University of Colombo, Sri Lanka

University of Colombo School of Computing

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2023 — 3^{rd} Year Examination — Semester 5

IT5405 (R) — Fundamentals of Multimedia (Repeat Paper)

Structured Question Paper

(2 Hours)

To be completed by the candidate							
Index Number							

Important Instructions

- The duration of the paper is **2 hours**.
- The medium of instructions and questions is English. Students should answer in the medium of English language only.
- This paper has **4 questions** on **12 pages**. Answer **all** questions.
- All questions carry **equal** marks.
- Write your answers **only on the space provided** on this question paper.
- Do not tear off any part of this question paper. Under no circumstances may this paper (or any part of this paper), used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper. If a page or part of a page is not printed, please inform the supervisor/invigilator immediately.
- Any electronic device capable of storing and retrieving text, including electronic dictionaries, smartwatches, and mobile phones, is not allowed.
- Calculators are **not allowed**.
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To be completed by the examiners

1	
2	
3	
4	
Total	

Index No …….

1) (a) Describe briefly the role that multimedia plays in marketing and advertising? Explain briefly using **five (05)** examples**.**

(15 marks)

ANSWER IN THIS BOX

Visual Appeal: Multimedia combines images, videos, and graphics to create visually compelling content that captures attention and makes a lasting impression.

Social Media Campaigns: eg: Instagram, Facebook, and Twitter heavily rely on multimedia content to drive engagement, shareability, and virality through photos, videos, and infographics.

Video Marketing: Videos are powerful tools for storytelling, product demonstrations, and conveying brand messages. For example, YouTube and TikTok are used for advertising purposes.

Interactive Content: the creation of interactive content such as quizzes, polls, and games, enhancing user engagement.

Podcasting: Audio-based content, such as podcasts, serves as a multimedia element that allows brands to share expertise, discuss industry trends, and build a loyal audience.

Email Marketing: Incorporating multimedia elements like images, eg.GIFs or videos in email campaigns

Augmented Reality (AR) enhances the customer experience by allowing users to visualize products in their real-world environment, supporting purchase decisions, and bridging the gap between online and offline experiences.

Infographics: Combining text, images, and data in infographics simplifies complex information, making it easily digestible and shareable across various digital platforms.

Virtual Events and Webinars: Multimedia elements such as presentations, videos, and live demos are integral to virtual events and webinars, enabling brands to connect with a global audience.

Search Engine Optimization (SEO): Search engines increasingly favor multimedia-rich content, including images and videos, in their algorithms, boosting the visibility of brands that incorporate diverse media elements into their online presence.

(b) What are the responsibilities of the Interface Designer? Explain briefly using **five (05)** examples**.**

(10 marks)

ANSWER IN THIS BOX

Interface designers, also known as UI (User Interface) designers, play a crucial role in creating digital products that are visually appealing, intuitive, and user-friendly. Their responsibilities often include:

1. User Research: Interface designers need to understand the target audience, their needs, and behaviors.

2. Wireframing and Prototyping: Designers create wireframes to outline the basic structure and layout of the interface.
3. Visual Design: Designers are responsible for the overall aesthetics of the interface. For example, choose colors, typography, and imagery that align with the brand and create a visually appealing and cohesive design.
4. Interaction Design: Designers define how users interact with the product. Eg. intuitive navigation, defining the user journey flow, and ensuring that the interaction patterns are consistent and user-friendly.
5. Information Architecture: Designers organize and structure information in a way that is easy for users to understand and navigate. Eg. creating sitemaps and defining the hierarchy of information.
6. Responsive Design: With the prevalence of various devices and screen sizes, interface designers need to ensure that the design is responsive and adapts seamlessly to different screen sizes, resolutions, and orientations.
7. Collaboration with Developers: Interface designers collaborate closely with developers to ensure the design vision is accurately implemented. Eg. involves providing design assets and specifications and addressing any design-related challenges during the development process.

8. Usability Testing: Designers conduct usability testing to gather feedback on the interface from real users. This helps identify issues or areas for improvement, allowing for iterative design enhancements.
9. Accessibility: Designers need to consider accessibility principles to ensure that the interface is usable by people with disabilities. Eg. involves designing for screen readers, ensuring proper color contrast, and providing alternative text for images

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10. Stay Updated on Design Trends: Interface designers need to stay current with industry trends, design tools, and emerging technologies to incorporate innovative and effective design solutions.

