COURSE CONTENT

AUGMENTED REALITY AND VIRTUAL REALITY								
II Semester: CSE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BCSE28	**Elective**	3	0	0	3	40	60	100
Contact Classes: 45	**Total Tutorials: Nil**	**Total Practical Classes: Nil**				**Total Classes: 45**		
Prerequisites: Computer Vision								

I. COURSE OVERVIEW:

An Augmented Reality (AR) and Virtual Reality (VR) course aims to cover various aspects of these immersive technologies, providing students or participants with a comprehensive understanding of their concepts, applications, development, and implementation.

II. COURSE OBJECTIVES:

The students will try to learn:

I. the fundamentals of sensation, perception, and perceptual training.
II. the scientific, technical, and engineering aspects of augmented and virtual reality systems.
III. The technology of augmented reality and its implementation

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to

CO1 Identify, examine, and use the software that reflects fundamental techniques for the design and deployment of VR and AR experience.
CO2 Describe how VR and AR systems work.
CO3 Choose, develop, explain, and defend the use of particular designs for AR and VR experiences.
CO4 Evaluate the benefits and drawbacks of specific AR and VR techniques on the human body
CO5 Identify and examine state-of-the-art AR and VR design problems and solutions

IV. COURSE CONTENT:

MODULE-I: INTRODUCTION (9)
Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality.
Multiple Models of Input and Output Interface in Virtual Reality: Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual /Auditory / Haptic Devices.

MODULE-II: VISUAL COMPUTATION IN VIRTUAL REALITY (9)
Fundamentals of Computer Graphics. Software and Hardware Technology on Stereoscopic Display. Advanced Techniques in CG: Management of Large Scale Environments & Real Time Rendering.

MODULE-III: INTERACTIVE TECHNIQUES IN VIRTUAL REALITY (9)
Body Track, Hand Gesture, 3D Manus, Object Grasp. **Development Tools and Frameworks in Virtual Reality**: Frameworks of Software Development Tools in VR. X3D Standard; Vega, MultiGen, Virtools etc.

MODULE-IV: APPLICATION OF VR IN DIGITAL ENTERTAINMENT (9)
VR Technology in Film & TV Production. VR Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR.

MODULE-V: 3D INTERACTION TECHNIQUES (9)
3D Manipulation Tasks, Manipulation Techniques and Input Devices, Interaction Techniques for 3D Manipulation.

V. TEXT BOOKS:

1. Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.
2. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

VI. REFERENCE BOOKS:

1. Alan Craig, William Sherman and Jeffrey Will, "Developing Virtual Reality Applications, Foundations of Effective Design", Morgan Kaufmann, 2009.

VII. WEB REFERENCES:

1. https://www.w3.org/WAI/APA/task-forces/research-questions/wiki/Virtual_Reality_and_Accessibility_References
2. https://nap.nationalacademies.org/read/4761/chapter/18
3. https://www.coursera.org/courses?query=augmented%20reality
4. https://www.udemy.com/topic/augmented-reality/

VIII. E-TEXT BOOKS:

1. https://www.researchgate.net/publication/322137851_Augmented_Reality_Books_An_Immersive_Approach_to_Learning
2. https://link.springer.com/book/10.1007/978-3-030-79062-2
3. https://link.springer.com/book/10.1007/978-3-030-79062-2

IX. MATERIALS ONLINE:

1. Course Outline Description
2. Tutorial question bank
3. Tech talk topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. PowerPoint presentation
11. E-Learning Readiness Videos (ELRV)