VII SEMESTER

Semester:VII		
INTERNET OF THINGS & LAB (Theory and Practice)		
Course Code: MVJ21CG71		**CIE Marks:50+50**
Credits: L:T:P: 3:0:1		**SEE Marks: 50 +50**
Hours:40 L+ 26 P		**SEE Duration: 03+03 Hours**

Course Learning Objectives: The students will be able to	
1	To learn the basic issues, policy and challenges in the Internet.
2	To get an idea of some of the application areas where Internet of Things can be applied.
3	To understand the cloud and internet environment.
4	To understand the various modes of communications with Internet.

UNIT-I	
Introduction to IoT: 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.* **Video link / Additional online information (related to module if any):** • http://www.theinternetofthings.eu/what-is-the-internet-of-things.	**8 Hrs**
UNIT-II	
IoT Protocols: 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.* **Video link / Additional online information (related to module if any):** https://inductiveautomation.com/resources/article/what-is-scada	**8 Hrs**
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	**8Hrs**

Things- Agents for the Behaviour of Objects.* **Video link / Additional online information (related to module if any):** RFID Applications: https://www.digiteum.com/rfid-technology-internet-of-things	
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.* **Video link / Additional online information (related to module if any):** • https://www.simform.com/home-automation-using-internet-of-things/	**8Hrs**
UNIT-V	
Web of Things: 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. **Video link / Additional online information (related to module if any):** • https://www.water-io.com/iot-vs-wot	**8 Hrs**

LABORATORY EXPERIMENTS

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
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. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
4. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
5. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
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.
7. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
8. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
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.

Any 9 experiments to be conducted

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

Reference Books	
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.
3.	ArshdeepBahga, Vijay Madisetti, "Internet of Things (A Hands-On-Approach)", VPT, 2014.
4.	Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocols", Wiley, 2012.

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

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marksare 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.

Semester: VII		
ARTIFICIAL INTELLIGENCE (Theory)		
Course Code: MVJ21CG721		**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.	

UNIT-I	
INTRODUCTION: What Is AI? The Foundations of Artificial Intelligence ,The History of Artificial Intelligence, The State of the Art . 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. **Video Links** • https://www.youtube.com/watch?v=3MW3ICnkQ9k	**8Hrs**
UNIT-II	
PROLOG- 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 **Using Predicate Logic:** Representing simple facts in logic, representing instance and ISA relationships, Computable Functions and Predicates, Resolution, Natural Deduction. **Video Links:** https://www.youtube.com/watch?v=pzUBrJLIESU	**8Hrs**
UNIT-III	
Heuristic search techniques: Generate and test, Hill Climbing, Best First Search, Problem Reduction, Constraint Satisfaction, Means-ends Analysis. **Weak Slot- and- Filler Structures:** Semantic Nets ,Frames. **Strong slot-and Filler Structures-** Conceptual Dependency, Scripts.	**8Hrs**

Video Links: https://www.youtube.com/watch?v=ieZr_TpRwnQ	
UNIT-IV	
Game Playing : Overview, Minimax Search Procedure, Adding alpha beta cut off, Additional Refinements, Iterative Deepening, References on Specific games. **Learning:** What is learning?, Forms of learning, Rote learning, learning by taking advice, Learning in problem solving, Induction leaning, Explanation based learning, Discovery, A **Video Links**: https://www.youtube.com/watch?v=_i-lZcbWkpsnalogy, Formal learning Theory, Neural Network Learning.	**8Hrs**
UNIT-V	
Natural Language Processing: Syntactic Processing, Semantic Analysis, Discourse and Pragmatic processing, Statistical Natural language processing and Spell checking. **Genetic Algorithms**: A peek into the biological world, Genetic Algorithms(GAs),Significance of genetic operators, termination parameters, niching and speciation, evolving neural network, theoretical grounding. **Video Links**: https://www.youtube.com/watch?v=zG8AJhVy5NY	**8Hrs**

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	
1.	Artificial Intelligence: A Modern Approach, Stuart Rusell, Peter Norving, Pearson Education 2nd Edition
2.	E. Rich , K. Knight & S. B. Nair - Artificial Intelligence, 3/e, McGraw Hill.
3.	Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems – Prentice Hal of India.
4.	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 marksis 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	**2**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**3**	**3**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**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

Semester: VII		
AGILE TECHNOLOGIES (Theory)		
Course Code: MVJ21CG722		**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	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.

UNIT-I	
Fundamentals of Agile: 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	**8Hrs**
UNIT-II	
Agile Scrum Framework: 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, Scrum Team, Scrum case study, Tools for Agile project management	**8 Hrs**
UNIT-III	
Agile Testing: 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	**8Hrs**
UNIT-IV	
Agile Software Design and Development: 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.	**8Hrs**
UNIT-V	
Industry Trends: Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits,	**8Hrs**

Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies.	

