GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester -V

Course Title: Multimedia Technologies
(Course Code: 4350707)

Diploma programme in which this course is offered	Semester in which offered
Computer Engineering	5th semester

1. RATIONALE

Multimedia Technologies refers to the use of different forms of media such as text, audio, images, and videos in a digital environment. It has become an essential part of modern society and has many applications in fields such as education, entertainment, and communication.

One important aspect of Multimedia Technologies is the use of software tools that enable the creation, manipulation, and distribution of multimedia content. Open source software, in particular, has gained popularity in recent years due to its availability, cost-effectiveness, and flexibility.

There are various tools which you can use to create and edit multimedia contents. The use of open source software like GIMP and OpenShot in Multimedia Technologies has several advantages. Firstly, open source software is often free of charge, which makes it accessible to a wider range of users. Secondly, open source software is developed by a community of volunteers who are passionate about creating high-quality tools, which often results in software that is stable, reliable, and constantly improving. Finally, open source software provides users with greater flexibility and control over their tools, as they are able to modify and customize the software to suit their specific needs.

GIMP (GNU Image Manipulation Program) is a powerful alternative to commercial software like Adobe Photoshop, and it is used by graphic designers, photographers, and artists. OpenShot is a cost-effective alternative to commercial software like Adobe Premiere Pro with features such as timeline editing, video effects, and audio mixing

There are number of technologies that form the heart of enabling the new Web 2.0 paradigm, with rich user interactions. Such popular Web 2.0-based social media sharing websites as YouTube, Facebook, Twitter and many more have drastically changed the content generation and distribution landscape, and indeed have become an integral part in people's daily life. The developments in the coding algorithms and hardware for sensing, communication, and interaction also empower virtual reality (VR) and augmented reality (AR), providing better immersive experiences beyond 3D. It examines these new-generation interactive multimedia services and discusses their potential and challenges.

In conclusion, the use of open source software like GIMP and OpenShot in Multimedia Technologies provides users with powerful and flexible tools for creating, manipulating, and distributing multimedia content. These tools are cost-effective, reliable, and constantly improving, making them an attractive option for users in various fields.

COMPETENCY

The purpose of this course is to help the student to attain the following industry identified competency through various teaching-learning experiences:

- To sharpen both theoretical and practical aspects in designing multimedia systems surrounding the emergence of multimedia technologies using contemporary software technologies.

2. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge, and the relevant soft skills associated with this competency are to be developed in the student to display the following COs:

Students will be able to

CO1) Identify basic multimedia features and applications.

CO2) Demonstrate various photo editing techniques to enhance visual effects of the image.

CO3) Create, edit videos and animate geometrical objects by applying different animation principles.

CO4) Examine the unique characteristics of social media sharing with their impact and cloud-assisted multimedia computing with content sharing

CO5) Describe working of augmented reality and virtual reality system.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T/2+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
3	-	2	5	30*	70	25	25	150

(*): Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-project to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessing the attainment of the cognitive domain UOs required for the attainment of the COs.

***Legends: L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **CA** - Continuous Assessment; **ESE** -End Semester Examination.*

5. SUGGESTED PRACTICAL EXERCISES

The following practical outcomes (PrOs) are the subcomponents of the COs. These PrOs need to be attained to achieve the COs.

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Browse the internet and find different webpages and identify the building blocks related to the multimedia.	I	01

