



University of Colombo, Sri Lanka

University of Colombo School of Computing

BIT

**DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY
(EXTERNAL)**

Academic Year 2024 — 3rd Year Examination — Semester 5

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

Structured Question Paper
(2 Hours)

To be completed by the candidate

Index Number

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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 10 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.
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- Calculators are **not allowed**.
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**To be completed by
the examiners**

1	
2	
3	
4	
Total	

How does multimedia play a crucial role in conducting business online (ebusiness)? Describe briefly using **five (05)** examples.

(15 marks)

ANSWER IN THIS BOX

- **Virtual Reality (VR) Showrooms:** Retailers use VR to create virtual showrooms, allowing customers to explore and experience products in a simulated environment from their homes.
- **Augmented Reality (AR) Integration:** AR enables customers to visualize products in real-life settings, such as trying on virtual clothes or seeing furniture in their rooms, enhancing purchase confidence.
- **Multimedia-Based Training Modules:** Companies use multimedia in employee training and onboarding by providing interactive videos, quizzes, and animations to improve knowledge retention.
- **Personalized Video Messages:** Businesses send personalized video greetings or thank-you messages to customers, improving customer relations and loyalty.
- **Dynamic Social Media Campaigns:** Multimedia content like reels, stories, and GIFs helps businesses attract and retain audiences on platforms like Instagram, TikTok, and Facebook.
- **Gamification in E-Commerce:** Online stores use multimedia-based gamification features like spin-the-wheel discounts or interactive reward systems to increase engagement and sales.
- **Live Streaming for Sales:** Live multimedia presentations, such as QVC-style live streams, enable businesses to showcase products, answer questions, and generate real-time sales.
- **Multimedia Email Marketing:** Emails featuring videos, animations, or interactive elements boost click-through rates and customer interest compared to text-only emails.
- **Digital Signage for Online Events:** Multimedia is used in virtual events and webinars for branding through animated banners, interactive presentations, and promotional videos.
- **Audio Content for Accessibility:** Podcasts and audio product descriptions cater to visually impaired customers or those who prefer listening, broadening the reach of e-business offerings.

(note : chatbot, Audio, video conference, text animations,images based search,Email Campaigns with Multimedia, 2D and 3D animation)

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

- I. Project Manager
- II. Multimedia Designer
- III. Interface Designer/ Writer
- IV. Video Specialist
- V. Audio Specialist

(10 marks)

ANSWER IN THIS BOX

Role:

Project Manager :

- A project manager's role is at the center of the action.
- He/she is responsible for the overall development and implementation of a project as well as for day-to-day operations. • Has to take care of budgets, schedules, creative sessions, time sheets, team dynamics, etc with the project.

Multimedia Designer

- Graphic designers deal with the visuals.
- Instructional designers make sure that the subject matter is clear and properly presented.
- Interface designers devise the navigation pathways and content maps.
- Information Designers structure the contents, determine user pathways and feedback, and select suitable presentation media.

Interface Designer/ Writer

- Interface designer's work is transparent.
- The role of an interface designer is to create a software device that organizes the multimedia content that lets the user access or modify the content and that presents the content on the screen.
- Interface designer has to design a simple multimedia screen with much user friendliness by effectively using windows, backgrounds, icons and control panels.

Video Specialist

- Video specialist must understand the potentials and limitations of the medium, how they affect the video production itself, and how to get the most out of it.
- He/she is responsible for shooting and editing quality video.
- He/she is fully responsible for preparing the complete video files for the most efficient delivery on CD, DVD or the web.
- He/she has to deal with the entire team of videographers, sound technicians, lighting designers, set designers, script supervisors, etc.

Audio Specialist

- Audio specialists are those who make a multimedia program come alive, designing and producing music, voice-over narrations, and sound effects.

- They are responsible for locating and selecting suitable music and talent, scheduling recording sessions, and digitizing and editing recorded material into computer files.

Write down the formula to calculate the size of the digital audio recording file.

