

Semester: VII		
INTERNET OF THINGS AND LAB (Theory and Practice)		
Course Code:	MVJ21CS71	CIE Marks:50+50
Credits:	4	SEE Marks: 50 +50
Hours:		SEE Duration: 03+03 Hours
<b>Course (Theory) Learning Objectives: The students will be able to</b>		
1	Learn the basic issues, policy and challenges in the Internet.	
2	Get an idea of some of the application areas where Internet of Things can be applied.	
3	Understand the cloud and internet environment.	
4	Understand the various modes of communications with Internet.	
<b>Course (Practice) Learning Objectives: The students will be able to</b>		
1	Understand the concepts of Internet of Things.	
2	Analyse basic protocols in wireless sensor network.	
3	Design IoT applications in different domain and be able to analyze their performance	
4	Implement basic IoT applications on embedded platform.	

UNIT-I	
<p><b>Prerequisites : Basic Knowledge about C or C++</b></p> <p><b>Introduction to IoT:</b> Definition – Foundations – Challenges and Issues - Identification - Security. Components in internet of things: Control Units – Sensors – Communication modules –Power Sources – Communication Technologies – RFID – Bluetooth – Zigbee – Wifi – Rflinks –Mobile Internet – Wired Communication-IoT Platform Overview-Raspberry pi-Arduino boards.*</p> <p><b>Applications:</b> Sensors in IoT.</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="http://www.theinternetofthings.eu/what-is-the-internet-of-things">http://www.theinternetofthings.eu/what-is-the-internet-of-things</a>.</li> <li>• <a href="https://www.engineersgarage.com/article_page/sensors-different-types-of-sensors/">https://www.engineersgarage.com/article_page/sensors-different-types-of-sensors/</a></li> <li>• <a href="https://www.educba.com/applications-of-sensors/">https://www.educba.com/applications-of-sensors/</a></li> </ul> <p><b>* Programming Assignments are Mandatory.</b></p>	<b>Hrs 8</b>
UNIT-II	
<p><b>IoT Protocols:</b> Protocol Standardization for IoT-M2M and WSN Protocols-SCADA and RFID Protocols-Issues with IoT Standardization-Protocols-IEEE 802.15.4-BACNet Protocol-Zigbee Architecture - Network layer – APS Layer – Security.*</p> <p><b>Applications:</b></p>	<b>Hrs 8</b>

IoT Protocol Applications

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

- <https://inductiveautomation.com/resources/article/what-is-scada>
- <https://iotbytes.wordpress.com/application-protocols-for-iot/>
- <https://data-flair.training/blogs/iot-protocols/>
- <https://www.avsystem.com/blog/iot-protocols-and-standards/>

**\* Programming Assignments are Mandatory.**

### UNIT-III

Resource Management in the Internet of Things: Clustering - Software Agents - Data Synchronization - Clustering Principles in an Internet of Things Architecture - The Role of Context - Design Guidelines -Software Agents for Object – Data Synchronization- Types of Network Architectures - Fundamental Concepts of Agility and Autonomy-Enabling Autonomy and Agility by the Internet of Things - The Evolution from the RFID-based EPC Network to an Agent based Internet of Things- Agents for the Behaviour of Objects.\*

**Applications:** RFID Applications

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

RFID Applications:

- <https://www.digiteum.com/rfid-technology-internet-of-things>
- <https://www.uio.no/studier/emner/matnat/ifi/INF5910CPS/h10/undervisningsmateriale/RFID-IoT.pdf>

**\* Programming Assignments are Mandatory.**

### UNIT-IV

**Case Study and IoT Application Development:** IoT applications in home-infrastructures security-Industries- IoT electronic equipment's. Use of Big Data and Visualization in IoT Industry 4.0 concepts - Sensors and sensor Node –Interfacing using Raspberry Pi/Arduino- Web Enabled Constrained Devices.

**Laboratory Sessions/ Experimental learning:** Interfacing using Raspberry Pi/Arduino

**Applications:** Elements in group

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

- <https://www.simform.com/home-automation-using-internet-of-things/>
- <https://iot5.net/iot-applications/smart-home-iot-applications/>
- <https://maker.pro/raspberry-pi/tutorial/how-to-connect-and-interface->

**Hrs 8**

**Hrs 8**

raspberry-pi-with-arduino# <ul style="list-style-type: none"> <li>• <a href="https://create.arduino.cc/projecthub/ruchir1674/how-to-interface-arduino-with-raspberrypi-504b06">https://create.arduino.cc/projecthub/ruchir1674/how-to-interface-arduino-with-raspberrypi-504b06</a></li> </ul> <p><b>* Programming Assignments are Mandatory.</b></p>	
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**UNIT-V**

<p><b>Web of Things:</b> Web of Things versus Internet of Things-Architecture Standardization for WoT-Platform Middleware for WoT- WoT Portals and Business Intelligence-Cloud of Things: Grid/SOA and Cloud Computing-Cloud Standards – Cloud of Things Architecture-Open Source e-Health sensor platform.</p> <p>Video link / Additional online information (related to module if any):</p> <ul style="list-style-type: none"> <li>• <a href="https://www.water-io.com/iot-vs-wot">https://www.water-io.com/iot-vs-wot</a></li> <li>• <a href="https://www.talend.com/resources/iot-cloud-architecture/">https://www.talend.com/resources/iot-cloud-architecture/</a></li> </ul> <p><b>* Programming Assignments are Mandatory.</b></p>	<b>Hrs 8</b>
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**LABORATORY EXPERIMENTS**

SL No	Experiment	Hrs
1	Familiarization with Arduino/Raspberry Pi and perform necessary software installation.	3
2	To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.	3
3	To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.	3
4	To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.	3
5	To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.	3
6	To interface Push button/Digital sensor (IR/LDR) with Arduino / Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.	3
7	To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.	3
8	Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.	3
9	To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.	3

**Course (Theory) Outcomes: After completing the course, the students will be able to**

CO1	Identify the components of IoT.
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CO2	Analyze various protocols of IoT.
CO3	Design portable IoT using appropriate boards
CO4	Develop schemes for the applications of IOT in real time scenarios.
CO5	Design business Intelligence and Information Security for WoT
<b>Course (Practice) Outcomes: After completing the course, the students will be able to</b>	
CO1	To understand how sensors and embedded systems work
CO2	Design and implement an accessory with BLE connectivity using standard mobile application development tools
CO3	To understand how to communicate with other mobile devices using various communication platforms such as Bluetooth and Wi-Fi.
CO4	Develop and demonstrate applications e.g. smartphone-based, sensor station
CO5	To understand how to program on embedded and mobile platforms.
<b>Text Books</b>	
1	Honbo Zhou, "The Internet of Things in the Cloud:A Middleware Perspective" -CRC Press-2012.
2	Dieter Uckelmann, Mark Harrison, "Architecting the Internet of Things", Springer2011.
<b>Reference Books:</b>	
1	Arshdeep Bahga, Vijay Madiseti, "Internet of Things (A Hands-On-Approach)", VPT, 2014.
2	Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocols", Wiley, 2012.
3	Luigi Atzori, Antonio Lera, Giacomo Morabito, "The Internet of Things: A Survey", Journal on Networks, Elsevier Publications, October, 2010.

### **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.

#### **Laboratory- 50 Marks**

The laboratory session is held every week as per the timetable 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 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 subdivisions. 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 (Theory)**

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

**CO-PO/PSO Mapping (Practice)**

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

High-3, Medium-2, Low-1

**Semester: VII**

**ARTIFICIAL INTELLIGENCE**

**(Theory)**

**Course Code: MVJ21CS721**

**CIE Marks:100**

**Credits: L:T:P:S: 3:0:0:0**

**SEE Marks: 100**

**Hours: 40L**

**SEE Duration: 3 Hrs**

**Course Learning Objectives: The students will be able to**

- |   |  |
|---|--|
| 1 | Describe the basic principles, techniques, and applications of Artificial Intelligence |
| 2 | Analyze and explain different AI learning methods                                      |
| 3 | Compare and contrast different AI techniques available.                                |

<b>UNIT-I</b>	
<p><b>INTRODUCTION:</b> What Is AI? The Foundations of Artificial Intelligence, The History of Artificial Intelligence, The State of the Art.</p> <p>Intelligent Agents: Agents and Environments ,Good Behavior: The Concept of Rationality ,The Nature of Environments, The Structure of Agents.Knowledge Representation Issues, Using Predicate Logic, Representing knowledge using Rules.</p> <p><b>Video Links</b></p> <ul style="list-style-type: none"> <li>• <a href="https://www.youtube.com/watch?v=3MW3ICnkQ9k">https://www.youtube.com/watch?v=3MW3ICnkQ9k</a></li> </ul>	<b>8Hrs</b>
<b>UNIT-II</b>	
<p><b>PROLOG-</b> The natural Language of Artificial Intelligence: Introduction, Converting English to Prolog Facts and Rules, Goals, Prolog Terminology, Variables, Control Structures, Arithmetic operators, Matching in Prolog, Backtracking, Cuts, Recursion, Lists, Dynamic databases, Input/Output and Streams</p> <p><b>Using Predicate Logic:</b> Representing simple facts in logic, representing instance and ISA relationships, Computable Functions and Predicates, Resolution, NaturalDeduction.</p> <p><b>Video Links:</b></p> <p><a href="https://www.youtube.com/watch?v=pzUBrJLIESU">https://www.youtube.com/watch?v=pzUBrJLIESU</a></p>	<b>8Hrs</b>
<b>UNIT-III</b>	
<p><b>Heuristic search techniques:</b> Generate and test, Hill Climbing, Best First Search,Problem Reduction, Constraint Satisfaction, Means-ends Analysis.</p> <p><b>Weak Slot- and- Filler Structures:</b> Semantic Nets ,Frames.</p> <p><b>Strong slot-and Filler Structures-</b> Conceptual Dependency, Scripts.</p> <p><b>Video Links:</b></p> <p><a href="https://www.youtube.com/watch?v=ieZr_TpRwnQ">https://www.youtube.com/watch?v=ieZr_TpRwnQ</a></p>	<b>8Hrs</b>
<b>UNIT-IV</b>	

