Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2023/2024

COURSE NAME	:	3D RENDERING AND COMPOSITION
COURSE CODE	:	DAG 22303
PROGRAMME CODE	:	DAG
EXAMINATION DATE	:	JULY 2024
DURATION	:	2 HOURS AND 30 MINUTES
INSTRUCTIONS	:	1. ANSWER **ALL** QUESTIONS 2. THIS FINAL EXAMINATION IS CONDUCTED VIA ☐ Open book ☒ Closed book 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **TWELVE (12)** PAGES

PART A

INSTRUCTION: ANSWER ALL QUESTIONS

Q1 The term of 3D rendering refers to ....

(a) The process of turning a two-dimensional model into a photorealistic three-dimensional image

(b) The technique of creating an image using three-dimensional data stored on a computer

(c) The process of turning a three-dimensional model into a photorealistic 2D image

(d) The technique of creating a three-dimensional model using computer-aided design software

Q2 The following is a step involved in the process of 3D visualization, **EXCEPT**

(a) Audio integration

(b) Modelling

(c) Texturing

(d) Shading

Q3 Which rendering engine in Blender is primarily focused on speed and interactivity while generating PBR materials?

(a) Eevee

(b) Cycles

(c) Workbench

(d) Freestyle

Q4 The technique does Eevee primarily use for rendering is ....

(a) Ambient occlusion

(b) Rasterization

(c) Ray tracing

(d) Path tracing

Q5 The rendering engine in Blender is a physically based path tracer designed for production rendering is ....

(a) Eevee

(b) Cycles

(c) Freestyle

(d) Workbench

Q6 The main purpose of the Workbench Engine in Blender is ....

(a) Quick rendering during modelling and animation preview

(b) Final rendering for production projects

(c) Creating photorealistic materials

(d) Compositing multiple images

Q7 The compositing in 3D rendering refers to ....

(a) The process of turning a 2D image into a 3D model

(b) The process of converting 3D models into 2D images

(c) The process of adding animations to a rendered scene

(d) The process of merging multiple images to create a single image

Q8 The following is an example of compositing, **EXCEPT**

(a) Environment construction

(b) Stage expansion

(c) Special effects

(d) Modelling

Q9 The purpose of compositing in 3D animation post-production is ....

(a) To create photorealistic 3D models from pre-production stage with other elements

(b) To merge render passes from the production stage with other elements

(c) To generate animations from scratch from the production stage with other elements

(d) To add textures to 3D models at the post-production stage with other elements

Q10 The components of a render typically combined during the compositing stage ....

(a) By separating each component into individual images to create the final image

(b) By blending the components back together to create the final image

(c) By exporting the components to a different software for final assembly

(d) By converting the components into 3D models for final assembly

Q11 The primary purpose of rendering in 3D animation is ....

(a) Combining multiple video inputs into a single track based on models, materials, lighting, and effects

(b) Defining camera angles and animation speed based on models, materials, lighting, and effects

(c) Calculating individual pixels for each frame based on models, materials, lighting, and effects

(d) Adding materials, textures, lighting, and shadows to the scene based on models, materials, lighting, and effects

Q12 The rendering algorithms can create different results, ranging from photorealistic to cartoon illustrated looks ....

(a) Different compositing techniques

(b) Various rendering algorithms

(c) CPU-intensive algorithms

(d) Path tracing algorithms

Q13 Given the complexities of the rendering process, how long would it take to create a 60-second animation at 30 frames per second?

(a) Less than an hour

(b) Around 3 hours

(c) Over 24 hours

(d) Over 7 hours

Q14 Compositing in the context of 3D animation post-production refers to ....

(a) Combining multiple video inputs into a single video track

(b) Adding materials and textures to a 3D model

(c) Defining camera angles and animation speed

(d) Calculating individual pixels for each frame

Q15 The purpose of defining camera angles in the rendering process is ....

(a) To determine the lighting conditions in the 3D visuals

(b) To create animations at different speeds in the 3D visuals

(c) To prepare the end-user video for delivery in the 3D visuals

(d) To convey the desired feeling and spaciousness in the 3D visuals

Q16 The rendering process's goal in producing 3D grey geometry is ....