2	Install and setup any open source tool for image editing like GIMP. Import and open an image file in tool. Practice with different menus or tools supported by image editing tool.	II	01
3	Import an image from the browser / picture folder and place it on the workspace. After that straighten, crop, scale, border and frame the given image.	II	02
4	Open any image of you with nature background and assess it for faults like brightness, contrast, sharpness etc. and use tools to adjust brightness-contrast, levels, curves, hue-saturation, NL_filter, Unsharp Mask, Red eye reduction, dodge brush, burn brush, smudge brush, healing brush to correct an image.	II	02
5	Combine multiple images using layers and then add text in resultant image and share it with any social media. Or By using multiple images and text make a flyer for upcoming college event.	II	02
6	Import a picture of a stationary motorcyclist. Apply suitable masking filters and background. The image should appear as though the motorcyclist is speeding fast.	II	02
7	Restore old monochrome photos to a new one. Apply suitable colors.	II	02
8	Import an image from the internet. Remove back ground from it using selecting part of an image and change the shape of object from an image using cage transform tool. Also remove an object by using clone tool.	II	02
9	Import any image from the computer and apply various effects on it and save it with new name.	II	01
10	Install and setup any open source tool for video Editing like OpenShot. Create a video of simple slideshow with images and background music.	III	01
11	Edit video using trimming, slicing and transitions using any video editing tool.	III	02
12	Apply various audio and video effect on imported video. Also give a title in a video using appropriate tool.	III	02
13	By using any animation tools create bouncing of ball animation.	III	02
14	Narrate any inspirational short story by using animation.	III	02
15	Upload video on YouTube and explore its meta data. Also discuss the key differences between YouTube videos and the traditional movies / TV shows. How would they affect content distribution? Prepare comparison chart for that.	IV	02

16	Explore software/hardware required for AR/VR technology and make a list of it with specifications. Also explore limitations and challenges affect the development of AR/VR applications.	V	02

Note

*i. More **Practical Exercises** can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list.*

*ii. The following are some **sample** 'Process' and 'Product' related skills (more may be added/deleted depending on the course) that occur in the above listed **Practical Exercises** of this course required which are embedded in the COs and ultimately the competency..*

S. No.	Sample Performance Indicators for the PrOs	Weightage in %
1	Technical Skills	30
2	Creativity	25
3	Attention to Detail	20
4	Timeliness	15
5	Presentation	10
Total		**100**

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

This major equipment with broad specifications for the PrOs is a guide to procure them by the administrators to usher in uniformity of practical in all institutions across the state.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Minimum System Requirements: Computer System with 64-bit Operating System (Linux, OS X, Chrome OS, Windows 7/8/10/11), Multi-core processor with 64-bit support, 4GB of RAM	All
2	Multimedia projector	All

7. AFFECTIVE DOMAIN OUTCOMES

The following ***sample*** Affective Domain Outcomes (ADOs) are embedded in many of the above-mentioned COs and PrOs. More could be added to fulfill the development of this competency.

a) Follow safety practices.
b) Practice good housekeeping.
c) Demonstrate working as a leader/a team member.
d) Maintain tools and equipment
e) Follow ethical practices.

The ADOs are best developed through the laboratory/field based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

i. 'Valuing Level' in 1st year
ii. 'Organization Level' in 2nd year.
iii. 'Characterization Level' in 3rd year.

8. UNDERPINNING THEORY

The major Underpinning Theory is formulated as given below and only higher level UOs of Revised Bloom's taxonomy are mentioned for development of the COs and competency in the students by the teachers. (Higher level UOs automatically includes lower level UOs in them). If required, more such higher level UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at Application and above level)	Topics and Sub-topics
Unit 1: Fundamentals of Multimedia	1.1 Define multimedia & list components of multimedia 1.2 Discuss the effects of multimedia in your daily life. 1.3 Examine multimedia applications in several areas. 1.4 Classify multimedia software based on its function 1.5 List multimedia skills required in a team.	1.1 What is multimedia? Components of multimedia 1.2 Multimedia: past and present: early history of multimedia, hypermedia, www, and internet, multimedia in the new millennium 1.3 Where to use multimedia? , delivering multimedia 1.4 Multimedia software tools: music sequencing and notation, digital audio, graphics and image editing, video editing, animation, multimedia authoring, multimedia broadcasting, Augmented reality and virtual reality 1.5 Multimedia skills required in a team
Unit 2: Image Editing	2.1. Describe image data types. 2.2. Describe types of file format to represent image 2.3. Describe steps for Image Straightening, Cropping, Scaling, 2.4. Apply image enhancement techniques on image 2.5. Use layering approach to edit images**.**	2.1. Graphics and image data types : 1-bit images, 8-bit gray-level images ,image data types, 24-bit color images, higher bit-depth images , 8-bit color images 2.2. File formats: gif, jpeg, png, tiff, windows bmp , Windows WMF, Netpbm Format , EXIF,HEIF , PS and PDF PTM 2.3. Explore image editing tool interface , various tools 2.4. Image straightening, cropping, scaling, framing an image 2.5. Image enhancement technique - correcting with brightness, correcting a dull image, oversaturated image, noisy image, removing red eye, repair images 2.6. Adding text to an image 2.7. Layers 2.8. Working on part of an image