<p><b>Game Playing</b> :Overview, Minimax Search Procedure, Adding alpha beta cut off, Additional Refinements, Iterative Deepening, References on Specific games.</p> <p><b>Learning:</b> What is learning?, Forms of learning, Rote learning, learning by taking advice, Learning in problem solving, Induction leaning, Explanation based learning, Discovery, A <b>Video Links:</b></p> <p><a href="https://www.youtube.com/watch?v=_i-lZcbWkpsnalogy">https://www.youtube.com/watch?v=_i-lZcbWkpsnalogy</a>, Formal learning Theory, Neural Network Learning.</p>	<b>8Hrs</b>
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**UNIT-V**

<p><b>Natural Language Processing:</b> Syntactic Processing, Semantic Analysis, Discourse and Pragmatic processing, Statistical Natural language processing and Spell checking.</p> <p><b>Genetic Algorithms:</b> A peek into the biological world, Genetic Algorithms(GAs),Significance of genetic operators, termination parameters, niching and speciation, evolving neural network, theoretical grounding.</p> <p><b>Video Links:</b> <a href="https://www.youtube.com/watch?v=zG8AJhVy5NY">https://www.youtube.com/watch?v=zG8AJhVy5NY</a></p>	<b>8Hrs</b>
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**Course Outcomes: After completing the course, the students will be able to**

CO1	Identify AI based problems and understand Intelligent agents
CO2	Apply predicate logic and heuristic techniques to solve AI problems.
CO3	Understand the different representation of knowledge.
CO4	Understand the concepts of learning and Natural Language Processing.
CO5	Understand Genetic Algorithms and solve AI problems using PROLOG.

**Reference Books**

<b>1.</b>	Artificial Intelligence: A Modern Approach, Stuart Rusell, Peter Norving, Pearson  Education 2nd Edition
<b>2.</b>	E. Rich , K. Knight & S. B. Nair - Artificial Intelligence, 3/e, McGraw Hill.



<b>3.</b>	Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems – Prentice Hal of India.
<b>4.</b>	G. Luger, “Artificial Intelligence: Structures and Strategies for complex problem Solving”, Fourth Edition, Pearson Education, 2002.

**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.

<b>CO-PO Mapping</b>												
<b>CO/PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	2	3	1	2	-	-	-	-	-	-	-	2
<b>CO2</b>	3	3	2	3	1	-	-	-	-	-	-	2
<b>CO3</b>	3	3	2	3	1	-	-	-	-	-	-	2

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

High-3, Medium-2, Low-1

<b>Semester: VII</b>		
<b>GREEN COMPUTING</b>		
<b>Course Code:</b>	<b>MVJ21CS722</b>	<b>CIE Marks:50</b>
<b>Credits:</b>	<b>3</b>	<b>SEE Marks: 50</b>
<b>Hours:</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.	
2	Skill in energy saving practices in their use of hardware.	
3	Examine technology tools that can reduce paper waste and carbon footprint by user and to understand how to minimize equipment disposal requirements	

<b>UNIT-I</b>	
<b>FUNDAMENTALS:</b> Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies:	<b>Hrs 8</b>

<p>Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.</p> <p><b>Real Time Applications:</b> how they keep data safe while in transit</p> <p><b>Video link / Additional online information:</b></p> <ul style="list-style-type: none"> <li>• <a href="https://nptel.ac.in/courses/106/104/106104182/">https://nptel.ac.in/courses/106/104/106104182/</a></li> <li>• <a href="https://www.youtube.com/watch?v=350Rb2sOc3U">https://www.youtube.com/watch?v=350Rb2sOc3U</a></li> </ul>	
<b>UNIT-II</b>	
<p><b>GREEN ASSETS AND MODELING :</b>Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.</p> <p><b>Real Time Applications:</b> climate-smart agriculture, land restoration, groundwater management, ecosystem-based adaptation</p> <p><b>Video link / Additional online information:</b></p> <ul style="list-style-type: none"> <li>• <a href="https://nptel.ac.in/courses/110/107/110107128/">https://nptel.ac.in/courses/110/107/110107128/</a></li> <li>• <a href="https://nptel.ac.in/courses/110/107/110107093/">https://nptel.ac.in/courses/110/107/110107093/</a></li> </ul>	<b>Hrs 8</b>
<b>UNIT-III</b>	
<p><b>GRID FRAMEWORK :</b>Virtualizing of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.</p> <p><b>Real Time Applications:</b> ChessBrain</p> <p><b>Video link / Additional online information:</b></p> <ul style="list-style-type: none"> <li>• <a href="https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ee42/">https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ee42/</a></li> <li>• <a href="https://onlinecourses.nptel.ac.in/noc19_ee64/preview">https://onlinecourses.nptel.ac.in/noc19_ee64/preview</a></li> </ul>	<b>Hrs 8</b>
<b>UNIT-IV</b>	
<p><b>GREEN COMPLIANCE :</b>Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.</p> <p><b>Real Time Applications:</b> Addressing Inconsistent Date Formats, Reducing False Positives in PEP Screening, Integrating Screening with Credit Card Approval Processes.</p> <p><b>Video link / Additional online information:</b></p> <ul style="list-style-type: none"> <li>• <a href="https://onlinecourses.nptel.ac.in/noc19_ee64/preview">https://onlinecourses.nptel.ac.in/noc19_ee64/preview</a></li> </ul>	<b>Hrs 8</b>
<b>UNIT-V</b>	

<p><b>CASE STUDIES :</b>The Environmentally Responsible Business Strategies (ERBS)  – Case Study Scenarios for Trial Runs – Case Studies Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.</p> <p><b>Real Time Applications:</b> The energy consumption in Torrent systems with malicious content, The use of thin client instead of desktop PC</p> <p><b>Video link / Additional online information:</b></p> <ul style="list-style-type: none"> <li>• <a href="https://nptel.ac.in/courses/106/105/106105195/">https://nptel.ac.in/courses/106/105/106105195/</a></li> <li>• <a href="https://nptel.ac.in/courses/106/104/106104182/">https://nptel.ac.in/courses/106/104/106104182/</a></li> </ul>	<b>Hrs 8</b>
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<b>Course Outcomes: After completing the course, the students will be able to</b>	
CO1	Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.
CO2	Enhance the skill in energy saving practices in their use of hardware.
CO3	Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders.
CO4	Understand the ways to minimize equipment disposal requirements.
CO5	Carry out multiple real time case studies.
<b>Text Books</b>	
1	Bhuvan Unhelkar, “Green IT Strategies and Applications-Using Environmental Intelligence”, CRC Press, June 2011
2	Woody Leonhard, Katherrine Murray, “Green Home computing for dummies”, August 2009.

<b>Reference Books</b>	
1	Bhuvan Unhelkar, Green IT Strategies and Applications-Using Environmental Intelligence, CRC Press, June 2014.
2	Woody Leonhard, Katherine Murray, Green Home computing for dummies, August 2012.
3	Alin Gales, Michael Schaefer, Mike Ebbers, “Green Data Center: steps for the Journey”, Shoff/IBM rebook, 2011.
4	Carl speshocky, “Empowering Green Initiatives with IT”, John Wiley & Sons, 2010.
5	Wu Chun Feng (editor), “Green computing: Large Scale energy efficiency”, CRC Press, 2012.

**Continuous Internal Evaluation (CIE):**

**Theory for 50 Marks**

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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														
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CO1	3	-	-	-	1	-	-	-	-	-	-	2	1	-
CO2	3	3	3	-	-	-	-	-	1	-	1	2	2	-
CO3	2	2	2	1	3	-	-	-	-	-	1	3	2	3
CO4	3	2	3	-	-	-	-	-	-	2	3	2	2	-
CO5	3	2	3	-	-	-	-	-	-	2	3	2	1	2

High-3, Medium-2, Low-1

Semester: VII		
ETHICAL HACKING		
Course Code:	MVJ21CS723	CIE Marks:50
Credits:	3	SEE Marks: 50
Hours:		SEE Duration: 3 Hrs
<b>Course Learning Objectives: The students will be able to</b>		
1	Understand numerous methods of real-world information intelligence	
2	Learn about vulnerability scanners	
3	Understand techniques used to sniff traffic across a network	
4	Familiarize with the methodologies that can be used to hack into a target.	
5	Appreciate the wide variety of attacks that can be performed against a wireless network	
UNIT-I		
<b>INTRODUCTION TO HACKING</b> : Terminologies, Categories of Penetration Test, Writing Reports, Structure of a Penetration Testing Report, Vulnerability Assessment Summary, Risk Assessment, Methodology, Linux Basics: File Structure, Cron Job, Users, Common Applications , BackTrack, Services.		<b>Hrs</b> <b>8</b>