(05 marks)

ANSWER IN THIS BOX

$$\text{Size} = \text{sr} * \text{t} * (\text{res}/8) * \text{n}$$

Size of Digital Audio Recording

- sr - sampling rate
- t - duration of recording (in s)
- res - (bit resolution / 8)
- n – stereo (=2) or mono (=1)

Briefly discuss the Windows Meta File (WMF) and Enhanced Meta File.

(05 marks)

ANSWER IN THIS BOX

WMF (Windows Meta File)

- Line-based (No curve!)
- Designed for Microsoft Windows 3.1
- Limited feature, but widely used in office market
- EMF (Enhanced Meta File)
 - Bézier curve-based
 - Designed for Microsoft Windows 95
 - Used for exchange of vector data internally between Windows applications

Briefly explain **three (03)** different types of colour models mentioning the advantages and limitations.
(15 marks)

ANSWER IN THIS BOX

- **RGB (Red, Green, Blue)**

- **Description:** RGB is an **additive color model**, meaning colors are created by adding light of the three primary colors: red, green, and blue. The absence of all three results in black, while combining them at full intensity creates white.
- **Use Cases:** Widely used in digital screens, cameras, and projectors because it aligns with how devices emit light.
- **Advantages:** Ideal for digital applications and can display millions of color variations.
- **Limitations:** Not suitable for print media as it relies on emitted light rather than reflected light.

- **CMYK (Cyan, Magenta, Yellow, Black)**

- **Description:** CMYK is a **subtractive color model**, where colors are created by subtracting light. It begins with a white substrate (e.g., paper) and adds cyan, magenta, yellow, and black inks to reduce the reflected light.
- **Use Cases:** Standard for printing processes, such as in magazines, posters, and packaging.
- **Advantages:** Works effectively with physical materials like paper and provides accurate color reproduction in print.
- **Limitations:** Limited color gamut compared to RGB, which can result in less vibrant colors.

- **HSV (Hue, Saturation, Value)**

- **Description:** This model is designed to align with human perception of color.
 - **Hue:** The color type, represented as a degree (0° - 360°) on a color wheel (e.g., 0° = red, 120° = green, 240° = blue).
 - **Saturation:** The intensity or purity of the color (0% = gray, 100% = full color).
 - **Value:** The brightness of the color (0% = black, 100% = full brightness).
- **Use Cases:** Popular in graphic design, digital art, and image editing tools due to its intuitive representation of colors.

- **Advantages:** Simplifies color selection for designers and artists by making it easier to adjust colors based on perception.
- **Limitations:** Not used for technical applications like printing or screen calibration.

Write down **five (05)** functionalities of the Charge Coupled Device (CCD) in a video camera?

(10 marks)

ANSWER IN THIS BOX

1. **Light Capture:**

The CCD captures light entering the camera through the lens. It consists of an array of light-sensitive pixels that convert incoming light (photons) into electrical charges.

2. **Image Formation:**

Each pixel corresponds to a specific part of the image, and the intensity of light at each pixel determines the strength of the electrical charge generated. This process forms the basis of the image.

3. **Charge Transfer:**

The CCD transfers the electrical charges from the individual pixels in an organized sequence. This allows the charges to be read one pixel at a time.

