VIDHYADEEP UNIVERSITY
Holy Flame of Knowledge

THIRD-YEAR DIPLOMA IT ENGINEERING SYLLABUS

Semester: 6TH

Course Code: 002298605 **Type of Course:** OEC-2

Course Name: Virtual Reality

Course Prerequisites: Basic knowledge of Virtual Reality

COURSE OBJECTIVE(S):

- This covers the development of Virtual/Augmented reality (VR/AR) worlds
- Including mathematical basis of motion and physics in VR/AR worlds,
  - human visual perception
  - design practices
  - enable immersive experiences for users
  - development on heterogeneous device hardware.

TEACHING & EXAMINATION SCHEME:

Teaching Scheme (Hrs/Week)				Examination Scheme					
Theory	Tutorial	Practical	Credit	SEE		CA			Total
				Th	Pr	MSE	PLE	LA	
3	0	0	3	60	00	20	20	00	100

Th: Theory; Pr: Practical; FA: Final Assessment; CAT: Continuous Assessment Theory; CAP: Continuous Assessment Practical;

*TOTAL Theory Hours: No. of Th. and Tut. Hrs/Week*15 = 45*

COURSE CONTENT(S):

Unit No.	Content	Hours	Weightage (%)
1	**Introduction of Virtual Reality** • Introduction, Fundamental Concept and Components of Virtual Reality. • Primary Features and Present Development on Virtual Reality. • Computer graphics,Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality,Virtuality and Immersion,Current trends and state of the art in immersive technologies,Developing platforms and consumer devices. • Scientific Landmark 3D Computer Graphics: Introduction,The Virtual world space,positioning the virtual observer,the perspective projection,human vision,stereo perspective projection,3D clipping, Colour theory, Simple 3D modelling, Illumination models,Reflection models, Shading algorithms .	06	10%
2	**Interactive Techniques in Virtual Reality**	12	30%

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	• Introduction,From 2D to 3D,3D space curves,3D boundary representation Geometrical Transformations: Introduction, Frames of reference,Modelling transformations,Instances,Picking,Flying,Scaling the VE, Collision detection Generic VR system: Introduction,Virtual environment,Computer, environment,VR technology,Model of interaction,VR Systems.		
3	**Visual Computation in Virtual Reality** • Animating the Virtual Environment: Introduction,The dynamics of numbers, Linear and Nonlinear interpolation,the animation of objects, Linear and non linear translation, shape & object inbetweening,free from deformation, particle system. • Physical Simulation: Introduction, Objects falling in a gravitational field,Rotating wheels,Elastic collisions, projectiles,simple pendulum, springs,Flight dynamics of an aircraft.	08	20%
4	**Augmented and Mixed Reality** • Taxonomy,technology and features of augmented reality, • difference between AR and VR,Challenges with AR, AR systems and functionality, Augmented reality methods, • visualization techniques for augmented reality,wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality,enhancing interactivity in AR environments,evaluating AR systems..	10	20%
5	**Multiple Models of Input and Output Interface in Virtual Reality** • Human factors: Introduction,the eye, the ear, the somatic senses. • VR Hardware: Introduction,sensor hardware,Head-coupled displays,Acoustic hardware, Integrated VR systems. • VR Software: Introduction,Modelling virtual world, Physical simulation,VR toolkits,Introduction to VRML, Input -- Tracker,Sensor,Digital Glove,Movement Capture,Video-based Input,3D Menus & 3D Scanner etc. • Output -- Visual / Auditory / Haptic Devices..	09	20%
	TOTAL	**45**	**100%**

Text Book(s):

Title of the Book	Author(s)	Publication

Nil		

Reference Book(s):

Title of the Book	Author(s)	Publication
The VR Book: Human-Centered Design for Virtual Reality	Jason Jerald	Morgan & Claypool Publishers
Virtual Reality Technology	Burdea, G. C. and P. Coffet	Wiley-IEEE Press
Understanding Augmented Reality, Concepts and Applications	Alan B. Craig	Morgan Kaufmann Publishers
Developing Virtual Reality Applications, Foundations of Effective Design	Alan Craig, William Sherman and Jeffrey Will	Morgan Kaufmann Publishers
Discovering Statistics Using SPSS	Andy Field	SAGE Publications Ltd

Web Material Link(s):

1. https://www.geeksforgeeks.org/virtual-reality-introduction/
2. https://en.wikipedia.org/wiki/Virtual_reality
3. https://www.intechopen.com/chapters/80516

Equivalent/Corresponding Course on NPTEL (SWAYAM):
NPTEL course on
https://nptel.ac.in/courses/106106138

COURSE EVALUATION:

Sr.No.	Activity	Marks	Weightage
1	Semester End Examination (External Th)	60	60%
2	Internal Examination	40	40%
2(a)	Mid Semester Examination	20	
2(b)	Attendance	10	
2(c)	Assessment Types (Any One from 2(c).1 to 2(c).7)	10	
2(c).1	Subject (Course) based Mini-Project		
2(c).2	Industry/Site Visit & Report		
2(c).3	Assignment		
2(c).4	Seminar		
2(c).5	Case Study		
2(c).6	Surprise Class Quiz		
2(c).7	Design Exercise		
2(c).7	Presentation		
2(d)	Practical (if Applicable)		

* For 4 Credit Subjects

1 Credit = 25 Marks

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Theory: 3 Credits = 75 Marks
Practicals: 1 Credit = 25 Marks
SEE Evaluation will be of 100 marks and converted to 50 Marks (75 Th + 25 Pr)
CA Evaluation will be of 100 Marks and converted to 50 Marks. (75 Th + 25 Pr)

Distribution of Marks for Theory Evaluation as per Bloom's Taxonomy Level:

Level	Remember	Understand	Apply	Analyse	Evaluate	Create
% Weightage	14%	26%	30%	10%	10%	10%

COURSE OUTCOMES: *(in the range of 4 to 6)*

CO1	Demonstrate understanding and design of VR/AR technology relates to human perception and cognition
CO2	Ability to design 3D interaction techniques
CO3	Demonstrate understanding of fundamental computer vision, computer graphics and human-computer interaction techniques related to VR/AR
CO4	Demonstrate insights to key application areas for VR/AR
CO5	Able to create applications of VR to the conduct of scientific research, training and industrial design.