<p><b>Applications:</b> Network packet analysis, Password guessing and cracking</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_process.htm">https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_process.htm</a></li> <li>• <a href="https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_hacker_types.htm">https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_hacker_types.htm</a></li> </ul>	
<p><b>UNIT-II</b></p>	
<p><b>INFORMATION GATHERING, TARGETENUMERATION AND PORT SCANNING TECHNIQUES</b></p> <p>Active, Passive and Sources of information gathering, Copying Websites Locally, NeoTrace, Cheops-ng, Intercepting a Response, WhatWeb, Netcraft, Basic Parameters, Xcode Exploit Scanner, Interacting with DNS Servers, Fierce, Zone Transfer with Host Command and Automation, DNS Cache Snooping- Attack Scenario, Automating Attacks, SNMP - Problem, Sniffing Passwords, Solar Winds Toolset, sweep, Brute Force and Dictionary- Tools , Attack, Enumeration, Intelligence Gathering Using Shodan, Target enumeration and Port Scanning Techniques.</p> <p>Applications: Session hijacking, Session spoofing</p> <p>Video link / Additional online information (related to module if any):</p> <ul style="list-style-type: none"> <li>• <a href="https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_enumeration.htm">https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_enumeration.htm</a></li> <li>• <a href="https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_sniffing.htm">https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_sniffing.htm</a></li> </ul>	<p><b>Hrs 8</b></p>
<p><b>UNIT-III</b></p>	
<p><b>VULNERABILITY ASSESSMENT &amp; NETWORKSNIFFING</b> : Introduction to Vulnerability Assessment - Pros and Cons, NMap, Updation of database, Testing SCADA Environments with Nmap, Nessus, Sniffing: Types, Hubs versus Switches, Modes, MITM Attacks, ARP Protocol Basics- working, Attacks, DoS Attacks, Dsniff tool, Using ARP Spoof to Perform MITM Attacks, Sniffing the Traffic with Dsniff, Sniffing Pictures with Drifnet, Urlsnarf and Webspy, Sniffing with Wireshark, Ettercap- ARP Poisoning, Hijacking Session with MITM Attack, ARP Poisoning with Cain and Abel, Sniffing Session Cookies with Wireshark, Hijacking the Session, SSL Strip: Stripping HTTPS Traffic, Requirements, Automating Man in the Middle Attacks, DNS Spoofing, DHCP Spoofing</p> <p>Applications: Network traffic sniffing, Denial of Service attacks</p> <p>Video link / Additional online information (related to module if any):</p> <ul style="list-style-type: none"> <li>• <a href="https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_sniffing.htm">https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_sniffing.htm</a></li> <li>• <a href="https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_tcp_ip_hijacking.htm">https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_tcp_ip_hijacking.htm</a></li> </ul>	<p><b>Hrs 8</b></p>
<p><b>UNIT-IV</b></p>	

**Understanding Network Protocols:** Attacking Network Remote Services, Common Target Protocols, tools for cracking network remote services, Attacking SMTP, Attacking SQL Servers, Client Side Exploitation Methods: E-Mails Leading to Malicious Attachments & Malicious Links, Compromising Client Side Update, Malware Loaded on USB Sticks

**Post exploitation:** Acquiring Situation Awareness, Privilege Escalation, Maintaining Access, Data Mining, Identifying and Exploiting Further Targets, Windows Exploit Development Basics.

**Applications:** Exploiting buffer overflow vulnerabilities

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

- [https://www.tutorialspoint.com/ethical\\_hacking/ethical\\_hacking\\_sql\\_injection.htm](https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_sql_injection.htm)
- [https://www.tutorialspoint.com/ethical\\_hacking/ethical\\_hacking\\_exploitation.htm](https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_exploitation.htm)

**Hrs**  
**8**

**UNIT-V**

**WIRELESS & WEB-HACKING**

**Wireless Hacking :** Requirements , Aircracking , Hidden SSIDs , Monitor Mode , Monitoring Tool- Beacon Frames on Wireshark ,Airodump-ng , Wireless Adapter in Monitor Mode , Determining the Target , Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng , Capturing Packets and Four-Way Handshake.

**Web Hacking :** Attacking the Authentication , Brute Force and Dictionary Attacks , Types of Authentication , Crawling Restricted Links , Testing for the Vulnerability , Authentication Bypass with Insecure Cookie Handling , SQL injection, XSS – DOM based,BeEF,CSRF, Bypassing CSRF and BeEF with XSS, Vulnerability in FCKeditor, efront.

**Applications:** Cross Site Scripting, Firewall

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

- [https://www.tutorialspoint.com/ethical\\_hacking/ethical\\_hacking\\_ddos\\_attacks.htm](https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_ddos_attacks.htm)
- [https://www.tutorialspoint.com/ethical\\_hacking/ethical\\_hacking\\_wireless.htm](https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_wireless.htm)

**Hrs**  
**8**

**Course Outcomes: After completing the course, the students will be able to**

CO1	Understand the core concepts related to malware, hardware and software vulnerabilities and their causes
CO2	Understand ethics behind hacking and vulnerability disclosure
CO3	Appreciate the Cyber Laws and impact of hacking Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies
CO4	Learn & understand different network protocols and attack strategies

CO5	Understanding the usefulness of wireless & web hacking
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Text Books	
1	Rafay Baloch ,–Ethical Hacking and Penetration Testing Guide  , CRC Press, 2015.
2	Patrick Engebretson, –The Basics of Hacking and Penetration Testing : Ethical Hacking and Penetration Testing Made Easy  , Syngress Media, Second Revised Edition, 2013.

Reference Books:	
1	Michael T. Simpson, Kent Backman, James E. Corley, –Hands On Ethical Hacking

### 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	3	3	1	-	-	-	-	1	-	-	-	3	2	-
CO2	3	3	1	-	-	-	-	2	-	1	-	3	2	-
CO3	3	3	1	2	-	-	-	-	-	1	-	3	-	2
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: VII		
CYBER SECURITY		
Course Code:	MVJ21CS724	CIE Marks:50
Credits:	3	SEE Marks: 50
Hours:		SEE Duration: 3 Hrs
<b>Course Learning Objectives: The students will be able to</b>		
1	Understand Ethical Hacking.	
2	Understand Preventing, monitoring, and responding to data breaches and cyber-attacks.	
3	Learn the key components of cyber security network architecture.	
4	Analyse cyber security architecture principles	

UNIT-I	
<p>A web security forensic lesson, web languages, introduction to different web attacks, overview of n-tier web applications; Web servers: Apache, IIS, database servers, introduction and overview of cybercrime, nature and scope of cybercrime, types of cybercrime: social engineering, categories of cybercrime, property cybercrime.</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://nptel.ac.in/courses/106/106/106106129/">https://nptel.ac.in/courses/106/106/106106129/</a></li> </ul>	<b>Hrs 8</b>
UNIT-II	
<p>Public key cryptography, RSA, online shopping, payment gateways, unauthorized access to computers, computer intrusions, white collar crimes, viruses and malicious code, internet hacking and cracking, virus attacks, pornography, software piracy, intellectual property, mail bombs, exploitation, stalking and obscenity in internet, digital laws and legislation, law enforcement roles and responses.</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://www.youtube.com/watch?v=6qdmriq2tWA">https://www.youtube.com/watch?v=6qdmriq2tWA</a></li> </ul>	<b>Hrs 8</b>
UNIT-III	
<p>Web hacking basics HTTP and HTTPS URL, web under the cover overview of java security reading the HTML source, applet security, servlets security, symmetric and asymmetric encryptions, network security basics, firewalls and IDS. Investigation: Introduction to cybercrime investigation, investigation tools, e-discovery, digital</p>	<b>Hrs 8</b>

evidence collection, evidence preservation, e-mail investigation, e-mail tracking, IP tracking, e-mail recovery, hands on case studies; Encryption and Decryption methods, search and seizure of computers, recovering deleted evidences, password cracking <b>Video link / Additional online information (related to module if any):</b> <ul style="list-style-type: none"> <li>• <a href="https://nptel.ac.in/courses/106/105/106105217/">https://nptel.ac.in/courses/106/105/106105217/</a></li> </ul>	
<b>UNIT-IV</b>	
Digital certificates, hashing, message digest, and digital signatures; Digital forensics: Introduction to digital forensics, forensic software and hardware, analysis and advanced tools, forensic technology and practices, forensic ballistics and photography, face, iris and fingerprint recognition, audio video analysis, windows system forensics, Linux system forensics, network forensics. <b>Video link / Additional online information (related to module if any):</b> <ul style="list-style-type: none"> <li>• <a href="https://www.digimat.in/nptel/courses/video/106106178/L05.html">https://www.digimat.in/nptel/courses/video/106106178/L05.html</a></li> </ul>	<b>Hrs 8</b>
<b>UNIT-V</b>	
Basics, secure JDBC, securing large applications, cyber graffiti; Laws and acts: Laws and ethics, digital evidence controls, evidence handling procedures, basics of Indian Evidence Act IPC and CrPC, electronic communication privacy act, legal policies. <b>Video link / Additional online information (related to module if any):</b> <ul style="list-style-type: none"> <li>• <a href="https://www.youtube.com/watch?v=F7mH5vz1qEI">https://www.youtube.com/watch?v=F7mH5vz1qEI</a></li> </ul>	<b>Hrs 8</b>

<b>Course Outcomes: After completing the course, the students will be able to</b>	
CO1	Analyse and resolve security issues in networks and computer systems to secure an IT infrastructure.
CO2	Design, develop, test and evaluate secure software.
CO3	Develop policies and procedures to manage enterprise security risks.
CO4	Evaluate and communicate the human role in security systems with an emphasis on ethics, social engineering vulnerabilities and training.
CO5	Assess cyber-security risk management policies in order to adequately protect an organization

<b>Text Books</b>	
1	Mc Clure, Stuart, Saumil Shah, Shreeraj Shah, –Web Hacking: Attacks and Defense  , AddisonWesley Professional, Illustrated Edition, 2003.
2	Garms, Jess, Daniel Somerfield, –Professional Java Security  , WroxPress, Illustrated Edition, 2001.