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

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Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marksis 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		
SPATIAL INFORMATION SYSTEM (Theory)		
Course Code: MVJ21CG723		**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	Expose the students with concepts of cartography as major components of input and output related to cartography
2	To provide exposure to data models and data structures in GIS and to introduce various Raster and Vector Analysis capabilities.
3	To expose the concept of quality and design of cartographic outputs in open GIS environment

UNIT-I	
Definition of Map - Mapping Organsiation in India- Classification based on Function, Scale, Characteristics – Ellipsoid and Geoid – Co-ordinate Systems - Rectangular and Geographic Coordinates – UTM and UPS - Projection – Function - Types of Map Projections – Transformations – Function - Affine transformation - Choice of Map Projection – Evolution of cartography- Geo-Spatial, Spatial and Non-spatial data – Definition of GIS – Evolution GIS – Components of GIS.	**8 Hrs**
UNIT-II	
Point, Line Polygon / Area, elevation and surface –Tessellations - Attributes and Levels of Measurement - Data Sources – Ground and Remote Sensing survey – Collateral data collection – Input: Map scanning and digitization, Registration and Georeferencing – Concepts of RDBMS - Raster Data Model – Grid – Data Encoding - Data Compression – Vector Data Model – Topological properties – Arc Node Data Structure – Raster Vs. Vector Comparison – File Formats for Raster and Vector – Data conversion between Raster and vector	**8Hrs**
UNIT-III	
Raster Data analysis: Local, Neighborhood and Regional Operations – Map Algebra – Vector Data Analysis: Topological Analysis, point-in-polygon, Line-in-polygon, Polygon-in-Polygon – Proximity Analysis: buffering, Thiessen Polygon – Non-topological analysis: Attribute data Analysis- concepts of SQL– ODBC	**8Hrs**
UNIT-IV	

Network – Creating Network Data - Origin, Destination, Stops, Barriers – Closest Facility Analysis, Service Area Analysis, OD Cost matrix analysis, Shortest Path Analysis – Address Geocoding – Surface Analysis – DEM, DTM - Point data to Surface interpolation – DEM Representaiton - Applications	**8Hrs**
UNIT-V	
Map Compilation – Cartographic functionalities for Map Design – Symbolization – Conventional signs and symbols – Spatial Data Quality – Lineage, Positional Accuracy, Attribute Accuracy, Completeness, Logical Consistency - Meta Data – Web based GIS: Definition, Merits - Architecture – Map Server – Spatial Data Infrastructure – Spatial Data Standards	**8Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Acquire knowledge about cartographic principles, spatial data models and spatial analysis.
CO2	Understand the cartographic outputs in open GIS environment
CO3	Understand Network and Surface Analysis
CO4	Design Raster and Vector Data Analysis
CO5	Compare Gis Data Models And Data Input

Reference Books	
1.	C.P. Lo, Albert K.W. Yeung, Concepts and Techniques of Geographic Information Systems, 2nd Edition, Prentice Hall, 2006, ISBN-13: 9780131495029
2.	John Jensen, Ryan Jensen, Introductory Geographic Information Systems, International Edition, Pearson Publishers, 2012, ISBN-10: 0136147763, ISBN-13: 9780136147763
3.	Kang-tsung Chang, Introduction to Geographic Information Systems with Data Set CD-ROM, 6th Edition, Mc Graw Hill, 2013, ISBN-10: 0077805402,. ISBN-13: 978-0077805401

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marksis 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**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

High-3, Medium-2, Low-1

Semester: VII		
COMPUTATIONAL PHOTOGRAMMETRY (Theory)		
Course Code: MVJ21CG724		**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	To introduce basics and concepts of aerial photography, acquisition and mapping from aerial photographs using different types of stereo plotters	

UNIT-I	
Principles - Stereoscopic depth perception – aerial photo-aerial camera -Scale – overlaps – stereoscopy – concepts – viewing and measuring system – principle of floating mark – methods of parallax measurement – vertical photographs – geometry, scale, parallax equations, planimetric mapping – Tilted photograph – Geometry, Coordinate system, Scale, Planimetric mapping	**8Hrs**
UNIT-II	
Coordinate systems for Photogrammetry - Map projections, Datums and conversions- 2D Coordinate transformations-Collinearity and Space resection-Analytical stereomodel and relative orientation- Three dimensional Coordinate transformations	**8Hrs**
UNIT-III	
Concepts of interior, relative, absolute orientation – direct georeferencing – object, image relation - collinearity and coplanarity conditions – effect of orientation elements - Elements and principles of Aerotriangulation – Independent Models-Simultaneous bundle adjustment - ortho mosaic	**8Hrs**
UNIT-IV	
Digital cameras- CCD camera- full frame, frame transfer, interline CCD camera - Time delay integration- spectral sensitivity of CCD sensor – geometry and radiometry problem of CCD image - Image Generation - Data Compression - formats – Georeferencing - Stereo viewing - Display modes - image matching techniques - Image measurements.	**8Hrs**
UNIT-V	
Review of space resection & intersection - Automatic tie point generation - Automatic Block triangulation, feature collection and plotting–DEM Generation - accuracy of DEMs, Orthorectification - regular & irregular data collection methods - contour generation - watershed delineation - Satellite Photogrammetry principles – missions - stereo image products	**8Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Acquire knowledge about photogrammetry principles, methods and products generation strategies in both Analytical and digital photogrammetry system.