Unit 3: Video and Animation	3.1 Explain about digital video standards, formats and technology. 3.2 Illustrate working of video 3.3 Use software tools to edit videos 3.4 Examine basic principles behind animation and techniques 3.5 Apply animation tools to make animation	3.1 Video basic terminology: codec, resolution, bit rate, frame rate, aspect ratio 3.2 How video works? Analog video , digital video 3.3 Video editing: clips - split clip, export clips, add to timeline, trimming & slicing, transform, effects: video effects, audio effects, export video in different mode, give titles. 3.4 Animation: power of motion 3.5 12 principals of animation 3.6 Animation fundamentals , animation techniques and file formats 3.7 Making animation that works : rolling ball , a bouncing ball, create an animated scene
Unit 4: Multimedia Information Sharing	4.1 Describe social media sharing 4.2 Discuss unique features of YouTube 4.3 Illustrate cloud computing for multimedia services.	4.1. Online social media sharing 4.2. representatives of social media services : user-generated content (UGC) , online social networking (OSN) 4.3. User-generated media content sharing 4.4. Case study : YouTube with unique features - video format and meta-data, characteristics of YouTube video, small-world in YouTube videos, YouTube from a partner's view 4.5. Cloud computing for multimedia services : cloud computing overview, multimedia cloud computing, cloud assisted media sharing, case study : Netflix

Unit 5: Augmented Reality and Virtual Reality	5.1 Differentiate Augmented Reality, Virtual Reality and Mix Reality 5.2 Describe working of Augmented Reality and Virtual Reality 5.3 Discuss application of Augmented Reality and Virtual Reality	5.1 Defining augmented reality, virtual reality and mix reality 5.2 Workflow of augmented reality its component - sensory data collection, localization and alignment, world generation and emission 5.3 Workflow of virtual reality and its component - virtual world, immersion, sensory feedback, and interactivity 5.4 Applications

***Note**: The UOs need to be formulated at the 'Application Level' and above of Revised Bloom's Taxonomy' to accelerate the attainment of the COs and the competency.*

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
	Fundamentals of Multimedia	6	3	6	3	12
I	Image Editing	14	2	8	8	18
II	Video and Animation	10	4	6	6	16
III	Multimedia Information Sharing	6	4	4	4	12
IV	Augmented Reality and Virtual Reality	6	3	6	3	12
Total		**42**	**16**	**32**	**24**	**70**

***Legends:** R=Remember, U=Understand, A=Apply and above (Revised Bloom's taxonomy)*
***Note**: This specification table provides general guidelines to assist students for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions assess the attainment of the UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary slightly from the above table.*

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related ***co-curricular*** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

i. Survey various image editing and video editing software and give a seminar on any of them.
ii. Make small video using GIMP and OpenShot in the group
iii. Undertake micro-projects in teams

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a) Massive open online courses (***MOOCs***) may be used to teach various topics/subtopics.
b) Guide student(s) in undertaking micro-projects.
c) ***'L' in section No. 4***means different types of teaching methods that are to be employed by teachers to develop the outcomes.
d) About ***20% of the topics/sub-topics*** which are relatively simpler or descriptive in nature is to be given to the students for ***self-learning***, but to be assessed using different assessment methods.
e) With respect to ***section No.11***, teachers need to ensure to create opportunities and provisions for ***co-curricular activities***.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be ***individually*** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should ***not exceed three.***

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain a dated work diary consisting of individual contributions in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than ***16 (sixteen) student engagement hours*** during the course. The student ought to submit a micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. This has to match the competency and the COs. Similar micro-projects could be added by the concerned course teacher:

Project 1: Create a logo for a new brand

- Design a logo for a new brand
- Create a short video showcasing the logo and brand name

Project 2: Create a video slideshow

- Create a video slideshow of photos or images
- Edit and enhance the photos or images before importing them into video tool

Project 3: Create a social media post graphic

- Design a graphic for a social media post
- To add text animations and effects to the graphic to make it more eye-catching

Project 4: Create an animated GIF

- Create a series of frames for an animated GIF
- Combine the frames into a final animated GIF

Project 5: Create a video bumper

- Create a short video bumper to introduce a video or brand

- Design the graphics and text for the bumper

Project 6: Create a meme

- Edit an image and add humorous text to create a meme
- Create a short video showcasing the meme with added effects and music

Project 7: Create a YouTube thumbnail

- Design a thumbnail image for a YouTube video
- Add text and other elements to the thumbnail to make it stand out and attract viewers.