Reference Books:	
1	Nelson Phillips, EinfingerSteuart, –Computer Forensics and Investigations  , Cengage Learning, New Delhi,2009.
2	Kevin Mandia, Chris Prosis, Matt Pepe, –Incident Response and Computer Forensics –, Tata McGraw Hill,2009
3	Robert M Slade, –Software Forensics  , Tata McGraw Hill, New Delhi, 1st Edition,2005.

### 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	3	3	1	-	-	-	-	1	-	-	-	3	2	-
CO2	3	3	1	-	-	-	-	2	-	1	-	3	2	-
CO3	3	3	1	2	-	-	-	-	-	1	-	3	-	2
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

<b>Course Code:</b>	<b>MVJ21CS725</b>	<b>CIE Marks:50</b>
<b>Credits:</b>	<b>3</b>	<b>SEE Marks: 50</b>
<b>Hours:</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	Focuses on development of algorithms and techniques to analyze and interpret the visible world around us.	
2	Understand the fundamental concepts related to multi-dimensional signal processing, feature extraction, pattern analysis visual geometric modeling, stochastic optimization etc.	
3	Explore the applications ranging from Biometrics, Medical diagnosis, document processing, mining of visual content, to surveillance, advanced rendering etc.	

<b>UNIT-I</b>	
<b>DIGITAL IMAGE FORMATION AND LOW-LEVEL PROCESSING</b>	<b>Hrs 8</b>
Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing	
<b>Video link / Additional online information:</b>	
<ul style="list-style-type: none"> <li>• <a href="https://www.youtube.com/watch?v=CVV0TvNK6pk">https://www.youtube.com/watch?v=CVV0TvNK6pk</a></li> </ul>	
<b>UNIT-II</b>	
<b>DEPTH ESTIMATION AND MULTI-CAMERA VIEWS</b>	<b>Hrs 8</b>
Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration.	
<b>Video link / Additional online information:</b>	
<ul style="list-style-type: none"> <li>• <a href="http://www.cse.iitm.ac.in/~vplab/computer_vision.html">http://www.cse.iitm.ac.in/~vplab/computer_vision.html</a></li> </ul>	
<b>UNIT-III</b>	
<b>FEATURE EXTRACTION</b>	<b>Hrs 8</b>
Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.	
<b>Video link / Additional online information:</b>	
<ul style="list-style-type: none"> <li>• <a href="https://nptel.ac.in/courses/106/106/106106046/">https://nptel.ac.in/courses/106/106/106106046/</a></li> </ul>	
<b>UNIT-IV</b>	
<b>IMAGE SEGMENTATION</b>	<b>Hrs 8</b>
Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection.	

<b>Video link / Additional online information:</b>	
<ul style="list-style-type: none"> <li>• <a href="https://nptel.ac.in/courses/117/105/117105079/">https://nptel.ac.in/courses/117/105/117105079/</a></li> </ul>	
<b>UNIT-V</b>	
<b>PATTERN ANALYSIS</b>	<b>Hrs 8</b>
Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods.	
<b>Video link / Additional online information:</b>	
<ul style="list-style-type: none"> <li>• <a href="https://www.youtube.com/watch?v=mfePdDh9t6Q">https://www.youtube.com/watch?v=mfePdDh9t6Q</a></li> </ul>	

<b>Course Outcomes: After completing the course, the students will be able to</b>	
CO1	Understand the concepts of Digital Image Processing.
CO2	Analyse Homography and stereopsis.
CO3	Analyse Edges and Hough Transforms.
CO4	Demonstrate the ideas of image Segmentation.
CO5	Implement the concepts of Pattern Analysis.

<b>Text Books</b>	
1	Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited 2011.
2	Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, 2003.

<b>Reference Books:</b>	
1	Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004.
2	K. Fukunaga; Introduction to Statistical Pattern Recognition, Second Edition, Academic Press, Morgan Kaufmann, 1990.
3	R.C. Gonzalez and R.E. Woods, Digital Image Processing, Addison- Wesley, 1992.

### **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.

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

High-3, Medium-2, Low-1

<b>Semester: VII</b>		
<b>GAME DESIGN &amp; DEVELOPMENT (Theory)</b>		
<b>Course Code:</b>	<b>MVJ21CS731</b>	<b>CIE Marks:50</b>
<b>Credits:</b>	<b>3</b>	<b>SEE Marks: 50</b>
<b>Hours:</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	Understand the concepts of Game design and development.	
2	Learn the processes, mechanics and issues in Game Design.	

3	Be exposed to the Core architectures of Game Programming.
4	Know about Game programming platforms, frame works and engines. Learn to develop games

<b>UNIT-I</b>	
<b>3D GRAPHICS FOR GAME PROGRAMMING</b>	
3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation, Physics-based Simulation, Scene Graphs.	<b>Hrs 8</b>
<b>UNIT-II</b>	
<b>GAME ENGINE DESIGN</b>	
Game engine architecture, Engine support systems, Resources and File systems, Game loop and real-time simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling.	<b>Hrs 8</b>
<b>UNIT-III</b>	
<b>GAME PROGRAMMING</b>	
Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management	<b>Hrs 8</b>
<b>UNIT-IV</b>	
<b>GAMING PLATFORMS AND FRAMEWORKS</b>	
2D and 3D Game development using Flash, DirectX, Java, Python, Game engines - Unity. DX Studio.	<b>Hrs 8</b>
<b>UNIT-V</b>	
<b>GAME DEVELOPMENT</b>	
Developing 2D and 3D interactive games using DirectX or Python – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi-Player games.	<b>Hrs 8</b>

<b>Course Outcomes: After completing the course, the students will be able to</b>	
CO1	Discuss the concepts of Game design and development.
CO2	Design the processes, and use mechanics for game development.
CO3	Explain the Core architectures of Game Programming.
CO4	Use Game programming platforms, frame works and engines.
CO5	Create interactive Games

<b>Text/ Reference Books</b>	
1	Mike Mc Shaffrfy and David Graham, "Game Coding Complete", Fourth Edition, Cengage Learning, PTR, 2012.
2	Jason Gregory, "Game Engine Architecture", CRC Press / A K Peters, 2009.

3	David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" 2 nd Editions, Morgan Kaufmann, 2006.
4	Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", 2 nd Edition Prentice Hall / New Riders, 2009.

**Continuous Internal Evaluation (CIE):**

**Theory for 50 Marks**

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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.

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CO3	3	3	3	-	-	-	-	-	-	-	-	-	1	3
CO4	3	3	3	-	-	-	-	-	-	-	-	-	1	2
CO5	2	2	2	-	-	-	-	-	-	-	-	-	2	-

High-3, Medium-2, Low-1

Semester: VII		
CLOUD COMPUTING (Theory)		
<b>Course Code:</b>	<b>MVJ21CS732</b>	<b>CIE Marks:50</b>
<b>Credits:</b>	<b>3</b>	<b>SEE Marks: 50</b>
<b>Hours:</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	Understand the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges;	
2	Introduce the basic ideas and principles in data center design; cloud management techniques and cloud software deployment considerations;	



3	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);
4	Introduce cloud storage technologies and relevant distributed file systems, NoSQL databases and object storage;
5	Discuss the variety of programming models and develop working experience in several of them.

<b>UNIT-I</b>	
<p><b>Introduction to Cloud Computing:</b> 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. Introduction to big data analytics, using MapReduce/Hadoop for analyzing unstructured data, Hadoop ecosystem of tools.</p> <p><b>Applications:</b> Microsoft Azure, Amazon Web Services</p> <p><b>Video link / Additional online information :</b></p> <p>1. <a href="https://www.youtube.com/watch?v=PW-V-72MJNY">https://www.youtube.com/watch?v=PW-V-72MJNY</a></p>	<b>Hrs 8</b>
<b>UNIT-II</b>	
<p><b>'Integration as a Service' Paradigm for the Cloud Era:</b> 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, 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</p> <p><b>Laboratory Sessions/ Experimental learning:</b></p> <p>1. Installation and Configuration of Hadoop.</p> <p><b>Applications:</b> PAAS (Facebook, Google App Engine)</p> <p><b>Video link / Additional online information:</b></p>	<b>Hrs 8</b>

