M.TECH/IT/3RD SEM/INFO 6101/2016

ADVANCED COMPUTER GRAPHICS & MULTIMEDIA
(INFO 6101)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) _____ refers to any type of application or presentation that involves more than one type of media, such as text, graphics, video, animation, and sound.
(a) An executable file (b) Desktop publishing
(c) Multimedia (d) Hypertext.

(ii) Which of the following does MPEG stand for?
(a) Movie Protocol Experts Group
(b) Movie Protocol Experimentation Group
(c) Motion Picture Experts Group
(d) Movie and Protocols Engineering Group.

(iii) A combination of an encryption algorithm and a decryption algorithm is called a
(a) plain text (b) cipher
(c) original text (d) shift cipher.

(iv) Hardware that creates sound from a mathematical representation is
(a) Sound Synthesizer (b) Stampers
(c) Speaker (d) Sound card.

(v) _____curve is one of the special line approximation methods
(a) Bezier (b) Ellipsoid
(c) Shearing (d) None of these.

(vi) In Joint Photographic Experts Group (JPEG), a gray scale picture is divided into blocks of
(a) 5 X 5 pixels (b) 6 X 6 pixels
(c) 7 X 7 pixels (d) 8 X 8 pixels.

(vii) The projection in which the projection plane is allowed to intersect the x, y and z-axes at equal distances is
(a) Wire frame model
(b) Constructive solid geometry methods
(c) Isometric projection
(d) Back face removal.

(viii) The types of projection are
(a) Parallel projection and perspective projection
(b) Perpendicular and perspective projection
(c) Parallel projection and Perpendicular projection
(d) Parallel projection and Oblique projection.

(ix) In temporal compression, redundant frames are
(a) channelized (b) organized
(c) digitized (d) removed.

(x) In Orthographic projection engineering uses
(a) Top view of an object (b) Front view of an object
(c) Side view of an object (d) All of these.

Group – B

2. (a) Find a transformation matrix which aligns a given vector **V** with the vector K along the positive z axis.

(b) Find the general form of an oblique projection onto the xy plane.
6 + 6 = 12

3. (a) Describe how we can extend the Liang – Brasky line clipping algorithm to clip 3D lines against a regular parallelopiped.

(b) Find an explicit representation for linear (degree 1) B – Splines in the case of uniformly spaced knots, i.e., $t_{i+1} - t_i = L$.
6 + 6 = 12

Group – C

4. (a) Discuss the polygon scan line algorithm for removing the hidden surfaces.

(b) Write a program to generate fractal curves using the self – squaring function $f(z) = z^2 + \lambda$, where λ is any selected complex constant.
6 + 6 = 12

5. (a) Derive a formula for the monochromatic light considering the basic illumination model and different type of light sources.

   (b) What is texture mapping? What is bump mapping and how is it different from texture mapping?

9 + (1 + 2) = 12

Group – D

6. (a) What are the different types of redundancies?

   (b) Compare lossy and lossless compression technique.

   (c) Explain the working principle of a flatbed scanner using proper diagram.

   (d) What are the different ways to change resolution of an image?

3 + 3 + 4 + 2 = 12

7. (a) Compare the efficiency of LZW and Huffman Encoding if the following content is needed to be compressed:
   aabbaabbaabbaabbaabbaabbaabb

   (b) Why YC signal formats are preferred at the time of video transmission?

   (c) How we play back a soundtrack in MIDI format? Explain your answer with diagram.

6 + 3 + 3 = 12

Group – E

8. (a) Form a KD tree using the following feature vectors:
   (50, 6), (70, 5), (55, 4.7), (20, 3), (34, 3.5), (60, 5.3), (65, 6.1), (52, 5.1)

   (b) What is R tree? Where it is used?

   (c) What are the different ways to query a video database?

   (d) What do you mean by ODA?

4 + 3 + 3 + 2 = 12

9. (a) Compare Point Quad Tree and MX Quad Tree. What is the advantage of Quad trees over normal Binary trees?

   (b) Insert the following feature vectors in a Point Quad Tree.
   (50, 50), (75, 80), (90, 65), (35, 85), (25, 25), (55, 75)
   What will be the difference if the same set of data is inserted into a MX Quad Tree?

   (c) What is QBIC?

(2 + 2) + (3 + 3) + 2 = 12