Project 8: Create an advertisement for new employee recruitment.
Project 9: Create 5 minute video by using minimum 5 different video clips
Project 10: Create brochure for your college.
Project 11: Create Invitation card for college reunion.
Project 12: Case study on any social media platform like Facebook, twitter in terms of content sharing
Project 13: Create animated sorting algorithm
Project 14: Explore any online image editing tools and make a note of new features
Project 15: Explore any online video editing tools and make a note of new features
Project 15: Create a flyer or advertisement for social issue.
Project 15: Create colorful balls and apply animation effects such that balls fall from a table and roll in different directions.
Project 15: Animate blossoming of a flower.
Project 15: Create scenery with a mirror reflection and proper lighting effect.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Fundamentals of Multimedia	Ze-Nian Li Mark S. Drew Jiangchuan Liu	Springer, Nature Switzerland AG 2021, Third Edition ISBN 978-3-030-62123-0
2	Multimedia: Making It Work	Tay Vaughan	McGraw-Hill, 2011, Eighth Edition ISBN: 978-0-07-174850-6
3	Principles of Multimedia	Ranjan Parekh	Tata McGraw Hill, New Delhi , 2013, Second Edition ISBN - 978-1-25-900650-0
4	GIMP for Absolute Beginners	Jan Smith with Roman Joost	APress , 2012 ISBN 978-1-4302-3168-4
5	THE BOOK OF GIMP: A Complete Guide To Nearly Everything	Olivier Lecarme, Karine Delvare	No Starch Press ,2013 ISBN : 978-1593273835
6	Openshot Video Editor	Jesse Russell, Ronald Cohn	Book on Demand Ltd. ISBN: 978-5-5122-8281-6

7	The Illusion of Life: Disney Animation	Frank Thomas and Ollie Johnston	Disney productions, 1995 ISBN: 0-7868-6070-7

14. SOFTWARE/LEARNING WEBSITES

I. Software:
   1. GIMP open source software (https://www.gimp.org/downloads/)
   2. OpenShot open source software(https://www.openshot.org/download/)

II. https://www.gimp.org/tutorials/
III. https://docs.gimp.org/
IV. https://cdn.openshot.org/static/files/user-guide/index.html
V. https://cdn.openshot.org/static/files/user-guide/OpenShotVideoEditor.pdf

15. PO-COMPETENCY-CO MAPPING

Semester V	**Multimedia Technologies(Course Code:** 4350708**)**						
	POs and PSOs						
Competency & Course Outcomes	**PO 1 Basic & Discipline specific knowledge**	**PO 2 Problem Analysis**	**PO 3 Design/ development of solutions**	**PO 4 Engineering Tools, Experimentation &Testing**	**PO 5 Engineering practices for society, sustainability & environment**	**PO 6 Project Management**	**PO 7 Life-long learning**
Competency To sharpen both theoretical and practical aspects in designing multimedia systems surrounding the emergence of multimedia technologies using contemporary software technologies.							
CO1) Identify basic multimedia features and applications.	3	-	1	1	-	-	2
CO2) Demonstrate various photo editing techniques to enhance visual effects of the image.	3	-	3	3	-	2	3
CO3) Create, edit videos and animate geometrical objects by applying different animation principles.	3	-	3	3	-	2	3
CO4) Examine the unique characteristics of social media sharing with their impact and cloud-assisted multimedia computing with content sharing	2	1	2	2	-	-	2
CO5) Describe working of augmented reality and virtual reality system.	2	1	2	2	-	-	3

Legend: '**3'** for high, '**2**' for medium, **'1'** for low or **'-'** for the relevant correlation of each competency, CO, with PO/ PSO

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

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1	Ms. Manisha P. Mehta HOD	Government Polytechnic, Himatnagar	manishamehtain@gmail.com

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