(a) To add materials and textures to the scene is laid out, angled, and flows

(b) To demonstrate how the 3D rendering is laid out, angled, and flows

(c) To combine multiple video inputs and outputs into a single video track

(d) To define camera angles and animation speed into a single video track

Q17 The next step after finalizing camera angles in the rendering process is ....

(a) Combining multiple video inputs into a single video track

(b) Adding materials, textures, lighting, and shadows

(c) Defining animation speed and dimension

(d) Preparing the video for delivery

Q18 The types of components are typically added during the finishing details stage of rendering is ....

(a) Individual pixels for each frame

(b) Camera angles and animation speed

(c) Materials, textures, lighting, and shadows

(d) Décor, furnishings, exterior flora, and landscape

Q19 The purpose when adding textures and a lighting environment during the rendering process is ....

(a) To calculate individual pixels for each frame

(b) To define camera angles and animation speed

(c) To combine multiple video inputs into a single video track

(d) To make the scene more realistic and visually appealing

Q20 Which step of the rendering process involves preparing the video for delivery by converting it to the intended format?

(a) Defining camera angles

(b) Creating 3D grey geometry

(c) Animation speed and dimension

(d) Finishing details to complete the 3D rendering

Q21 The primary distinction between real-time rendering and non-real-time rendering is ....

(a) Real-time rendering aims on photo-realism at a minimum frame rate, while non-real-time rendering allows for more detail by prioritizes speed

(b) Real-time rendering is only aimed to use for still images at a minimum frame rate, while non-real-time rendering allows for more detail by using for animations

(c) Real-time rendering aims to maintain interactivity at a minimum frame rate, while non-real-time rendering allows for more detail but longer rendering times

(d) Real-time rendering relies on ray tracing at a minimum frame rate, while non-real-time rendering allows for more detail by uses radiosity

Q22 The rendering technique takes indirect lighting or bounced diffused light into consideration is ....

(a) Real-time rendering

(b) Scanline rendering

(c) Ray tracing

(d) Radiosity

Q23 Some key characteristics of renders produced using the Radiosity technology is ....

(a) Hard shadows and minimal color bleeding

(b) Soft graded shadows and color bleeding

(c) Limited realism and low photorealism requirement

(d) Fast rendering times and minimum computational need

Q24 The following is a characteristic of scanline rendering ....

(a) It focuses on ray tracing for accurate shadows.

(b) It computes pixels individually for each frame.

(c) It relies on global illumination techniques for lighting.

(d) It is primarily used for still images rather than animations.

Q25 The primary function of a 3D rendering engine is ....

(a) To create 3D models from scratch

(b) To simulate physical interactions within a 3D scene

(c) To generate lighting effects within a 3D environment

(d) To convert 3D models into a set of pixels for visual output

Q26 Rendering engine known for its photorealistic renders and memory efficiency ....

(i) Arnold

(ii) Redshift

(iii) Renderman

(iv) V-Ray

(a) i and ii

(b) ii and iii

(c) iii and iv

(d) i and iv

Q27 The purpose of the "Ray Shadow" feature in Blender ....

(i) To create ray-traced shadows

(ii) To adjust the intensity of shadows

(iii) To add ambient occlusion to a scene

(iv) To generate realistic textures for materials

(a) i and ii

(b) ii and iii

(c) iii and iv

(d) i and iv

Q28 Several aspects of a material determine its surface characteristics, such as colour, shine and reflectance are ....

(i) Material properties

(ii) Material nodes

(iii) Lighting setup

(iv) Texturing

(a) i and ii

(b) ii and iii

(c) iii and iv

(d) i and iii

Q29 The radiosity contribute to the realism of rendered scenes ....

(i) By creating hard shadows and minimal color bleeding

(ii) By simulating the diffusion of light between surfaces

(iii) By relying on real-time rendering techniques

(iv) By accelerating the rendering process

(a) i and ii

(b) ii and iii

(c) iii and iv

(d) i and iv

Q30 The main purpose of the Z-buffer method in hidden surface removal are____ and_____.