1. <a href="https://www.youtube.com/watch?v=ifZh5SJAujA">https://www.youtube.com/watch?v=ifZh5SJAujA</a>	
<b>UNIT-III</b>	
<p><b>Virtual Machines Provisioning and Migration Services:</b> 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</p> <p><b>Laboratory Sessions/ Experimental learning:</b> Implementation of Para-Virtualization using VM Ware’s Workstation/ Oracle’s Virtual Box and Guest O.S</p> <p><b>Applications:</b> Hardware Virtualization, Operating system Virtualization, Server Virtualization, Storage Virtualization</p> <p><b>Video link / Additional online information :</b></p> <ul style="list-style-type: none"> <li>• <a href="https://www.youtube.com/watch?v=7m3f-P-WWbg">https://www.youtube.com/watch?v=7m3f-P-WWbg</a></li> </ul>	<b>Hrs 8</b>
<b>UNIT-IV</b>	
<p><b>Platform and Software as a Service:</b>Technologies and Tools for Cloud Computing- Aneka Cloud Platform- Aneka Resource Provisioning Service- Hybrid Cloud Implementation - CometCloud Architecture- Autonomic Behavior of CometCloud- Overview of CometCloud-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</p> <p><b>Laboratory Sessions/ Experimental learning:</b> Create an application (Ex: Word Count) using Hadoop Map/Reduce.</p> <p><b>Applications:</b> Schedule book</p> <p><b>Video link / Additional online information :</b></p> <ul style="list-style-type: none"> <li>• <a href="https://www.youtube.com/watch?v=3KJjKY8k9Lk">https://www.youtube.com/watch?v=3KJjKY8k9Lk</a></li> </ul>	<b>Hrs 8</b>
<b>UNIT-V</b>	
<p><b>MapReduce Programming Model and Implementations:</b>MapReduce Programming Model- Major MapReduce Implementations for the Cloud- The Basic Principles of Cloud Computing-A Model for Federated Cloud Computing-</p>	<b>Hrs 8</b>

<p>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</p> <p><b>Laboratory Sessions/ Experimental learning:</b></p> <p>Create your resume in a neat format using google and zoho cloud Programs on PaaS</p> <p><b>Applications:</b> Network Storage, Google Apps and Microsoft office online</p> <p><b>Video link / Additional online information :</b></p> <p>1. <a href="https://www.youtube.com/watch?v=uj2Sb7b_Do0">https://www.youtube.com/watch?v=uj2Sb7b_Do0</a></p>	
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<b>Course Outcomes: After completing the course, the students will be able to</b>	
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.

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

<b>Reference Books:</b>	
1.	Barrie Sosinsky, "Cloud Computing Bible", John Wiley & Sons, 2010.
2.	Tim Mather, Subra Kumaraswamy, and Shahed Latif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", O'Reilly, 2009.

### **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: VII		
BLOCKCHAIN TECHNOLOGY (Theory)		
<b>Course Code:</b>	<b>MVJ21CS733</b>	<b>CIE Marks:50</b>
<b>Credits:</b>	<b>3</b>	<b>SEE Marks: 50</b>
<b>Hours:</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	Familiarise the functional/operational aspects of cryptocurrency ecosystem.	
2	Understand emerging abstract models for Blockchain Technology.	
3	Understand how blockchain systems (mainly Bitcoin and Ethereum) work and how to securely interact with them.	
4	Identify major research challenges and technical gaps existing between theory and practice in cryptocurrency domain.	
5	Design, build, and deploy smart contracts and distributed applications.	

### UNIT-I

<p><b>Basics:</b> Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.</p> <p><b>Applications: Telecommunications, finance, universities</b></p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://coincentral.com/byzantine-generals-problem/">https://coincentral.com/byzantine-generals-problem/</a></li> <li>2. <a href="https://www.tutorialspoint.com/distributed_dbms/distributed_dbms_database_s.htm">https://www.tutorialspoint.com/distributed_dbms/distributed_dbms_database_s.htm</a></li> </ul>	<b>Hrs 8</b>
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**UNIT-II**

<p><b>Blockchain:</b> Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft &amp; Hard Fork, Private and Public blockchain.</p> <p><b>Applications: Government, healthcare</b></p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>2. <a href="https://blockonomi.com/merkle-tree/">https://blockonomi.com/merkle-tree/</a></li> </ul>	<b>Hrs 8</b>
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**UNIT-III**

<p><b>Distributed Consensus:</b> Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.</p> <p><b>Applications:</b> Decentralized Applications, Encrypted messaging applications</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://blockonomi.com/nakamoto-consensus/">https://blockonomi.com/nakamoto-consensus/</a></li> <li>• <a href="https://cointelegraph.com/explained/proof-of-work-explained">https://cointelegraph.com/explained/proof-of-work-explained</a></li> </ul>	<b>Hrs 8</b>
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**UNIT-IV**

<p><b>Cryptocurrency:</b> History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin.</p> <p><b>Applications:</b> Peer - to - peer payment application.</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://blockgeeks.com/guides/smart-contracts/">https://blockgeeks.com/guides/smart-contracts/</a></li> </ul>	<b>Hrs 8</b>
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**UNIT-V**

<p>Cryptocurrency Regulation: Stakeholders, Roots of Bit coin, Legal Aspects-Cryptocurrency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://www.water-io.com/iot-vs-wot">https://www.water-io.com/iot-vs-wot</a></li> <li>2. <a href="https://www.talend.com/resources/iot-cloud-architecture/">https://www.talend.com/resources/iot-cloud-architecture/</a></li> </ul>	<b>Hrs 8</b>
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<b>Course Outcomes: After completing the course, the students will be able to</b>	
CO1	Basic Cryptographic primitives used in Blockchain – Secure, Collision-resistant hash functions, digital signature, public key cryptosystems, zero-knowledge proof systems.
CO2	Policies and applications of Blockchain in Distributed databases.
CO3	Explain the Nakamoto consensus, List and describe differences between proof-of-work and proof-of-stake consensus.
CO4	Design, build, and deploy smart contracts and distributed applications.
CO5	Cryptocurrency governance, regulations and applications.

#### **Textbooks**

- |          |   |
|----------|---|
| <b>1</b> | Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016). |
| <b>2</b> | Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies.  |

#### **Reference Books:**

1.	Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System.
2.	DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger," Yellow paper. 2014.
3	Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts

#### **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.

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

High-3, Medium-2, Low-1

<b>Semester: VII</b>		
<b>BIG DATA ANALYTICS</b>		
<b>Course Code:</b>	<b>MVJ21CS734</b>	<b>CIE Marks:50</b>
<b>Credits:</b>	<b>3</b>	<b>SEE Marks: 50</b>
<b>Hours:</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	The scope and essentiality of Big Data and Business Analytics.	
2	The technologies used to store, manage, and analyze big data in a Hadoop ecosystem.	
3	The techniques and principles in big data analytics with scalability and streaming capability.	
4	The hypothesis on the optimized business decisions in solving complex real-world problems.	

<b>UNIT-I</b>	
<b>INTRODUCTION TO BIG DATA:</b> Characteristics of Data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, Traditional Business Intelligence (BI) versus Big Data. Big data analytics: Classification of Analytics,	<b>Hrs 8</b>

Importance and challenges facing big data, Terminologies Used in Big Data Environments, The Big Data Technology Landscape. <b>Video link</b> : <a href="https://www.digimat.in/nptel/courses/video/106104189/L01.html">https://www.digimat.in/nptel/courses/video/106104189/L01.html</a>	
<b>UNIT-II</b>	
<b>INTRODUCTION TO HADOOP:</b> Introducing Hadoop,RDBMS versus Hadoop,Distributed Computing Challenges, History and overview of Hadoop, Use Case of Hadoop,Hadoop Distributors,Processing Data with Hadoop, Interacting with Hadoop Ecosystem <b>Videolink:</b> <a href="https://www.digimat.in/nptel/courses/video/106104189/L04.html">https://www.digimat.in/nptel/courses/video/106104189/L04.html</a>	<b>Hrs 8</b>
<b>UNIT-III</b>	
<b>THE HADOOP DISTRIBUTED FILESYSTEM:</b> Hadoop Distributed File System(HDFS):The Design of HDFS, HDFS Concepts, Basic Filesystem Operations, Hadoop Filesystems. The Java Interface- Reading Data from a Hadoop URL, Reading Data Using the Filesystem API, Writing Data. Data Flow- Anatomy of a File Read, Anatomy of a File Write, Limitations.  • <b>Video link</b> : <a href="https://www.digimat.in/nptel/courses/video/106104189/L04.html">https://www.digimat.in/nptel/courses/video/106104189/L04.html</a>	<b>Hrs 8</b>
<b>UNIT-IV</b>	
<b>UNDERSTANDING MAP REDUCE FUNDAMENTALS:</b> Map Reduce Framework: Exploring the features of Map Reduce, Working of Map Reduce, Exploring Map and Reduce Functions, Techniques to optimize Map Reduce jobs, Uses of Map Reduce. Controlling MapReduce Execution with InputFormat, Reading Data with custom RecordReader,-Reader, Writer, Combiner, Partitioners, Map Reduce Phases,Developing simple MapReduce Application. <b>Videolink:</b> <a href="https://www.digimat.in/nptel/courses/video/106104189/L06.html">https://www.digimat.in/nptel/courses/video/106104189/L06.html</a>	<b>Hrs 8</b>
<b>UNIT-V</b>	
<b>INTRODUCTION TO PIG:</b> Introducing Pig: Pig architecture, Benefits, Installing Pig, Properties of Pig, Running Pig, Getting started with Pig Latin, Working with operators in Pig, Working with functions in Pig.  • Video link: <a href="https://www.youtube.com/watch?v=qr_awo5vz0g">https://www.youtube.com/watch?v=qr_awo5vz0g</a>	<b>Hrs 8</b>

<b>Course Outcomes: After completing the course, the students will be able to</b>	
CO1	Explain the evolution of big data with its characteristics and challenges with traditional business intelligence.
CO2	Explain the big data technologies used to process and querying the bigdata in Hadoop, MapReduce and Pig.
CO3	Make use of appropriate components for processing, scheduling and knowledge extraction from large volumes in distributed Hadoop Ecosystem





CO1	2	2		-	-	-	-	-	-	-	-	-	2	-
CO2	2	2		-	-	-	-	-	-	-	-	-	2	2
CO3	2	3	2	2	-	-	-	-	-	-	-	-	1	3
CO4	1	2	3	-	-	-	-	-	-	-	-	-	1	2
CO5	1	2	2	2	-	-	-	-	-	-	-	-	2	-

High-3, Medium-2, Low-1

<b>Semester: VII</b>		
<b>AGILE TECHNOLOGIES</b>		
<b>(Theory)</b>		
<b>Course Code: MVJ21CS735</b>		<b>CIE Marks:100</b>
<b>Credits: L:T:P:S: 3:0:0:0</b>		<b>SEE Marks: 100</b>
<b>Hours: 40L</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	Discuss the essence of agile development methods.	
2	Carry out all stages of an agile software process in a team, to produce working software.	
3	Provide practical knowledge of how to manage a project using Scrum framework.	
4	Use test driven development to ensure software quality.	
5	Should be able to demonstrate a more advanced capability to apply lean and agile development techniques to solve complex problems.	