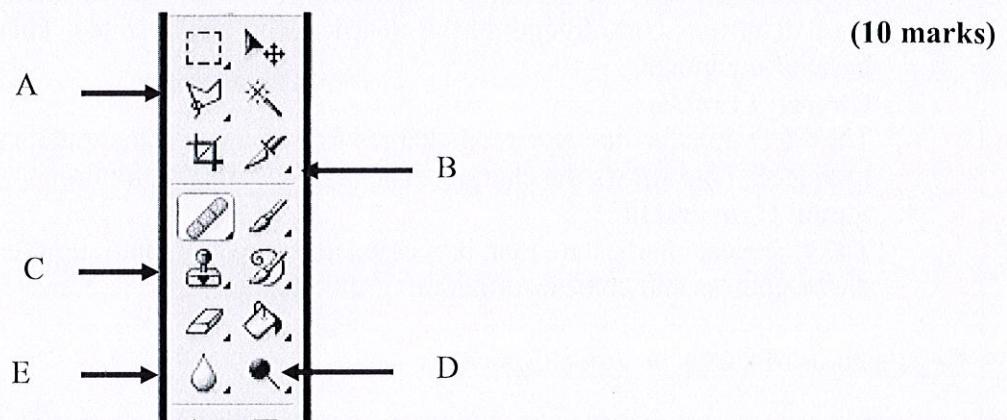
4. **Signal Conversion:**

The electrical charges are then processed and converted into digital signals, representing the brightness and color information of the image.

Key Features of CCDs in Video Cameras:

- **High Image Quality:** CCDs are known for their excellent image quality, sharpness, and low noise, making them suitable for professional video recording.
- **Light Sensitivity:** They are highly sensitive to light, enabling clear images even in low-light conditions.
- **Color Reproduction:** With proper filters, CCDs can accurately capture colors for realistic image output.

Identify sub-tools in Photoshop for labels from A to F.



ANSWER IN THIS BOX

A –Polygonal Lasso Tool

B –Slice Tool

C –Clone Stamp Tool

D –Dodge Tool

E –Blur Tool

What is the “Lempel Ziv-Welch” Compression algorithm? Explain briefly.

(05 marks)

ANSWER IN THIS BOX

The Lempel-Ziv-Welch (LZW) compression algorithm is a lossless data compression method that reduces the size of data without losing any information. It is an efficient algorithm widely used in file formats like GIF, TIFF, and PDF.

LZW replaces repeated patterns of data with shorter codes.

It uses a dynamically built dictionary to map sequences of input symbols to codes.

The algorithm begins with a dictionary containing all individual symbols of the input (e.g., ASCII characters).

It reads the input data character by character, forming sequences.

If a sequence is already in the dictionary, it extends the sequence by adding the next character.

If a sequence is not in the dictionary, it assigns a new code to that sequence and adds it to the dictionary.

The compressed data can be decoded using the same dictionary generation process, ensuring no data loss.

Effective for compressing data with repeated patterns (e.g., text, images).

LZW is commonly used in image compression (e.g., GIF), file archiving tools, and data transmission systems where lossless compression is essential.

Briefly explain Dynamic range and Gamma correction in Photoshop.

(05 marks)

