3	2	3	2	-	-	-	-	-	-	2	3	1

High-3, Medium-2, Low-1

Semester: VI		
Open Elective I		
INTRODUCTION TO DRONES		
Course Code:MVJ21AI643		**CIE Marks:100**
Credits: L:T:P:S:3:1:0:0		**SEE Marks: 100**
Hours: 40L+26T		**SEE Duration: 3 Hrs**
Course Learning Objectives: The students will be able to		
1	To make the students to understand the basic concepts of UAV systems design.	

UNIT-I	
INTRODUCTION TO UAV: History of UAV –classification – Introduction to Unmanned Aircraft Systems--models and prototypes – System Composition-applications. **Video Links :** https://www.digimat.in/nptel/courses/video/101104073/L01.html	**8 Hrs**
UNIT-II	
THE DESIGN OF UAV SYSTEMS : Introduction to Design and Selection of the System-Aerodynamics and Airframe Configurations- Characteristics of Aircraft Types- Design Standards and Regulatory Aspects-UK,USA and Europe- Design for Stealth--control surfaces-specifications. **Video Links:** https://www.digimat.in/nptel/courses/video/101104083/L01.html	**8 Hrs**
UNIT-III	
AVIONICS HARDWARE : Autopilot – AGL-pressure sensors-servos-accelerometer –gyros-actuators- power supply- processor, integration, installation, configuration, and testing. **Video Links:**https://nptel.ac.in/courses/101/104/101104083/	**8 Hrs**
UNIT-IV	
COMMUNICATION PAYLOADS AND CONTROLS: Payloads-Telemetry-tracking-Aerial photography-controls-PID feedback-radio control frequency range –modems-memory system-simulation-ground test-analysis-trouble shooting. **Video Links**: https://nptel.ac.in/courses/101/108/101108047/	**8 Hrs**
UNIT-V	
THE DEVELOPMENT OF UAV SYSTEMS :Waypoints navigation-ground control software-System Ground Testing- System In-flight Testing- Future Prospects and Challenges-Case Studies – Mini and Micro UAVs. Video Links**:https://nptel.ac.in/courses/101/104/101104073/**	**8 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Ability to design UAV system
CO2	Prepare preliminary design requirements for an unmanned aerial vehicle.
CO3	Perform system testing for unmanned aerial vehicles
CO4	Integrate various systems of unmanned aerial vehicle.
CO5	Design micro aerial vehicle systems by considering practical limitations.

Reference Books	
1.	Paul G Fahlstrom, Thomas J Gleason, "Introduction to UAV Systems", UAV Systems, Inc, 1998
2.	Reg Austin "Unmanned Aircraft Systems UAV design, development and deployment", Wiley, 2010.
3.	Dr. Armand J. Chaput, "Design of Unmanned Air Vehicle Systems", Lockheed Martin Aeronautics Company, 2001
4.	Kimon P. Valavanis, "Advances in Unmanned Aerial Vehicles: State of the Art and the Road to Autonomy", Springer, 2007

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

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CO3	3	3	2	3	2	-	-	-	-	-	-	2	3	-
CO4	3	3	2	3	2	-	-	-	-	-	-	2	3	2
CO5	3	3	2	3	3	-	-	-	-	-	-	2	3	3

High-3, Medium-2, Low-1

Semester: VI		
Open Elective I		
JAVA PROGRAMMING		
Course Code:MVJ21AI644		**CIE Marks:100**
Credits: L:T:P:S:3:1:0:0		**SEE Marks: 100**
Hours: 40L+26T		**SEE Duration: 3 Hrs**
Course Learning Objectives: The students will be able to		
1	Learn fundamental features of object oriented language and JAVA	
2	Set up Java JDK environment to create, debug and run simple Java programs	
3	Learn object oriented concepts using programming examples	
4	Study the concepts of importing of packages and exception handling mechanism.	
5	Discuss the String Handling examples with Object Oriented concepts	

UNIT-I	
An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings Text book 1: Ch 2, Ch 3	**8 Hrs**
UNIT-II	
Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements. Text book 1: Ch 4, Ch 5	**8 Hrs**
UNIT-III	
Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited, Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract	**8 Hrs**

Classes, Using final with Inheritance, The Object Class. Text book 1: Ch 6, Ch 7.1-7.9, Ch 8.	