CO2	Understand the problem related to generation of products and solving them.

Reference Books	
1.	Edward M. Mikhail, James S.Bethel, J.Chris McGlone, Introduction on "Modern Photogrammetry", John Wiley & Sons, Inc., 2001, ISBN 0-471-30924-9
2.	Francis h. Moffitt, Edward M. Mikhail, Photogrammetry, TBS The Book Service Ltd, Third Edition,1980, ISBN 070022517X, 9780700225170
3.	Karl Kraus, Photogrammetry, Fundamentals and standard processes, Dümmler, 2000, ISBN 978 3 11019007 6
4.	MichealKasser and Yves Egels, "Digital Photogrammetry", Taylor and Francis, 2003, ISBN 0203305957, 9780203305959

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marksis 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	**2**	**1**	**1**	**-**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

High-3, Medium-2, Low-1

Semester: VII		
COGNITIVE SCIENCE (Theory)		
Course Code: MVJ21CG725		**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	To learn the basics of Cognitive Science with focus on acquisition, representation, and use of knowledge by individual minds, brains, and machines, as well as groups, institutions, and other social entities.
2	To study the mind and intelligence, embracing psychology, artificial intelligence, neuroscience and linguistics
3	To appreciate the basics of cognitive Psychology
4	To understand the role of Neuro science in Cognitive field

UNIT-I	
The Cognitive view –Some Fundamental Concepts – Computers in Cognitive Science – Applied Cognitive Science – The Interdisciplinary Nature of Cognitive Science – Artificial Intelligence: Knowledge representation -The Nature of Artificial Intelligence - Knowledge Representation – Artificial Intelligence: Search, Control, and Learning	**8Hrs**
UNIT-II	
Cognitive Psychology – The Architecture of the Mind - The Nature of Cognitive Psychology- A Global View of The Cognitive Architecture- Propositional Representation- Schematic Representation Cognitive Processes, Working Memory, and Attention- The Acquisition of Skill- The Connectionist Approach to Cognitive Architecture	**8Hrs**
UNIT-III	
Brain and Cognition Introduction to the Study of the Nervous System – Neural Representation – Neuropsychology- Computational Neuroscience - The Organization of the mind - Organization of Cognitive systems - Strategies for Brain mapping – A Case study: Exploring mindreading	**8 Hrs**
UNIT-IV	
Language Acquisition: Milestones in Acquisition – Theoretical Perspectives- Semantics and Cognitive Science – Meaning and Entailment – Reference – Sense – Cognitive and Computational Models of Semantic Processing – Information Processing Models of the Mind- Physical symbol systems and language of thought- Applying the Symbolic Paradigm- Neural networks and distributed information processing- Neural network models of Cognitive Processes	**8Hrs**

UNIT-V	
Reasoning – Decision Making – Computer Science and AI: Foundations & Robotics – New Horizons - Dynamical systems and situated cognition- Challenges – Emotions and Consciousness – Physical and Social Environments - Applications	**8Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Explain, and analyze the major concepts, philosophical and theoretical perspectives, empirical findings, and historical trends in cognitive science, related to cultural diversity and living in a global community.
CO2	Use cognitive science knowledge base to create their own methods for answering novel questions of either a theoretical or applied nature,
CO3	Proficient with basic cognitive science research methods, including both theory-driven and applied research design, data collection, data analysis, and data interpretation.

Reference Books	
1.	Cognitive Science: An Introduction, Second Edition by Neil Stillings, Steven E. Weisler, Christopher H. Chase and Mark H. Feinstein ,1995
2.	Cognitive Science: An Introduction to the Science of the Mind ,José Luis Bermúdez, Cambridge University Press, New York,2010
3.	Cognitive Psychology, Robert L. Solso, Otto H. MacLin and M. Kimberly MacLin, 2007, Pearson Education
4.	Cognitive Science: An Introduction to the Study of Mind (2006) by J. Friedenberg and G. Silverman

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 marksis 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**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**1**	**3**	**3**	**2**	**-**	**-**	**2**	**-**	**1**	**-**
CO3	**3**	**2**	**1**	**3**	**-**	**2**	**-**	**-**	**2**	**-**	**-**	**-**

High-3, Medium-2, Low-1

Semester: VII		
MOBILE AND PERVASIVE COMPUTING (Theory)		
Course Code: MVJ21CG731		**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	To understand the basics of Mobile computing and Personal computing
2	To learn the role of wireless networks in Mobile Computing and Pervasive Computing
3	To study about the underlying wireless networks.
4	To understand the architectures of mobile and pervasive applications
5	To become familiar with the pervasive devices and mobile computing platforms.