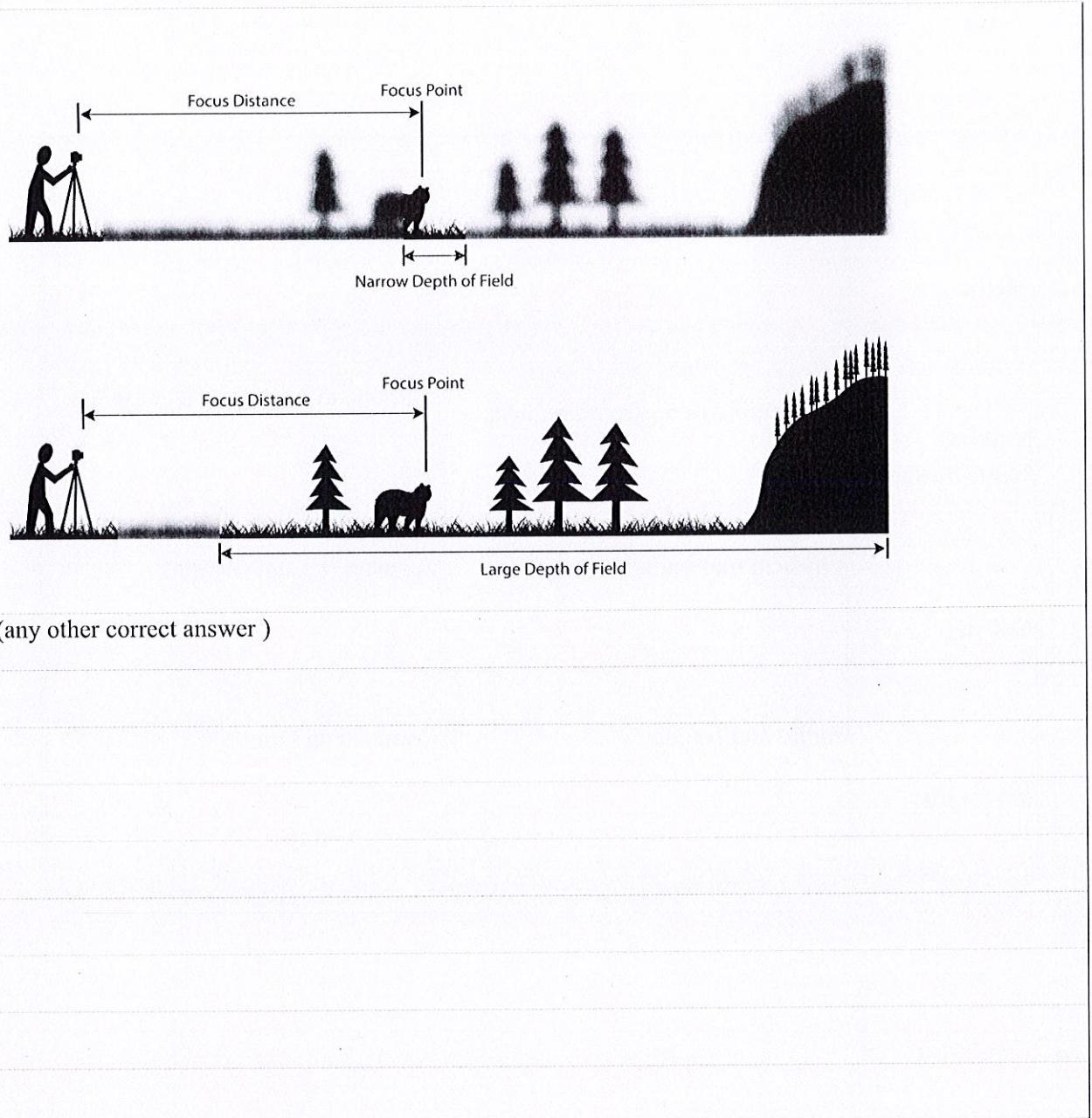
- Dynamic range refers to the range of light intensities, from the darkest shadows to the brightest highlights, that an image can capture or display.
 - Photoshop offers tools to adjust the dynamic range of an image, allowing you to enhance details in both shadows and highlights.
 - **Adjustments:** The "Shadows/Highlights" adjustment, "Curves," and "Levels" tools can help expand or compress the dynamic range, improving image detail in both dark and bright areas.
 - A **high dynamic range (HDR)** image typically contains more data from the light and dark ends of the spectrum, creating a more detailed and natural-looking **Definition:** Gamma correction adjusts the brightness of the midtones in an image without affecting the shadows or highlights too much. It's used to make the image display more naturally on different monitors or devices.
- Gamma correction can be applied using the "Levels" or "Curves" adjustments, where you can modify the gamma curve to adjust the brightness of midtones.
- The **gamma value** (usually 2.2 for standard displays) determines how dark or bright the midtones will appear. Decreasing gamma makes the image darker, while increasing it lightens the midtones.
- It helps ensure that images appear consistent across various devices with different brightness and contrast settings.

Briefly discuss what is meant by the *Depth of field* using an illustration.

(10 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.



(any other correct answer)

Fill in the following table according to the difference between Analog audio recording and Digital audio recording using the given key points.

(10 marks)

ANSWER IN THIS BOX

Feature	Analog Audio Recording	Digital Audio Recording
Method	Continuous waveform	Discrete samples (binary data)

Media	Tapes, vinyl	CDs, memory cards, hard drives
Noise & Degradation	Susceptible to noise, wears over time	Immune to noise, no degradation
Editing	Physical manipulation required	Software-based, flexible
Portability	Bulky and fragile	Compact and durable