UNIT-IV	
Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions. Text book 1: Ch 9, Ch 10	**8 Hrs**

UNIT-V	
Enumerations, Type Wrappers, I/O, Applets, and Other Topics: I/O Basics, Reading Console Input, Writing Console Output, The PrintWriter Class, Reading and Writing Files, Applet Fundamentals, The transient and volatile Modifiers, Using instance of, strict fp, Native Methods, Using assert, Static Import, Invoking Overloaded Constructors Through this( ), String Handling: The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using value Of( ), Changing the Case of Characters Within a String , Additional String Methods, String Buffer, String Builder. Text book 1: Ch 12.1,12.2, Ch 13, Ch 15	**8 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Explain the object-oriented concepts and JAVA.
CO2	Develop computer programs to solve real world problems in Java
CO3	Develop simple GUI interfaces for a computer program to interact with users

Reference Books	
1.	Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007. (Chapters 2, 3, 4, 5, 6,7, 8, 9,10, 12,13,15)
2.	Mahesh Bhave and Sunil Patekar, "Programming with Java", First Edition, Pearson Education,2008, ISBN:9788131720806.
3.	Rajkumar Buyya,S Thamarasi selvi, xingchen chu, Object oriented Programming with java, Tata McGraw Hill education private limited.
4.	E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be

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Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO/PSO Mapping													
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	3	3	-	-	-	-	-	-	2	2	-
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CO3	3	3	2	3	2	-	-	-	-	-	-	2	3	-
CO4	3	3	2	3	2	-	-	-	-	-	-	2	3	-
CO5	3	3	2	3	3	-	-	-	-	-	-	2	3	1

High-3, Medium-2, Low-1

<table>
<tr><td colspan="3" align="center">Semester: VI</td></tr>
<tr><td colspan="3" align="center">Open Elective I</td></tr>
<tr><td colspan="3" align="center">ETHICAL HACKING</td></tr>
<tr><td>Course Code:MVJ21AI645</td><td></td><td>CIE Marks:100</td></tr>
<tr><td>Credits: L:T:P:S:3:1:0:0</td><td></td><td>SEE Marks: 100</td></tr>
<tr><td>Hours: 40L+26T</td><td></td><td>SEE Duration: 3 Hrs</td></tr>
<tr><td colspan="3">Course Learning Objectives: The students will be able to</td></tr>
<tr><td>1</td><td colspan="2">Understand Ethical Hacking.</td></tr>
<tr><td>2</td><td colspan="2">Identify how intruders escalate privileges and what steps can be taken to secure a system.</td></tr>
<tr><td>3</td><td colspan="2">Introduce and demonstrate hacking tools for penetration testing purposes only.</td></tr>
</table>

UNIT-I	
Ethics Of Ethical Hacking: Why you need to Understand Your Enemy's Tactics?, Recognizing The Gray Areas in Security – Vulnerability Assessment – Penetration Testing. Ethical Hacking and the Legal System: Understanding Individual Cyber laws – 18 USC Section 1029, 1030, 2510 – Digital Millennium Copyright Act (DMCA) – Cyber Security Enhancement Act 2002. Proper and Ethical Disclosure: CERT's Current Process – Full Disclosure Policy – Organization for Internet Safety **Applications:** In-class activity to understand the penetration testing methodologies. **Video link / Additional online information (related to module if any):** https://www.youtube.com/watch?v=a1xQq60EtJc	**10 Hrs**
UNIT-II	
Social Engineering Attacks: How A Social Engineering Attack Works? – Conducting A Social Engineering Attack – Common Attacks used in Penetration Testing – Defending Against Social Engineering Attacks. Physical Penetration Attacks: Why A Physical Penetration is important – Conducting a Physical Penetration – Common Ways into A Building. Insider Attacks: Why Simulating an Insider Attack is Important – Conducting an Insider Attack – Defending against Insider Attack. **Applications**: Understand the network protocols and port scanning techniques using Kali linux **Video link / Additional online information (related to module if any):** https://www.digimat.in/nptel/courses/video/106106178/L34.html	**10 Hrs**
UNIT-III	
Understanding and Detecting Content-Type Attacks: How do Content-Type Attacks work? - Which File Formats are Being Exploited Today? - Tools to Detect Malicious PDF Files – Tools to test your Protections against Content-Type Attacks – How to protect your Environment from	**10 Hrs**

Content-Type Attacks. Web Application Security Vulnerabilities: Overview of Top Web Application Security Vulnerabilities – SQL Injection Vulnerabilities – Cross-Site Scripting Vulnerabilities. VoIP Attacks

Applications: Familiarizing with different types of attacks such as sniffing, spoofing etc