UNIT-I	
Differences between Mobile Communication and Mobile Computing – Contexts and Names – Functions – Applications and Services – New Applications – Making Legacy Applications Mobile Enabled – Design Considerations – Integration of Wireless and Wired Networks – Standards Bodies – Pervasive Computing – Basics and Vision – Principles of Pervasive Computing – Categories of Pervasive Devices	**8Hrs**
UNIT-II	
Migration to 3G Networks – IMT 2000 and UMTS – UMTS Architecture – User Equipment – Radio Network Subsystem – UTRAN – Node B – RNC functions – USIM – Protocol Stack – CS and PS Domains – IMS Architecture – Handover – 3.5G and 3.9G a brief discussion – 4G LAN and Cellular Networks – LTE – Control Plane – NAS and RRC – User Plane – PDCP, RLC and MAC – WiMax IEEE 802.16d/e – WiMax Internetworking with 3GPP	**8Hrs**
UNIT-III	
Sensor Networks – Role in Pervasive Computing – In Network Processing and Data Dissemination – Sensor Databases – Data Management in Wireless Mobile Environments – Wireless Mesh Networks – Architecture – Mesh Routers – Mesh Clients – Routing – Cross Layer Approach – Security Aspects of Various Layers in WMN – Applications of Sensor and Mesh networks	**8Hrs**
UNIT-IV	
Adaptability – Mechanisms for Adaptation - Functionality and Data – Transcoding – Location Aware Computing – Location Representation – Localization Techniques – Triangulation and Scene Analysis – Delaunay Triangulation and Voronoi graphs – Types of Context – Role of Mobile Middleware – Adaptation and Agents – Service Discovery Middleware	**8Hrs**
UNIT-V	

Three tier architecture - Model View Controller Architecture - Memory Management – Information Access Devices – PDAs and Smart Phones – Smart Cards and Embedded Controls – J2ME – Programming for CLDC – GUI in MIDP – Application Development ON Android and iPhone.	**8Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Deploy 3G networks
CO2	Develop suitable algorithms for 4G networks.
CO3	Use sensor and mesh networks to develop mobile computing environment.
CO4	Develop mobile computing applications based on the paradigm of context aware computing.
CO5	Identify architecture for Application Development

Reference Books	
1.	Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, "Mobile Computing: Technology, Applications and Service Creation", Second Edition, Tata McGraw Hill, 2010.
2.	Reto Meier, "Professional Android 2 Application Development", Wrox Wiley, 2010.
3.	Pei Zheng and Lionel M Li, 'Smart Phone & Next Generation Mobile Computing', Morgan Kaufmann Publishers, 2006
4.	Frank Adelstein, 'Fundamentals of Mobile and Pervasive Computing', TMH, 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 marksis 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**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**2**
CO3	**3**	**2**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**3**
CO4	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**2**
CO5	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**2**

High-3, Medium-2, Low-1

Semester: VII		
COMPUTER APPLICATIONS IN DESIGN (Theory)		
Course Code: MVJ21CG732		**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	To impart knowledge on computer graphics which are used routinely in diverse areas as science, engineering, medicine, etc	

UNIT-I	
Output primitives (points, lines, curves etc.,), 2-D & 3-D transformation (Translation, scaling, rotation) windowing - view ports - clipping transformation	**8Hrs**
UNIT-II	
Introduction to curves - Analytical curves: line, circle and conics – synthetic curves: Hermite cubic spline- Bezier curve and B-Spline curve – curve manipulations. Introduction to surfaces - Analytical surfaces: Plane surface, ruled surface, surface of revolution and tabulated cylinder – synthetic surfaces: Hermite bicubic surface- Bezier surface and B-Spline surface- surface manipulations.	**8Hrs**
UNIT-III	
NURBS- Basics- curves, lines, arcs, circle and bi linear surface. Regularized Boolean set operations - primitive instancing - sweep representations - boundary representations – constructive solid Geometry - comparison of representations - user interface for solid modeling.	**8 Hrs**
UNIT-IV	
Hidden – Line – Surface – solid removal algorithms shading – coloring. Introduction to parametric and variational geometry based software's and their principles creation of prismatic and lofted parts using these packages.	**8 Hrs**
UNIT-V	
Assembly modeling - interferences of positions and orientation - tolerances analysis – mass property calculations - mechanism simulation. Graphics and computing standards– Open GL Data Exchange standards – IGES, STEP etc– Communication standards.	**8Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	It helps the students to get familiarized with the computer graphics application in

	design.
CO2	This understanding reinforces the knowledge being learned and shortens the overall learning curve which is necessary to solve CAE problems that arise in engineering