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2) a) "Discrete roles might be needed for a multimedia production team.". Briefly describe how IT can be used to perform the following:

I. Audio Specialist
II. Storyboard Designer
III. Video Editor

(09 marks)

ANSWER IN THIS BOX

I. Audio Specialist:

- provide access to professional audio software like Pro Tools, Ableton Live, or Adobe Audition, allowing the audio specialist to record, edit, and mix audio tracks seamlessly.
-facilitate the use of virtual instruments and sample libraries, enabling the creation of diverse and high-quality soundscapes for multimedia projects.
Collaborative Platforms: Cloud-based platforms and version control systems allow audio specialists to collaborate with team members and share audio files efficiently.

II. Storyboard Designer:

Digital Storyboarding Tools: IT can provide access to digital storyboard software such as Storyboard eg. Toon Boom Storyboard Pro, streamlining the creation and revision of visual narratives.
Tablets and Digital Drawing Tools: support and digital drawing tools enhance the storyboard designer's ability to create detailed and dynamic visual representations of scenes.
Collaboration Platforms: Integrated platforms allow real-time collaboration, enabling storyboard designers to work seamlessly with other team members, including feedback and revisions.

III. Video Editor:

Video Editing Software: Access to professional video editing software like Adobe Premiere Pro, Final Cut Pro, or DaVinci Resolve allows video editors to assemble and edit video footage effectively.
High-Performance Hardware: Powerful computers equipped with dedicated graphics cards and sufficient RAM enhance the speed and efficiency of video editing processes, especially for high-resolution content.
Cloud Storage and Collaboration: - enable seamless sharing of video files, project assets, and real-time collaboration with other team members, regardless of geographic location.

(b) Using five (05) examples, briefly describe the new technologies that are revolutionizing the media industry.

(10 marks)

ANSWER IN THIS BOX

1. Augmented Reality (AR) and Virtual Reality (VR):
AR and VR technologies are transforming the media industry by providing immersive experiences. Virtual reality allows users to step into virtual worlds, enhancing storytelling in areas like gaming and virtual events. Augmented reality overlays digital information onto the real world, creating interactive and engaging content for users, eg. mobile apps and interactive advertisements.

2. Artificial Intelligence (AI) and Machine Learning (ML):
AI and ML are revolutionizing media through personalized content recommendations, content creation, and automation. AI-driven tools assist in creating and curating content, from automated video editing to generating written articles, streamlining production processes.

3. Blockchain Technology:
- changing the media landscape by addressing issues related to transparency, copyright, and content distribution. It allows for transparent and secure transactions, enabling fair compensation for content creators through smart contracts.

4. 5G Technology:
The advent of 5G technology is revolutionizing media by enabling faster and more reliable internet connections. This facilitates seamless streaming of high-quality content, supports augmented and virtual reality applications, and enhances overall user experience.

5. Voice Technology and Smart Assistants:
Voice-controlled devices and smart assistants powered by natural language processing (NLP) technologies are changing how users interact with media. Consumers can now use voice commands to search for content, control playback, and access information. This technology is integrated into smart speakers, TVs, and mobile devices, offering a more convenient and hands-free media experience.

6. Podcasting and Audio Innovation:
The rise of podcasting and advancements in audio technology are reshaping how people consume information. From interactive audio stories to personalized audio content using AI, the media industry is exploring new possibilities for delivering content through auditory channels.
7. Live Streaming and User-Generated Content:
- support live streaming and user-generated content are gaining popularity. From live social media broadcasts to interactive streaming on gaming platforms, these technologies are changing the dynamics of audience engagement and participation in media consumption.
8. Personalization and Recommendation Algorithms:
AI-driven recommendation algorithms analyze user behavior to provide personalized content suggestions.
9. Immersive Journalism and 360-Degree Video:
Media outlets are adopting immersive journalism techniques, incorporating 360-degree videos and virtual reality to provide a more immersive and empathetic understanding of news stories.