(i) To calculate the depth of each surface

(ii) To eliminate shadows from the scene

(iii) To speed up the rendering process

(iv) To adjust the color of materials

(a) i and ii

(b) ii and iii

(c) iii and iv

(d) i and iii

(30 marks)

PART B

INSTRUCTION: PLEASE STATE WEATHER THE ANSWER IS TRUE OR FALSE

Q31 The entire process of 3D rendering and composition can be done using 3D rendering software, which uses data from 3D models to create the render.

Q32 3D Rendering Platform and Module includes three render engines with different strength.

Q33 For quick lighting and shading iterations, Adobe Animate provides interactive 3D viewport rendering for all render engines.

Q34 Cycles Engine is a render engine designed for quick rendering during modelling and animation preview.

Q35 Compositing is the process of fusing visual components from several sources into a single image in order to give the impression that the components are all a part of the same scene.

Q36 The process of mixing two or more render passes or adding layers to generate a single image or a collection of images with certain features in 3D animation called compositing.

Q37 When businesses use 3D animation to streamline their design, development, and manufacturing processes, there is higher efficiency, improved productivity, reduced waste, and better conversions.

Q38 Rendering takes all of our work thus far and calculates the individual pixels for each frame, based on models, materials, lighting, effects and user interface.

Q39 The final step of our process takes the compressed video out of compositing and converts this video to the intended format for delivery.

Q40 There are many factors to take into account when creating exterior renderings, from the sky's lighting to the surrounding architecture.

Q41 There are two types of standard television images: PAL (Europe) at 25 frames per second and SECAM at 30 frames per second (PAL).

Q42 Grey geometry often known as grey renderings or the white box is devoid of any colours, textures, and illumination from the outside environment.

Q43 The 3D artist will start expanding the landscape and starting to add more realistic components if the render is outside during the defining the camera angles steps.

Q44 Naturally, much of the lighting in a photo depends on the camera position and whether it was taken inside or outside.

Q45 Depending on how long it takes to generate a single image, rendering techniques may be put into three general categories, however it's becoming harder to tell which one is better.

Q46 Rendering engines utilise the host CPU or GPU's processing capacity to complete their calculations.

Q47 3D rendering is the first stage of the 3D visualisation process, even if the terms "3D rendering" and "3D visualisation" are sometimes used interchangeably.

Q48 Without the right lighting setup, even the most meticulously built and texturing scene would produce subpar results, yet a simple model might appear incredibly realistic with the right lighting.

Q49 Moving the "Light-only" light allows the user to choose where the shadows appear.

Q50 Materials can be used, in their most basic form, to "paint" an item with different colors or to show what material it is made of.

(20 marks)

PART C

INSTRUCTION: ANSWER ALL QUESIONS

Q51 A 3D rendering engine is a component of 3D software that does the mathematics required to produce a 3D scene's visual output. To put it another way, the rendering engine takes the camera, texturing, lighting, and shading data from the 3D models and converts them into a set of pixels that can be seen as an image.

(a) State **TWO (2)** component of rendering engine are a widely available.

(2 marks)

(b) Briefly explain your answers from **Q51(a)** with some features and attributes.

(4 marks)

Q52 Post-production is the final stage in the process of creating an animation.

(a) State **THREE (3)** elements involved in post-production process.

(3 marks)

(b) Support your answer from **Q52(a)** with **THREE (3)** elements process.

(6 marks)

(c) List **FOUR (4)** delivery method and file format of 3D rendering and composition for the end-user.

Delivery Method	File Format

(4 marks)

Q53 Rendering techniques can be divided into two broad categories according to the length of time required to render a single image.

(a) Briefly explain **TWO (2)** 3D rendering method in animation.

(6 marks)

(b) 3D rendering can be accomplished using a variety of computational techniques, each of which has pros and cons. Explain in detail **THREE (3)** of 3D rendering techniques in 3D rendering animation.

(9 marks)

Q54 Ray tracing-based rendering techniques, such as ray casting, recursive ray tracing, distribution ray tracing, photon mapping, and route tracing, are typically slower and more accurate than scanline rendering approaches on a spectrum of computing cost and visual fidelity.

(a) Sketch the ray tracing-based rendering techniques that illustrate an accurate method.

(6 marks)

(b) Support your answers from **Q54(a)** by briefly explain each of the techniques.

(10 marks)

- END OF QUESTIONS -