Reference Books	
1.	David F. Rogers, James Alan Adams "Mathematical elements for computer graphics" second edition, Tata McGraw-Hill edition.2003
2.	Donald Hearn and M. Pauline Baker "Computer Graphics", Prentice Hall, Inc., 1992
3.	Foley, Wan Dam, Feiner and Hughes – Computer graphics principles & practices, Pearson Education – 2003.
4.	Ibrahim Zeid Mastering CAD/CAM – McGraw Hill, International Edition, 2007

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marksis 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	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

High-3, Medium-2, Low-1

Semester: VII		
GAME DESIGN & DEVELOPMENT (Theory)		
Course Code: MVJ21CG733		**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	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.

UNIT-I	
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.	**8 Hrs**
UNIT-II	
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.	**8 Hrs**
UNIT-III	
Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management	**8Hrs**
UNIT-IV	
2D and 3D Game development using Flash, DirectX, Java, Python, Game engines - Unity. DX Studio.	**8Hrs**
UNIT-V	
Developing 2D and 3D interactive games using DirectX or Python – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.	**8Hrs**

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

Reference Books	
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

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 marksis 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**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
C05	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

High-3, Medium-2, Low-1

Semester: VII		
COMPUTER GRAPHICS (Theory)		
Course Code: MVJ21CG734		**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	Understand the two dimensional graphics and their transformations
2	Gain knowledge about graphics hardware devices and software used.
3	Appreciate illumination and color models.
4	Understand the three dimensional graphics and their transformations.
5	Be familiar with understand clipping techniques.

UNIT-I	
Survey of computer graphics, Overview of graphics systems – Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.	**8Hrs**
UNIT-II	
Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; widow-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms.	**8 Hrs**
UNIT-III	
Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations – Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces. **TRANSFORMATION AND VIEWING:** Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations; Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods	**8Hrs**

UNIT-IV	
Light sources – basic illumination models – halftone patterns and dithering techniques; Properties of light – Standard primaries and chromaticity diagram; Intuitive colour concepts – RGB colour model – YIQ colour model – CMY colour model – HSV colour model – HLS colour model; Colour selection.	**8Hrs**
UNIT-V	
Design of Animation sequences – animation function – raster animation – key frame systems – motion specification –morphing – tweening. **COMPUTER GRAPHICS REALISM:** Tiling the plane – Recursively defined curves – Koch curves – C curves – Dragons – space filling curves – fractals – Grammar based models – fractals – turtle graphics – ray tracing.	**8Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Design two dimensional graphics
CO2	Apply two dimensional transformations.
CO3	Design three dimensional graphics.
CO4	Apply three dimensional transformations.
CO5	Design animation sequences.

Reference Books	
1.	John F. Hughes, Andries Van Dam, Morgan Mc Guire ,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley ,"Computer Graphics: Principles and Practice", , 3rd Edition, Addison- Wesley Professional,2013. (UNIT I, II, III, IV)
2.	Donald Hearn and Pauline Baker M, "Computer Graphics", Prentice Hall, New Delhi, 2007 (UNIT V).
3.	Donald Hearn and M. Pauline Baker, Warren Carithers,"Computer Graphics With Open GL", 4th Edition, Pearson Education, 2010.
4.	Hill F S Jr., "Computer Graphics", Maxwell Macmillan" , 1990.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marksis 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	**1**											
CO2	**1**		**2**	**2**			**1**			**2**	**2**	
CO3	**1**							**2**	**2**	**2**	**1**	
CO4	**1**	**2**				**2**						**2**

High-3, Medium-2, Low-1

Semester: VII		
3D ANIMATION (Theory)		
Course Code: MVJ21CG735		**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	To Understand fundamental properties of animation
2	To educate the basic of animation history
3	To develop a simple 3D model in a software
4	To understand the topology of 3D mode
5	To educate the basic physical property of different 3D objects and environment.

UNIT-I	
3D animation, animation industry, history of 3D animation, concept of modelling, texturing, rigging, animation, lighting and rendering. Different type of video formats, pixels vector and raztor, file formats, colour depth, bit depth, frame rate, timecode.	**8 Hrs**
UNIT-II	
Story – developing story for 3D Script, screen play, storyboard, animatic, pre visualization, design. Character, conflict, goal, story telling principles, basic shot framing, camera movement in 3D, global surroundings. Working principles of producer, director, animator.	**8Hrs**
UNIT-III	
Understanding the differences between NURBS and Polygon, topology of objects, working with references, Reading anatomy- human and living organisms, breaking human anatomy into different parts. Face, facial expressions, eye movement, lip movement, Character definition. Basic poses, Curve editor.	**8 Hrs**
UNIT-IV	
Timing movement of object or character, space and scale.Law of inertia, movement laws, newton‟s third law, working with gravity, action – reaction, motion weight and gravity, jump, walk and run.	**8Hrs**
UNIT-V	
Rigging – pivot positions, FK and IK, parenting, deformers, scripting, expressions, rigging workflow. Keyframe, Graph editor, dope sheet, animation techniques, basic lighting, lighting and attributes, motion capture technology, real time rendering.	**8Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Students will be able to understand the physics behind the 3D animation
CO2	Students will understand the basic movement of character
CO3	Students will develop the idea for the 3D animation movie

CO4	Students will understand the physics behind the different types of forces
CO5	Students will rig a character and animate it.