<b>UNIT-I</b>	
<b>Fundamentals of Agile:</b> The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools	<b>8Hrs</b>
<b>UNIT-II</b>	
<b>Agile Scrum Framework:</b> Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master,	<b>8 Hrs</b>

Scrum Team, Scrum case study, Tools for Agile project management	
<b>UNIT-III</b>	
<b>Agile Testing:</b> The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester	<b>8Hrs</b>
<b>UNIT-IV</b>	
<b>Agile Software Design and Development:</b> Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.	<b>8Hrs</b>
<b>UNIT-V</b>	
<b>Industry Trends:</b> Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits,	<b>8Hrs</b>
Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies.	

<b>Course Outcomes: After completing the course, the students will be able to</b>	
CO1	Understand the background and driving forces for taking an Agile approach to software development
CO2	Understand the business value of adopting Agile approaches.
CO3	Drive development with unit tests using Test Driven Development

CO4	Deploy automated build tools, version control and continuous integration
CO5	Apply design principles and refactoring to achieve Agility.

Reference Books	
1.	Ken Schawber, Mike Beedle, "Agile Software Development with Scrum", Pearson Education.
2.	Lisa Crispin, Janet Gregory, "Agile Testing: A Practical Guide for Testers and Agile Teams", Addison Wesley.
3.	Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices", Prentice Hall
4.	Robert Spalding: "Storage Networks the Complete Reference", Tata McGraw-Hill, 2011.

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

High-3, Medium-2, Low-1

Semester: VII		
INTRODUCTION TO DATA SCIENCE		
Course Code:	MVJ21CS741	CIE Marks:50
Credits:	3	SEE Marks: 50

<b>Hours:</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
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.	

<b>UNIT-I</b>	
Introduction: Big Data and Data Science hype and getting past the hype Datafication. Current landscape of perspectives. Skill sets needed. Statistical Inference. Populations and samples. Statistical modeling, probability distributions, Introduction to R programming. <b>Video-Links</b> <a href="https://www.youtube.com/watch?v=KMj49syT8JM&amp;list=PLyqSpQzTE6M-sBjDcT21Gpnj8grR2fDgc">https://www.youtube.com/watch?v=KMj49syT8JM&amp;list=PLyqSpQzTE6M-sBjDcT21Gpnj8grR2fDgc</a>	<b>Hrs 8</b>
<b>UNIT-II</b>	
Exploratory Data Analysis and the Data Science Process. Basic tools (plots, graphs and summary statistics) of EDA. Philosophy of EDA. The Data Science Process. Case Study: Real Direct (online real estate) Three Basic Machine Learning Algorithms. Linear Regression, k-Nearest Neighbors (k-NN), k-means <b>Video Links:</b> <a href="https://nptel.ac.in/courses/106/101/106101163/">https://nptel.ac.in/courses/106/101/106101163/</a>	<b>Hrs 8</b>
<b>UNIT-III</b>	
Feature Generation and Feature Selection (Extracting Meaning From Data). Motivating application: user (customer) retention. Feature Generation (brainstorming, role of domain expertise, and place for imagination). Feature Selection algorithms. Filters; Wrappers; Decision Trees; Random Forests. <b>Video Links:</b> <a href="https://nptel.ac.in/courses/106/101/106101163/">https://nptel.ac.in/courses/106/101/106101163/</a>	<b>Hrs 8</b>
<b>UNIT-IV</b>	
Recommendation Systems: Building a User-Facing Data Product. Algorithmic ingredients of a Recommendation Engine. Dimensionality Reduction. Singular Value Decomposition. - Principal Component Analysis. <b>Video Links:</b> <a href="https://nptel.ac.in/courses/106/101/106101163/">https://nptel.ac.in/courses/106/101/106101163/</a>	<b>Hrs 8</b>
<b>UNIT-V</b>	
Data Visualization. Basic principles, ideas and tools for data visualization. Data Science and Ethical Issues. Discussions on privacy, security, ethics	<b>Hrs 8</b>

<b>Video Links:</b> <a href="https://nptel.ac.in/courses/106/101/106101163/">https://nptel.ac.in/courses/106/101/106101163/</a>	
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<b>Course Outcomes: After completing the course, the students will be able to</b>	
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CO1	Understand the statistical foundations of data science
CO2	Learn techniques to pre-process raw data so as to enable further analysis.
CO3	Conduct exploratory data analysis and create insightful visualizations to identify patterns
CO4	Introduce machine learning algorithms for prediction/classification and to derive insights.
CO5	Analyze the degree of certainty of predictions using statistical test and models.

<b>Text Books</b>	
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1	Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.
2	Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. ISBN 1449361323. 2013.
3	Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science.

<b>Reference Books:</b>	
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1	Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly, 1st edition, 2015
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### **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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	1	2	-	-	-	-	-	-	-	2	1	-
CO2	3	3	2	3	1	-	-	-	-	-	-	2	2	2
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

<b>Semester: VII</b>		
<b>INTERNET OF THINGS</b>		
<b>Course Code:</b>	<b>MVJ21CS742</b>	<b>CIE Marks:50</b>
<b>Credits:</b>	<b>3</b>	<b>SEE Marks: 50</b>
<b>Hours:</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	Learn the basic issues, policy and challenges in the Internet.	
2	Get an idea of some of the application areas where Internet of Things can be applied.	
3	Understand the cloud and internet environment.	

4	Understand the various modes of communications with Internet.
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<b>UNIT-I</b>	
<p><b>Prerequisites : Basic Knowledge about C or C++</b></p> <p><b>Introduction to IoT:</b> Definition – Foundations – Challenges and Issues - Identification - Security. Components in internet of things: Control Units – Sensors – Communication modules –Power Sources – Communication Technologies – RFID – Bluetooth – Zigbee – Wifi – Rflinks –Mobile Internet – Wired Communication-IoT Platform Overview-Raspberry pi-Arduino boards.*</p> <p><b>Applications:</b> Sensors in IoT.</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="http://www.theinternetofthings.eu/what-is-the-internet-of-things">http://www.theinternetofthings.eu/what-is-the-internet-of-things</a>.</li> <li>• <a href="https://www.engineersgarage.com/article_page/sensors-different-types-of-sensors/">https://www.engineersgarage.com/article_page/sensors-different-types-of-sensors/</a></li> <li>• <a href="https://www.educba.com/applications-of-sensors/">https://www.educba.com/applications-of-sensors/</a></li> </ul> <p><b>* Programming Assignments are Mandatory.</b></p>	<b>Hrs 8</b>
<b>UNIT-II</b>	
<p><b>IoT Protocols:</b> Protocol Standardization for IoT-M2M and WSN Protocols-SCADA and RFID Protocols-Issues with IoT Standardization-Protocols-IEEE 802.15.4-BACNet Protocol-Zigbee Architecture - Network layer – APS Layer – Security.*</p> <p><b>Applications:</b></p> <p>IoT Protocol Applications</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://inductiveautomation.com/resources/article/what-is-scada">https://inductiveautomation.com/resources/article/what-is-scada</a></li> <li>• <a href="https://iotbytes.wordpress.com/application-protocols-for-iot/">https://iotbytes.wordpress.com/application-protocols-for-iot/</a></li> <li>• <a href="https://data-flair.training/blogs/iot-protocols/">https://data-flair.training/blogs/iot-protocols/</a></li> <li>• <a href="https://www.avsystem.com/blog/iot-protocols-and-standards/">https://www.avsystem.com/blog/iot-protocols-and-standards/</a></li> </ul> <p><b>* Programming Assignments are Mandatory.</b></p>	<b>Hrs 8</b>
<b>UNIT-III</b>	
<p>Resource Management in the Internet of Things: Clustering - Software Agents - Data Synchronization - Clustering Principles in an Internet of Things Architecture - The Role of Context - Design Guidelines -Software Agents for Object – Data</p>	<b>Hrs 8</b>

Synchronization- Types of Network Architectures - Fundamental Concepts of Agility and Autonomy-Enabling Autonomy and Agility by the Internet of Things - The Evolution from the RFID-based EPC Network to an Agent based Internet of Things- Agents for the Behaviour of Objects.\*

**Applications:** RFID Applications

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

RFID Applications:

- <https://www.digiteum.com/rfid-technology-internet-of-things>
- <https://www.uio.no/studier/emner/matnat/ifi/INF5910CPS/h10/undervisningsmateriale/RFID-IoT.pdf>

