INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, ALLAHABAD

C2 Assessment, 12 November 2021.

Graphics & Visual Computing IGVC-5211

B.Tech - IT: V - Semester

Full Marks - 25 will be scaled to 10. **Time - 2.0hrs.**

Answers should be brief and to the point. Marks will be deducted for unnecessary wring. Calculators are allowed. Write your 1) Name 2)Roll No 3) Signature on each page you upload.

1. Obtain the cubic spline which connects the given knots (vertices) $(x, y = f(x))$ in the tabular form (a) and (b). Applying natural spline boundary conditions. Mention the **(i)** *"continuity* **C***?" which will be used.* **(ii)** *Name of the Spline being used.* **(iii)** *Procedure to obtain the requirements*.

a.				
x	0	1	2	3
$f(x)$	1	2	33	244

b.				
x	-0.50	0.00	0.25	1.00
$f(x)$	0.731531	1.000000	1.268400	1.718282

[5X2=10]

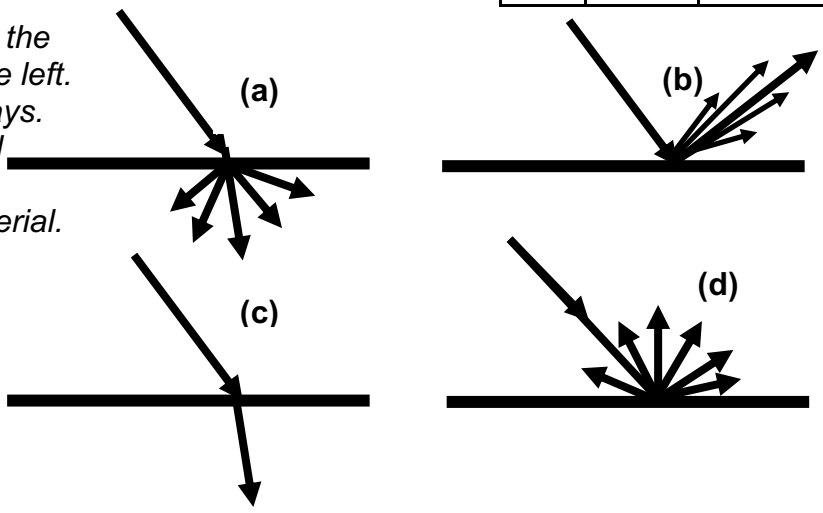
2. Using the following values of $f(x)$ and $f'(x)$.

Estimate the values of $f(-0.5)$ and $f(0.5)$ using piecewise cubic Hermite interpolation. **[5]**

x	$f(x)$	$f'(x)$
-1	1	-5
0	1	1
1	3	7

3. Illuminations: a) *Match the pictures on the right, with the corresponding term on the left. The arrows in the picture denote light rays. The dashed lines represent the material type to be considered. The key is in the interaction of the light rays with the material.*

- **i) Specular**
- **ii) Diffuse**
- **iii) Transparent**
- **iv) Translucent**



b) Explain and derive the different terms in the illumination equation used in graphics. Explain the equation in terms of the directions of the different sources of light $\hat{L}_i$, the normal to the surface $\hat{n}$, and the viewer/camera position $\hat{V}$ only. Include attenuation due to distance d_L of the object from the light source and the atmospheric attenuation form object to the viewer. Consider the following attenuation: $I(r) = \frac{e^{-\sigma r}}{r^2} I_0$. Where r is the distance from the light-source, and σ is the scattering cross section.

c) There is a Ground glass (glass whose surface has been ground to produce a flat but rough (matte) finish) in graphics which is back illumined. Include the additional terms in the equation if necessary to reproduce the effect.

[(4x0.5)+(3+1+2)+(2)=10]

Online Fixed Time Assessment (FTA) of Graphics and Visual Computing (IGVC-5222C) will be held as scheduled on ***November 12, 2021 from 11:00hours to 13:00hours (11:00AM to 1:00PM)*** *for B.Tech-IT V Semester.*

This FTA will be of 10marks out of 30. The remaining 20 marks will be for the online assignments that you have been submitting. This ratio of 10:20 may be varied in favor of the performance by the students so that the performance of the students could be maximized.

The question can be viewed at 11:00 AM on November 12, on your GVC Google Classroom.

The questions will be Subjective/Descriptive problem-solving type and will be conducted through "Google Classroom". ***CALCULATORS ARE ALLOWED****. MAXIMUM Marks: WILL BE SCALED TO 10marks. Answers to these questions should be written on Paper with your PEN/ PENCIL.*
On the Top margin of each paper Students should write their

i) Question No, ii) Roll No, iii) Name and iv) Signature.

These pages should be scanned and uploaded. Please install Adobe Scan to take the pictures of your answer pages for uploading it (Preferably in PDF). Do not scan at high resolution so that the file size is too large and it becomes difficult to upload it from your end.

Do not share your login and password of your IITA e-mail. Any Malpractice of uploading through a single IP no, Uploading someone else's answer Sheet **IS a CRIME**. THE STUDENT will automatically fail the course.

These are difficult times. Your sincerity towards learning and ethical practice is expected from all of you.

Best wishes and stay safe indoors, eat healthy food and (vitamins) to keep your-self immunized. Wear a mask outdoors and unsure indoor regions. Take good precautions of yourself and the elders in your family.

Pavan Chakraborty