Reference Books	
1.	Ami Chopine, "3D art essentials" Taylor & Francis" 2012.
2.	Beane A. "3D animation essentials". John Wiley & Sons; 2012.
3.	Cabrera C. "An Essential Introduction to Maya Character Rigging with DVD". Routledge; 2012.
4.	King R. "3D Animation for the Raw Beginner Using Autodesk Maya 2e". CRC Press; 2019.

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 marksis 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**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

CO2	**3**	**2**	**1**	**3**	**3**	**2**	**-**	**-**	**2**	**-**	**1**	**-**
CO3	**3**	**2**	**1**	**3**	**-**	**2**	**-**	**-**	**2**	**-**	**-**	**-**

High-3, Medium-2, Low-1

Semester: VII		
PHOTOGRAPHY (Theory)		
Course Code: MVJ21CG741		**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	To create opportunities for professional and creative expression through the practice and art of photography
2	To understand the concept of lighting
3	To educate the importance of photo journalism
4	To inculcate aesthetic sense involved in creativity
5	To educate the student about different genres of photography

UNIT-I	
History of Photography, History of camera, Different camera formats, working of an SLR and DSLR Cameras. Features and functions of SLR and DSLR Cameras. Various camera controls. Zonesystem. Exposure. Image sensors. Different storage formats.	**8Hrs**
UNIT-II	
Different type of Lenses - Basic Shots and Camera Angles, Photographic Composition - View point and Camera angle-Eye Level, Low and High, Balance-Aspects of Balancing, Shapes and Lines, Pattern, Volume, Lighting, Texture, Tone, Contrast- and Colour, Framing, various Perspectives.	**8Hrs**
UNIT-III	
Colour Theory, Colour Temperature, Electromagnetic spectrum, Different types of Lights based on Manufacturing and photography purpose, Different lighting patterns, Light equipments, Light Reflectors and Diffusers for Portraits and other genres of photography, Light Meters and Light measurement Units. Uses of various Filters.	**8Hrs**
UNIT-IV	
Basics of News Photography-Essential elements of News, Importance of News photographs, Types of News photographs Spot News, Feature, Planning for News Photography-Planning of shooting script, Shooting script techniques, Layout design, Qualities for a Photojournalist, Picture stories and Lens required for News Photography.	**8Hrs**
UNIT-V	
Basic shooting and Lighting Techniques and Equipments required for different genres of Photography like Black and White, Landscape, Cityscape, Architecture, Advertising, Fashion, Food, Automobile, Sports, Travel, Children, Portrait, Still Life, Event, Silhouette, Festival and Themes.	**8Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Students will learn the principles of good composition in photography

CO2	Students will develop an individual style in representing the society through photographs.
CO3	Students will understand the function of camera.
CO4	Students will develop an individual style in representing the society through photographs.
CO5	Students will be able to understand the advanced camera operations.

Reference Books	
1.	Ansel Adams, The Negative,Bulfinch press, Fourteenth Edition, 2008
2.	Bryan Peterson, Understanding exposure, Amphoto books, 4th edition, 2016.
3.	BalakrishnaAiyer, Digital Photojournalism, Authors press,2005
4.	Ben long, Complete Digital Photography, Charles River Media, Third 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 marksis 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**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**1**	**3**	**3**	**2**	**-**	**-**	**2**	**-**	**1**	**-**
CO3	**3**	**2**	**1**	**3**	**-**	**2**		**-**	**2**	**-**	**-**	**-**
CO4	**3**	**3**	**2**	**3**	**3**	**2**	**-**	**-**	**2**	**2**	**2**	**-**
CO5	**3**	**2**	**3**	**3**	**3**	**2**	**-**	**-**	**2**	**2**	**2**	**2**

High-3, Medium-2, Low-1

Semester: VII		
VIDEO PRODUCTION TECHNIQUES (Theory)		
Course Code: MVJ21CG742		**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	To understand the basic and evaluation of videography
2	To understand the audio recording knowledge for various production techniques
3	To inculcate the production aesthetic sense in terms of lighting, composition, sound and usage of equipment.
4	To gain knowledge of studio equipment usage and benefits
5	To create opportunities for creative expression through the practice and production of programmes