**\* Programming Assignments are Mandatory.**

#### UNIT-IV

**Case Study and IoT Application Development:** IoT applications in home-infrastructure security-Industries- IoT electronic equipment's. Use of Big Data and Visualization in IoT Industry 4.0 concepts - Sensors and sensor Node – Interfacing using Raspberry Pi/Arduino- Web Enabled Constrained Devices.\*

**Laboratory Sessions/ Experimental learning:**Interfacing using Raspberry Pi/Arduino

**Applications:** Elements in group

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

- <https://www.simform.com/home-automation-using-internet-of-things/>
- <https://iot5.net/iot-applications/smart-home-iot-applications/>
- <https://maker.pro/raspberry-pi/tutorial/how-to-connect-and-interface-raspberry-pi-with-arduino#>
- <https://create.arduino.cc/projecthub/ruchir1674/how-to-interface-arduino-with-raspberrypi-504b06>

**\* Programming Assignments are Mandatory.**

#### UNIT-V

**Hrs 8**

<p><b>Web of Things:</b>Web of Things versus Internet of Things-Architecture</p> <p>Standardization for WoT-Platform Middleware for WoT- WoT Portals and Business Intelligence-Cloud of Things: Grid/SOA and Cloud Computing-Cloud Standards –Cloud of Things Architecture-Open Source e-Health sensor platform.</p> <p>Video link / Additional online information (related to module if any):</p> <ul style="list-style-type: none"> <li>• <a href="https://www.water-io.com/iot-vs-wot">https://www.water-io.com/iot-vs-wot</a></li> <li>• <a href="https://www.talend.com/resources/iot-cloud-architecture/">https://www.talend.com/resources/iot-cloud-architecture/</a></li> </ul> <p>* Programming Assignments are Mandatory.</p>	<b>Hrs 8</b>
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<b>Course Outcomes: After completing the course, the students will be able to</b>	
CO1	Identify the components of IoT.
CO2	Analyze various protocols of IoT.
CO3	Design portable IoT using appropriate boards
CO4	Develop schemes for the applications of IOT in real time scenarios.
CO5	Design business Intelligence and Information Security for WoT

<b>Text Books:</b>	
1	Honbo Zhou, "The Internet of Things in the Cloud:A Middleware Perspective" -CRC Press-2012.
2	Dieter Uckelmann, Mark Harrison, "Architecting the Internet of Things", Springer2011.

<b>Reference Books:</b>	
1	Arshdeep Bahga, Vijay Madisetti, "Internet of Things (A Hands-On-Approach)", VPT, 2014.
2	Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocols", Wiley, 2012.
3	Luigi Atzori, Antonio Lera, Giacomo Morabito, "The Internet of Things: A Survey", Journal on Networks, Elsevier Publications, October, 2010.

### **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	PO1 1	PO 12	PSO 1	PSO2
CO1	3	3	1	-	-	-	-	-	-	-	-	3	1	-
CO2	3	3	1	-	-	-	-	-	-	-	-	3	2	-
CO3	3	3	1	2	-	-	-	-	-	1	-	3	2	3
CO4	3	3	3	3	-	-	-	2	2	2	-	3	1	3
CO5	3	3	3	3	-	-	2	2	3	2	-	3	2	2

High-3, Medium-2, Low-1

**Semester: VII****VISUALIZATION TECHNIQUES**

<b>Course Code:</b>	<b>MVJ21CS743</b>	<b>CIE Marks:50</b>
<b>Credits:</b>	<b>3</b>	<b>SEE Marks: 50</b>
<b>Hours:</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	learn the value of visualization, specific techniques in information visualization and scientific visualization, and how understand how to best leverage visualization methods	

**UNIT-I**

Introduction –Visualization Stages –Computational Support –Issues –Different Types of Tasks –Data representation –Limitation: Display Space, Rendering Time,	<b>Hrs 8</b>
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Navigation Link.	
<b>UNIT-II</b>	
Human Factors –Foundation for a Science of Data Visualization –Environment-Optics – Optimal Display –Overview about Lightness, Brightness, Contrast, Constancy, Color –Visual Attention that Pops Out –Types of Data –Data Complexity –The Encoding of Values – Encoding of Relation –Relation and Connection –Alternative Canvass.	<b>Hrs 8</b>
<b>UNIT-III</b>	
Human Vision –Space Limitation –Time Limitations –Design –Exploration of Complex Information Space –Figure Caption in Visual Interface –Visual Objects and Data Objects – Space Perception and Data in Space –Images, Narrative and Gestures for Explanation	<b>Hrs 8</b>
<b>UNIT-IV</b>	
Norman’s Action Cycle –Interacting with Visualization –Interaction for Information Visualization –Interaction for Navigation –Interaction with Models –Interacting with Visualization –Interactive 3D Illustrations with Images and Text –Personal View – Attitude – user perspective –Convergence –Sketching –Evaluation.	<b>Hrs 8</b>
<b>UNIT-V</b>	
Design –Virtual Reality: Interactive Medical Application –Tactile Maps for visually challenged People –Animation Design for Simulation –Integrating Spatial and Nonspatial Data –Innovating the Interaction –Small Interactive Calendars – Selecting One from Many– Web Browsing Through a Key Hole –Communication Analysis –Archival Galaxies	<b>Hrs 8</b>

<b>Course Outcomes: After completing the course, the students will be able to</b>	
CO1	Understand the fundamentals of data visualization
CO2	Acquire knowledge about the issues in data representation
CO3	Visualize the complex engineering design.
CO4	Design real time interactive information visualization system
CO5	Apply the visualization techniques in practical applications

<b>Text/Reference Books:</b>	
1	Robert Spence, “Information Visualization:An Introduction”, Third Edition, Pearson Education, 2014.
2	Colin Ware, “Information Visualization Perception for Design”, ThirdEdition, Morgan Kaufmann, 2012.

3	Robert Spence, "Information Visualization Design for Interaction", Second Edition, Pearson Education, 2006
4	Benjamin B. Bederson, Ben shneiderman, "The Craft of Information Visualization", Morgan Kaufmann, 2003.
5	Thomas Strothotte, "Computational Visualization: Graphics, Abstraction and Interactivity", Springer, 1998.
6	Matthew O.Ward, George Grinstein, Daniel Keim, "Interactive Data Visualization: Foundation, Techniques and Applications", Second Edition, A.K.Peters/CRC Press,2015.
7	JoergOsarek, "Virtual Reality Analytics", Gordon`s Arcade, 2016.

### 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	3	-	-	-	1	-	-	-	-	-	-	2	2	-
CO2	3	3	3	2	-	-	-	-	1	-	1	2	2	2
CO3	2	2	2	1	3	-	-	-	-	-	1	3	2	2
CO4	3	2	3	2	1	-	-	-	-	2	3	2	2	3

C05	3	2	3	1	-	-	-	-	-	2	3	2	2	-
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High-3, Medium-2, Low-1

<b>Semester: VII</b>		
<b>ETHICAL HACKING</b>		
<b>Course Code:</b>	<b>MVJ21CS744</b>	<b>CIE Marks:50</b>
<b>Credits:</b>	<b>3</b>	<b>SEE Marks: 50</b>
<b>Hours:</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	Understand numerous methods of real-world information intelligence	
2	Learn about vulnerability scanners	
3	Understand techniques used to sniff traffic across a network	
4	Familiarize with the methodologies that can be used to hack into a target.	
5	Appreciate the wide variety of attacks that can be performed against a wireless network	

<b>UNIT-I</b>
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<p><b>INTRODUCTION TO HACKING</b> : Terminologies, Categories of Penetration Test, Writing Reports, Structure of a Penetration Testing Report, Vulnerability Assessment Summary, Risk Assessment, Methodology, Linux Basics: File Structure, Cron Job, Users, Common Applications , BackTrack, Services.</p> <p><b>Applications:</b> Network packet analysis, Password guessing and cracking</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_process.htm">https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_process.htm</a></li> <li>• <a href="https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_hacker_types.htm">https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_hacker_types.htm</a></li> </ul>	<p><b>Hrs 8</b></p>
<p><b>UNIT-II</b></p>	
<p><b>INFORMATION GATHERING, TARGETENUMERATION AND PORT SCANNING TECHNIQUES</b></p> <p>Active, Passive and Sources of information gathering, Copying Websites Locally, NeoTrace, Cheops-ng, Intercepting a Response, WhatWeb, Netcraft, Basic Parameters, Xcode Exploit Scanner, Interacting with DNS Servers, Fierce, Zone Transfer with Host Command and Automation, DNS Cache Snooping- Attack Scenario, Automating Attacks, SNMP - Problem, Sniffing Passwords, Solar Winds Toolset, sweep, Brute Force and Dictionary- Tools , Attack, Enumeration, Intelligence Gathering Using Shodan, Target enumeration and Port Scanning Techniques.</p> <p>Applications: Session hijacking, Session spoofing</p> <p>Video link / Additional online information (related to module if any):</p> <ul style="list-style-type: none"> <li>• <a href="https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_enumeration.htm">https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_enumeration.htm</a></li> <li>• <a href="https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_sniffing.htm">https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_sniffing.htm</a></li> </ul>	<p><b>Hrs 8</b></p>
<p><b>UNIT-III</b></p>	
<p><b>VULNERABILITY ASSESSMENT &amp; NETWORKSNIFFING</b> : Introduction to Vulnerability Assessment - Pros and Cons, NMap, Updation of database, Testing SCADA Environments with Nmap, Nessus, Sniffing: Types, Hubs versus Switches, Modes, MITM Attacks, ARP Protocol Basics- working, Attacks, DoS Attacks,</p>	<p><b>Hrs 8</b></p>