(c)

A certain color system used for the web is defined in 16 different values, each of which can be anyone figure from 0 to 9 or "a" to "f" (Hexadecimal values). Calculate the total number of colors that this system can produce if its primary colors are Red, Green, and Blue.

(06 marks)

ANSWER IN THIS BOX

Number of figures per hexadecimal value = 16
For Red = 16 x 16 = 256
For Green = 16 x 16 = 256
For Blue = 16 x 16 = 256
Considering all 6 RGB values,
Possible total number of colours = 256 x 256 x 256
= 16, 777, 216 colours (16 million colours)

3) (a) Briefly explain what is dithering.

(05 marks)

ANSWER IN THIS BOX

Dithering is the process where the color value of each pixel is changed to the closest matching color value in the target palette using a mathematical algorithm.

- Dithering introduces a pattern of noise or dots to simulate additional colors and smooth out these transitions, creating the illusion of more colors than the actual color palette supports.
- Noise pattern helps blend colors and reduce the visual artifacts associated with limited color depth, resulting in a more visually pleasing and natural-looking image.

(b) What is the functionality of the Charge Coupled Device (CCD) in the video camera?

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(05 marks)

ANSWER IN THIS BOX

CCD (Charge Coupled Device) –converts light to electric signals. 3 CCDs(for Red, Green & Blue) are needed for high quality broadcast.
In digital cameras, images are focused on a chip called CCD. The face of a CCD is studded with transistors.
• They create current in proportion to the intensity of light striking them.
• These transistors make up the pixels of the image.
• CCD does not output digital signals (Electrical charges that build up in CCD are not digital)
(Further more:)

The Charge-Coupled Device (CCD) is a technology used in video cameras and digital cameras to capture and convert light into electrical signals. The functionality of the CCD in a video camera involves the following steps:

Light Detection: The CCD contains an array of photosensitive elements called pixels. Each pixel detects and responds to the intensity of light that falls on it.

Charge Generation: When light strikes the pixels, it generates electric charges proportional to the intensity of the light.

Charge Transfer: The electric charges generated in each pixel are transferred in an orderly manner from one pixel to the next within the CCD.

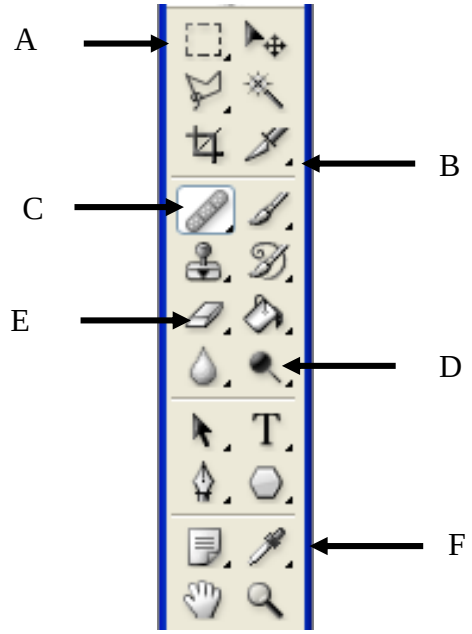
Signal Amplification: The charges are then amplified as they move through the device, helping to maintain the integrity of the signal.

Analog-to-Digital Conversion: The analog electric charges are converted into digital signals, creating a digital representation of the captured image.

Output: The digital signals are then processed and sent to the camera's image processor, where they can be further manipulated, stored, or transmitted.

(c) Identify and label the following tools from A to F with two sub tools under each in photoshop.

(10 marks)



ANSWER IN THIS BOX

A: Rectangular Marquee Tools, Elliptical Marquee Tools

B. Slice Tool , Crop Tool

C. Heal Tool , Patch Tool, Spot Heal, Red Eye Tool

D –Dodge tool, burn, sponge tool

E – Eraser Tool, Background Eraser Tool, Magic Errasor Tool

F – eye dropper Tool, colour sample tool

(e) Briefly explain Serif and Sans Serif Fonts with suitable examples and illustrations.

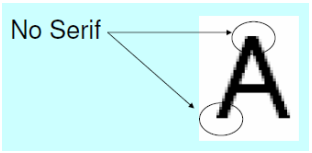
(5 marks)

ANSWER IN THIS BOX

- Serif – the decoration at the end of a letter
- Serif fonts have a decoration (eg. Times Roman, Courier, Monotype Corsiva, etc.)