UNIT-I	
History of Video Cameras, Different camera formats, working of an Video Camera. Features and functions video cameras, Shots and Camera angles used in various production process.	**8 Hrs**
UNIT-II	
Basics of sound recording. Different types of microphones and factors governing their selection. In built microphones in cameras, Mixing of Sound. Audio sweetening practical. Sound manipulation. Outdoor sound recording vs Studio recording.	**8 Hrs**
UNIT-III	
Lighting patterns, light equipment‟s and accessories, reflectors, light measurement, control of light. Lighting for different programs, Design considerations, Economical Sets, Virtual Sets, Make-ups and costumes.	**8Hrs**
UNIT-IV	
Lighting in the studio, Different camera mounting equipment‟s, Single and Multi-cameraproduction, Production control room, Use of Video mixer, Chromo keying and other visual effects. Editing the production – The Art and techniques of Editing.	**8 Hrs**
UNIT-V	
Different genres of Video programmes, Talk shows, Interviews, short film making, Public service announcements and Corporate films. Broadcast distribution, Online distribution, Festivals and Competitions	**8Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	recognize the principles of production techniques
CO2	expertise in both indoor and outdoor production.
CO3	produce social responsible programmes to create change in the society

CO4	follow ethical and social and also represent the society in a good way.
CO5	Students become experts in handling camera and related equipments

Reference Books	
1.	Albert Moran and Michael Keane, Television across Asia: Television Industries, Programme formats & Globalisation, Routledge Curzon, Taylor & Francis Group, 2004
2.	Belavadi Vasuki, „Video Production," Oxford University Press, 2012
3.	Gerald Millerson, Television Production, 15th Edition, Focal Press, 2012.
4.	Herbert Zettl, Television Production Handbook, 10th Edition, Wadsworth Publications,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 marksis 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**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**1**	**3**	**3**	**2**	**-**	**-**	**2**	**-**	**1**	**-**
CO3	**3**	**2**	**1**	**3**	**-**	**2**	**-**	**-**	**2**	**-**	**-**	**-**
CO4	**3**	**3**	**2**	**3**	**3**	**2**	**-**	**-**	**2**	**2**	**2**	**-**
CO5	**3**	**2**	**3**	**3**	**3**	**2**	**-**	**-**	**2**	**2**	**2**	**2**

High-3, Medium-2, Low-1

Semester: VII		
EDITING TECHNIQUES (Theory)		
Course Code: MVJ21CG743		**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	To appreciate editing as creative element for storytelling
2	To understand procedures, techniques, and standard practices in video editing
3	To understand the aesthetic principles and concepts of video editing

UNIT-I	
Definition of editing, the historical development of editing theory, audience manipulation through editing, Understanding the trends in the editing industry- New technologies in post production. Film and video formats, the principles and formats of digital video, Hardware and software requirements for nonlinear editing, introduction to various operating systems, overview of software available for editing.	**8Hrs**
UNIT-II	
Roles and responsibilities of editors, skills required for an successful editor, Working Principles - Considering Script as an Architeure, Understanding directional intent, Camera angles and movement, reading light, reading the actor, understanding stories and their purpose. Copyright and ethical issues in editing.	**8Hrs**
UNIT-III	
Definition of Shot, Scene and Sequence, Five Shot Rule, Editing Decisions, Editing Opportunities, Six Elements of Edit, Five Types of Edit, Working Practices, Importance of tone, pace and rhythm. Establishing Continuity.	**8Hrs**
UNIT-IV	
Styles in editing, Techniques in editing, Editing to Manipulate Time, Editing Transitions, Graphics, Animation and Plug-Ins Continuity Editing and Complexity Editing, Dynamics of Sound – discovering the beat, sound as a character, invisible sound, tone and pitch and creative usage of sound in editing. Usage of Colours based on gender, culture and personalities. Planning the nonlinear editing process: Budgeting time, personnel and space.	**8Hrs**
UNIT-V	
Digital Story telling - Editing styles for reality programs - News, features, bulletins, documentaries, reality shows; Editing styles fictional Narratives –Short Films, Serials, Films; Editing Styles for PSAs, Advertisements and Music Videos. Editing for sports and other live and recorded events	**8Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Students will be able to understand the different principles of editing
CO2	Students will learn the application of various styles and methods of editing in their

	video projects
CO3	Students will understand the aesthetic reason for the edit choices made by film/video makers.
CO4	Students will understand the role of editor
CO5	Students will be able to edit the video projects.

Reference Books	
1.	Bryce Button, Nonlinear Editing: Storytelling, Aesthetics, & Craft, Focal Press, 2002
2.	Dancyger Ken, The Technique of Film and Video Editing – History, Theory and Practice. Focal Press, 2005.
3.	Koppelman Charles, Behind The Seen - How Walter Murch Edited Cold Mountain on Final Cut Pro - Pearson Publications, 2014.
4.	Lumet Sidney, Making Movies, Random House, New York, 1995.