Dsniff tool, Using ARP Spoof to Perform MITM Attacks, Sniffing the Traffic with Dsniff, Sniffing Pictures with Drifnet, Urlsnarf and Webspay, Sniffing with Wireshark, Ettercap- ARP Poisoning, Hijacking Session with MITM Attack, ARP Poisoning with Cain and Abel, Sniffing Session Cookies with Wireshark, Hijacking the Session, SSL Strip: Stripping HTTPS Traffic, Requirements, Automating Man in the Middle Attacks, DNS Spoofing, DHCP Spoofing

Applications: Network traffic sniffing, Denial of Service attacks

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

- [https://www.tutorialspoint.com/ethical\\_hacking/ethical\\_hacking\\_sniffing.htm](https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_sniffing.htm)
- [https://www.tutorialspoint.com/ethical\\_hacking/ethical\\_hacking\\_tcp\\_ip\\_hijacking.htm](https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_tcp_ip_hijacking.htm)

#### UNIT-IV

**Understanding Network Protocols:** Attacking Network Remote Services, Common Target Protocols, tools for cracking network remote services, Attacking SMTP, Attacking SQL Servers, Client-Side Exploitation Methods: E-Mails Leading to Malicious Attachments & Malicious Links, Compromising Client Side Update, Malware Loaded on USB Sticks

**Post exploitation:** Acquiring Situation Awareness, Privilege Escalation, Maintaining Access, Data Mining, Identifying and Exploiting Further Targets, Windows Exploit Development Basics.

**Applications:** Exploiting buffer overflow vulnerabilities

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

- [https://www.tutorialspoint.com/ethical\\_hacking/ethical\\_hacking\\_sql\\_injection.htm](https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_sql_injection.htm)
- [https://www.tutorialspoint.com/ethical\\_hacking/ethical\\_hacking\\_exploitation.htm](https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_exploitation.htm)

**Hrs 8**

#### UNIT-V

**WIRELESS & WEB-HACKING****Hrs 8**

**Wireless Hacking** : Requirements , Aircracking , Hidden SSIDs , Monitor Mode , Monitoring Tool- Beacon Frames on Wireshark ,Airodump-ng , Wireless Adapter in Monitor Mode , Determining the Target , Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng , Capturing Packets and Four-Way Handshake.

**Web Hacking** : Attacking the Authentication , Brute Force and Dictionary Attacks , Types of Authentication , Crawling Restricted Links , Testing for the Vulnerability , Authentication Bypass with Insecure Cookie Handling , SQL injection, XSS – DOM based,BeEF,CSRF, Bypassing CSRF and BeEF with XSS, Vulnerability in FCKeditor, efront.

**Applications:** Cross Site Scripting, Firewall

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

- [https://www.tutorialspoint.com/ethical\\_hacking/ethical\\_hacking\\_dos\\_attacks.htm](https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_dos_attacks.htm)
- [https://www.tutorialspoint.com/ethical\\_hacking/ethical\\_hacking\\_wireless.htm](https://www.tutorialspoint.com/ethical_hacking/ethical_hacking_wireless.htm)

**Course Outcomes: After completing the course, the students will be able to**

CO1	Understand the core concepts related to malware, hardware and software vulnerabilities and their causes
CO2	Understand ethics behind hacking and vulnerability disclosure
CO3	Appreciate the Cyber Laws and impact of hacking Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies
CO4	Learn & understand different network protocols and attack strategies
CO5	Understanding the usefulness of wireless & web hacking

**Text Books**

1	Rafay Baloch ,–Ethical Hacking and Penetration Testing Guide  , CRC Press, 2015.
2	Patrick Engebretson, –The Basics of Hacking and Penetration Testing : Ethical Hacking and Penetration Testing Made Easy  , Syngress Media, Second Revised Edition, 2013.

**Reference Books:**

1	Michael T. Simpson, Kent Backman, James E. Corley, –Hands On Ethical Hacking
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**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
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CO3	3	3	1	2	-	-	-	-	-	1	-	3	-	2
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

<b>Semester: VII</b>		
<b>BLOCKCHAIN TECHNOLOGY</b>		
<b>Course Code:</b>	<b>MVJ21CS745</b>	<b>CIE Marks:50</b>
<b>Credits:</b>	<b>3</b>	<b>SEE Marks: 50</b>
<b>Hours:</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	Familiarize the functional/operational aspects of cryptocurrency ecosystem.	
2	Understand emerging abstract models for Blockchain Technology.	
3	Understand how blockchain systems (mainly Bitcoin and Ethereum) work and how to securely interact with them.	
4	Identify major research challenges and technical gaps existing between theory and practice in cryptocurrency domain.	
5	Design, build, and deploy smart contracts and distributed applications.	

<b>UNIT-I</b>	
<b>Basics:</b> Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table,	<b>Hrs 8</b>

<p>ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.</p> <p><b>Applications: Telecommunications, finance, universities</b></p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://coincentral.com/byzantine-generals-problem/">https://coincentral.com/byzantine-generals-problem/</a></li> <li>• <a href="https://www.tutorialspoint.com/distributed_dbms/distributed_dbms_databases.htm">https://www.tutorialspoint.com/distributed_dbms/distributed_dbms_databases.htm</a></li> </ul>	
<p><b>UNIT-II</b></p>	
<p><b>Blockchain:</b> Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft &amp; Hard Fork, Private and Public blockchain.</p> <p><b>Applications: Government, healthcare</b></p> <p><b>Video link / Additional online information (related to module if any):</b></p> <p>3. <a href="https://blockonomi.com/merkle-tree/">https://blockonomi.com/merkle-tree/</a></p>	<p><b>Hrs 8</b></p>
<p><b>UNIT-III</b></p>	
<p><b>Distributed Consensus:</b> Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.</p> <p><b>Applications:</b> Decentralized Applications, Encrypted messaging applications</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://blockonomi.com/nakamoto-consensus/">https://blockonomi.com/nakamoto-consensus/</a></li> <li>• <a href="https://cointelegraph.com/explained/proof-of-work-explained">https://cointelegraph.com/explained/proof-of-work-explained</a></li> </ul>	<p><b>Hrs 8</b></p>
<p><b>UNIT-IV</b></p>	
<p><b>Cryptocurrency:</b> History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin.</p> <p><b>Applications:</b> Peer - to - peer payment application.</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <p>4. <a href="https://blockgeeks.com/guides/smart-contracts/">https://blockgeeks.com/guides/smart-contracts/</a></p>	<p><b>Hrs 8</b></p>
<p><b>UNIT-V</b></p>	

<p>Cryptocurrency Regulation: Stakeholders, Roots of Bit coin, Legal Aspects-Cryptocurrency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.</p> <p><b>Video link / Additional online information (related to module if any):</b></p> <ul style="list-style-type: none"> <li>• <a href="https://www.water-io.com/iot-vs-wot">https://www.water-io.com/iot-vs-wot</a></li> <li>• <a href="https://www.talend.com/resources/iot-cloud-architecture/">https://www.talend.com/resources/iot-cloud-architecture/</a></li> </ul>	<b>Hrs 8</b>
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<b>Course Outcomes: After completing the course, the students will be able to</b>	
CO1	Basic Cryptographic primitives used in Blockchain – Secure, Collision-resistant hash functions, digital signature, public key cryptosystems, zero-knowledge proof systems.
CO2	Policies and applications of Blockchain in Distributed databases.
CO3	Explain the Nakamoto consensus, List and describe differences between proof-of-work and proof-of-stake consensus.
CO4	Design, build, and deploy smart contracts and distributed applications.
CO5	Cryptocurrency governance, regulations and applications.

<b>Text Books</b>	
1	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
2	Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies.

<b>Reference Books:</b>	
1	Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System.
2	DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger," Yellow paper.2014.
3	Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts

### **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).

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

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.

High-3, Medium-2, Low-1



<b>Semester: VII</b>		
<b>PROJECT PHASE – 1</b>		
<b>(Theory)</b>		
<b>Course Code: MVJ21CSPR75</b>		<b>CIE Marks:100</b>
<b>Credits: L:T:P:S: 3:0:0:0</b>		<b>SEE Marks: 100</b>
<b>Hours: 40L</b>		<b>SEE Duration: 3 Hrs</b>
<b>Course Learning Objectives: The students will be able to</b>		
1	To support independent learning.	
2	To develop interactive, communication, organization, time management, and presentation skills.	
3	To impart flexibility and adaptability	
4	To expand intellectual capacity, credibility, judgment, intuition.	
5	To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas	

### Project Work Phase - I

Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, and external guide and prepare the project report as per the norms avoiding plagiarism.

#### Course Outcomes: After completing the course, the students will be able to

CO1	Describe the project and be able to defend it.
CO2	Learn to use modern tools and techniques
CO3	Develop skills to work in a team to achieve common goal. Develop skills of project management and finance.
CO4	Develop skills of self-learning, evaluate their learning and take appropriate actions to improve it.
CO5	Prepare them for life-long learning to face the challenges and support the technological changes to meet the societal needs.

#### Scheme of Evaluation

Internal Marks: The Internal marks (50 marks) evaluation shall be based on Phase wise

completion of the project work, Project report, Presentation and Demonstration of the actual/model/prototype of the project.

#### CIE Marks Breakup for Major Project during VII Semester:

Relevance of the Topic	10 Marks
Report	20 Marks
Evaluation by Guide	25 Marks
Presentation	30 Marks
Viva- Voce	15 Marks
Total	100 Marks

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

High-3, Medium-2, Low-1