Sans means without.

- Sans Serif means Without Serif/decoration.
- Sans Serif fonts include Arial, Lucida Sans, Helvetica, etc.



Serif Fonts
– New Century Schoolbook
– Times New Roman
– Monotype Corsiva
– Book Antiqua

Sans Serif Fonts
– Arial
– Helvetica
– Verdana

– Impact

4) (a) Explain why video encoding is required using a suitable example.

(06 marks)

ANSWER IN THIS BOX

Video encoding is a process that involves converting raw video data into a specific format, compressing it, and possibly adding other metadata. This is done to reduce the file size, make it compatible with various devices and network conditions, and ensure efficient storage and transmission. The primary reasons for video encoding include:

Reducing File Size:

Raw video data is often very large and impractical for storage and transmission. Video encoding employs compression algorithms to reduce the file size while maintaining an acceptable level of visual quality.

Bandwidth Efficiency:

Video files with lower data rates are easier to transmit over networks. Encoded videos can be streamed or downloaded more efficiently, making them suitable for various platforms, such as online streaming services.

Device Compatibility:

Different devices and applications support various video formats and codecs. Encoding allows video content to be converted into a compatible format that can be played on a wide range of devices, including smartphones, computers, smart TVs, and gaming consoles.

Quality Optimization:

Video encoding provides options to balance file size and visual quality. By adjusting parameters like bit rate, resolution, and compression settings, content creators can optimize videos for different purposes, such as high-definition streaming or low-bandwidth environments.

Example: YouTube Videos

Consider the example of uploading a video to YouTube. When a user uploads a video, YouTube processes and encodes it into multiple resolutions and bit rates to cater to various devices and network conditions. Here's why video encoding is crucial in this scenario:

Adaptation to Network Speed:

Users may have different internet speeds. Video encoding allows YouTube to provide multiple versions of the same video at varying bit rates. Users with slower internet connections can stream a lower-resolution version, while those with faster connections can enjoy higher-quality video.

Device Compatibility:

YouTube's encoding process ensures that the uploaded video is compatible with a wide range of devices, from mobile phones to smart TVs. By providing videos in different formats and resolutions, YouTube ensures a seamless viewing experience across various devices.

Storage Efficiency:

Hosting and streaming high-quality videos in their raw, uncompressed form would be impractical due to the associated storage and bandwidth costs. Video encoding helps YouTube efficiently store and deliver videos, optimizing the use of their infrastructure.

(b) What is the "Lempel Ziv-Welch" Compression algorithm? Explain briefly.

(05 marks)

ANSWER IN THIS BOX

The LZW algorithm is widely used in various file compression formats, including GIF (Graphics Interchange Format) and the popular UNIX compression tool, compress. The main idea behind LZW is to replace repeated sequences of data with shorter codes, thereby reducing the overall size of the data without losing any information.
A brief overview of how the LZW compression algorithm works:

1. Dictionary Initialization: -The algorithm starts with a dictionary that contains individual characters or small sequences of characters.
2. Input Data Processing: - The algorithm reads through the input data and looks for sequences of characters that have occurred before.
3. Code Assignment: When a sequence is found, it is replaced with a code representing that sequence. New codes are dynamically added to the dictionary for previously unseen sequences.
4. Output Generation: - The compressed output is a sequence of these codes, which is typically more compact than the original data.
5. Decompression:- To decompress the data, a similar dictionary is used to reconstruct the original sequence of characters from the codes.

This allows it to achieve good compression ratios for various types of data.

(c) Briefly discuss what is meant by the Depth of field using illustration.

(8 marks)

ANSWER IN THIS BOX

Depth of field is essentially the distance between the nearest in-focus area and the furthest in-focus area in your shot. When that distance is short/narrow/small, it is known as "shallow depth of field," and your foreground (everything in front of your main subject) and background (everything behind your main subject) appears out of focus, while your main subject appears in focus. When that distance is long/wide/large, it is known as "deep depth of field," and your foreground, mid, and background appear in focus.