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 marksis 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**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**1**	**3**	**3**	**2**	**-**	**-**	**2**	**-**	**1**	**-**
CO3	**3**	**2**	**1**	**3**	**-**	**2**	**-**	**-**	**2**	**-**	**-**	**-**
CO4	**3**	**3**	**2**	**3**	**3**	**2**	**-**	**-**	**2**	**2**	**2**	**-**
CO5	**3**	**2**	**3**	**3**	**3**	**2**	**-**	**-**	**2**	**2**	**2**	**2**

High-3, Medium-2, Low-1

Semester: VII		
MOTION GRAPHICS (Theory)		
Course Code: MVJ21CG744		**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	To become visually literate, including competence with the non-verbal languages of art and design
2	To develop visual, verbal, and written responses to visual phenomena, and organize perception and conceptualizations both rationally and intuitively
3	To learn the basic principles of storyboarding and project mapping
4	To educate the concept of tracking
5	To understand the usage of 3D in live action

UNIT-I	
General principles of motion graphics, - Different software‟s used for motion graphics, Photoshop, Final cut pro, Premier Pro, After effects, Combustion, Nuke. - Create Pipeline for production. - Exercise for each software differently. - Creating a story board	**8Hrs**
UNIT-II	
Understanding and working with the keying concepts, Working with different types of keyer Working with Roto shots, Removing the blue/green screen using different keyers, Working with 2D tracking Working with planar tracking	**8 Hrs**
UNIT-III	
Working with RGB, colour waveform, colour histogram, Curves Understanding the alpha value, Colour grading of Computer generated objects, Adding the lights and shadow Matching light space and adjusting for brightness and colour Mask the region Working with layer and node based software's.	**8Hrs**
UNIT-IV	
Camera tracking in different software‟s - Combining of graphics elements into the live action Create and modify 3D objects, Importing 3D materials to various software, Create a 3D title	**8Hrs**
UNIT-V	
Understanding audio properties, Working with different levels of audio, Different type of audio formats, Working with multi track audio, Rendering the final mix down audio, Lip sync with the visual, Export the final output.	**8Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Students will able to shoot the graphics video on their own
CO2	Students will be able to assemble the green /blue mate footage
CO3	Students will be able to work with the 3D environment digitally
CO4	Students will be able to work with the audio

CO5	Students will understand the concept of rendering

Reference Books	
1.	Blazer L. Animated storytelling: Simple steps for creating animation and motion graphics. Peachpit Press; 2015.
2.	Ian Crook, Peter Beare, Motion Graphics: Principles and Practices from the Ground Up, Bloomsbury Publishing, 2017.
3.	Jackson C. After Effects for Designers: Graphic and Interactive Design in Motion. Focal Press; 2018.
4.	Jon Krasner, Motion Graphic Design: Applied History and Aesthetics Focal press, 2013.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marksis 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**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**1**	**3**	**3**	**2**	**-**	**-**	**2**	**-**	**1**	**-**
CO3	**3**	**2**	**1**	**3**	**-**	**2**	**-**	**-**	**2**	**-**	**-**	**-**
CO4	**3**	**3**	**2**	**3**	**3**	**2**	**--**	**-**	**2**	**2**	**2**	**-**
CO5	**3**	**2**	**3**	**3**	**3**	**2**	**-**	**-**	**2**	**2**	**2**	**2**

High-3, Medium-2, Low-1

Semester: VII		
COMPUTER VISION (Theory)		
Course Code: MVJ21CG745		**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	This course will enable students to Computer Vision focuses on development of algorithms and techniques to analyze and interpret the visible world around us. This requires understanding of the fundamental concepts related to multi-dimensional signal processing, feature extraction, pattern analysis visual geometric modeling, stochastic optimization etc. Knowledge of these concepts is necessary in this field, to explore and contribute to research and further developments in the field of computer vision. Applications range from Biometrics, Medical diagnosis, document processing, mining of visual content, to surveillance, advanced rendering etc.	

UNIT-I	
Digital Image Formation and low-level processing 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	**8Hrs**
UNIT-II	
Depth estimation and Multi-camera views Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration.	**8Hrs**
UNIT-III	
Feature Extraction 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.	**8Hrs**
UNIT-IV	
Image Segmentation Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection.	**8Hrs**

UNIT-V	
Pattern Analysis 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.	**8Hrs**

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

Reference Books	
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.
3.	Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004.
4.	K. Fukunaga; Introduction to Statistical Pattern Recognition, Second Edition, Academic Press, Morgan Kaufmann, 1990.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marksis 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	**2**	**1**	**1**	**-**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**1**	**-**	**-**	**1**	**1**	**-**	**2**	**3**	**3**	**3**	**-**	**-**
CO4	**3**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**3**	**3**	**3**	**3**

High-3, Medium-2, Low-1

Semester: VII		
PROJECT PHASE – 1 (Theory)		
Course Code: MVJ21CGPR75		**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	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