Video link / Additional online information (related to module if any):

https://nptel.ac.in/courses/106/106/106106199/

UNIT-IV	
Passive Analysis: Ethical Reverse Engineering – Why Bother with Reverse Engineering? – Source Code Analysis. Advanced Reverse Engineering: Overview of Software Development Process – Instrumentation Tools – Fuzzing – Instrumented Fuzzying Tools and Techniques. Finding New Browser Based Vulnerabilities. Mitigation Alternatives	**10 Hrs**
Applications: Exploiting buffer overflow vulnerabilities	
Video link / Additional online information (related to module if any):	
https://www.youtube.com/watch?v=9dd3M2a4LKI	
UNIT-V	
Collecting Malware and Initial Analysis: Malware – Latest Trends in Honeynet Technology – Catching Malware – Initial Analysis of Malware. Hacking Malware: Trends in Malware – DeObfuscating Malware – Reverse Engineering Malware.	**10 Hrs**
Applications: Understand the protection mechanism to prevent against various server attacks.	
Video link / Additional online information (related to module if any):	
https://nptel.ac.in/noc/courses/noc15/SEM1/noc15-cs03/	

Course Outcomes: After completing the course, the students will be able to	
CO1	Understand the Ethics Of Ethical Hacking.
CO2	Identify the Social Engineering Attacks.
CO3	Recognize and Detect Types of Attacks.
CO4	Manage Instrumented Fuzzying Tools and Techniques.
CO5	Collect Malware and Initial Analysis.

Reference Books	
1.	Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, Terron Williams, ―Gray Hat Hacking The Ethical Hackers Handbook‖, 3rd Edition, 2011
2.	Sharma Pankaj, ―Hacking‖, APH Publishing, 2005
3.	Rajat Khare, ―Network Security and Ethical Hacking‖, Luniver Press, 2006.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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Semester End Examination (SEE):

Total marks: 50+50=100

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CO4	3	3	3	3	-	3	2	2	2	2	-	3	2	-
CO5	3	3	3	3	-	3	2	2	3	2	-	3	2	-

High-3, Medium-2, Low-1

Semester: VI		
ANGULAR JS AND NODE JS		
(Theory & Lab)		
Course Code: MVJ21AEC66		**CIE Marks:100**
Credits: L:T:P:S: 2:0:0:0		**SEE Marks: 100**
Hours: 40L		**SEE Duration: 3 Hrs**
Course Learning Objectives: The students will be able to		
1	To learn the basics of Angular JS.	
2	To understand the Angular JS Modules	
3	To implement Forms, inputs and Services	
4	To implement Directives and Databases	
5	To understand basics of Node JS.	

UNIT-I	
Introduction To Angular JS: Introduction – Features – Angular JS Model-View-Controller – Expression -Directives and Controllers.	**6Hrs**
UNIT-II	
Angular JS Modules: Arrays –Working with ng-model – Working with Forms – Form Validation – Error Handling with Forms – Nested Forms with ng-form – Other Form Controls.	**6Hrs**
UNIT-III	
Directives& Building Databases: Part I- Filters – Using Filters in Controllers and Services – Angular JS Services – Internal Angular JS Services – Custom Angular JS Services	**6Hrs**
UNIT-IV	
Directives& Building Databases: Part-II- Directives – Alternatives to Custom Directives – Understanding the Basic options – Interacting with Server –HTTP Services – Building Database, Front End and BackEnd	**6Hrs**
UNIT-V	
Introduction to NODE .JS: Introduction –Using the Terminals – Editors – Building a Webserver with Node – The HTTP Module – Views and Layouts.	**6Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Describe the features of Angular JS.
CO2	Recognize the form validations and controls.
CO3	Implement Directives and Controllers
CO4	Evaluate and create database for simple application.
CO5	Plan and build webservers with node using Node .JS.

Reference Books	
1	Adam Freeman - ProAngular JS, Apress, First Edition, 2014.
2	ShyamSeshadri, Brad Green –"AngularJS: Up and Running: Enhanced Productivity with Structured Web Apps", Apress, O'Reilly Media, Inc.

3.	AgusKurniawan–"AngularJS Programming by Example", First Edition, PE Press, 2014.
4.	Brad Dayley, "Learning Angular JS", Addison-Wesley Professional, First Edition, 2014.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

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CO4	3	2	3	2	1	-	-	-	-	2	3	2
CO5	3	2	3	1	-	-	-	-	-	2	3	2

High-3, Medium-2, Low-1