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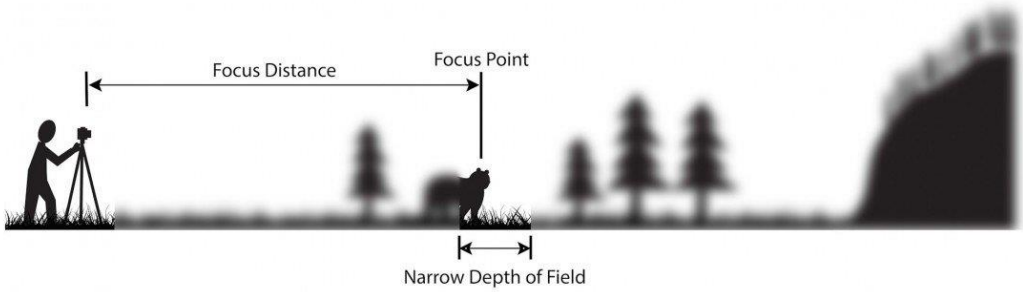

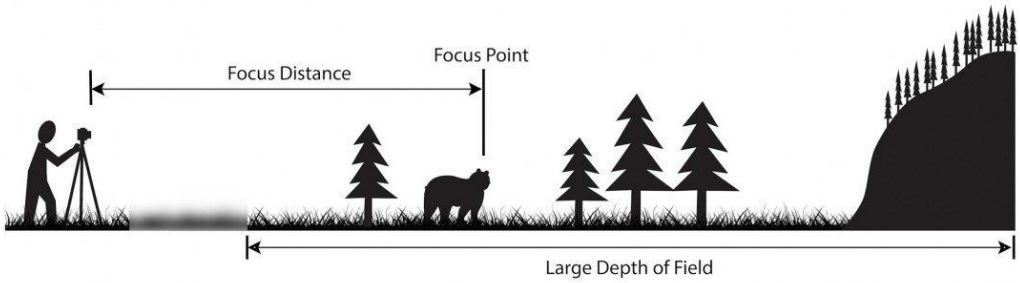

(any other correct answer)

(d) Explain the difference between Analog audio recording and Digital audio recording?

(06 marks)

ANSWER IN THIS BOX

Analog audio recording and digital audio recording are two distinct methods of capturing and storing audio signals, each with its own set of characteristics and advantages. Here's an overview of the key differences between the two:

Representation of Sound:

Analog: In analog recording, sound waves are represented as continuous electrical voltages. The recording medium (e.g., magnetic tape or vinyl) directly mirrors the variations in air pressure created by sound.
Digital: In digital recording, sound is converted into a series of numerical values, or samples. These samples are taken at regular intervals, creating a digital representation of the audio signal.

Signal Quality:

Analog: Analog recordings are susceptible to noise, distortion, and degradation over time. The quality is limited by the physical characteristics of the recording medium and playback equipment.

Digital: Digital recordings can provide higher fidelity and more accurate reproduction of the original sound. However, digital recordings may suffer from issues like quantization noise if the sample resolution is low.

Storage and Reproduction:

Analog: Analog recordings are typically stored on physical media such as tapes, vinyl records, or cassette tapes. Playback involves using analog equipment to read and reproduce the original signal.

Digital: Digital recordings are stored as binary data on various digital storage media (e.g., CDs, DVDs, hard drives). Digital audio files can be easily copied and manipulated without degradation, and playback is achieved through digital-to-analog converters (DACs).

Editing and Processing:

Analog: Editing analog recordings involves physically cutting and splicing tapes or using analog equipment. This process can be time-consuming and may result in quality loss.

Digital: Digital audio can be easily edited and processed using software tools. Digital audio workstations (DAWs) allow for precise editing, manipulation, and the application of various effects without degrading the original quality.

Durability and Longevity:

Analog: Analog recordings may degrade over time due to factors like wear and tear on physical media or magnetic tape deterioration.

Digital: Digital recordings, when stored properly, can remain unchanged over time. However, the longevity of digital formats may depend on factors such as storage media lifespan and evolving technology standards.

Portability:

Analog: Analog recordings are generally less portable due to the physical nature of the media.
Digital: Digital audio files can be easily transported and shared, making them more convenient in terms of portability.

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