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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 4020 Roll No. | | | | | | | | | | |

B.Tech.

SEVENTH SEMESTER EXAMINATION, 2004-2005

COMPUTER AIDED DESIGN

Time : 3 Hours *Total Marks : 100*

Note : *(i) Attempt **ALL** questions.*

(ii) Question No.1 is short answer/objective type.

1. (a) A synthetic surface patch that can be controlled locally as well as globally by its off - line points is : **1x20=10**

(i) H - spline

(ii) Bazier patch

(iii) B - spline patch

(iv) None

(b) Select a class of transformation :

(i) Translation, rotation, windowing, reflection, clipping, scaling, panning.

(ii) Translation, rotation, windowing, reflection, clipping, scaling, panning, texering.

(iii) Translation, rotation, windowing, reflection, clipping, scaling, panning, cancanating.

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(iv) Only 'i'

(v) None

(c) Why raster scan display device is preferred in CAD ?

(d) What do you mean by isoperimetric formulation of FEM solutions ?

(e) What do you understand by Object Oriented Programming ?

(f) A good representation scheme should address the following minimum issues as :

(i) 4

(ii) 5

(iii) 6

(iv) 7

(v) 8

(vi) Only three

(g) Select the unambiguous representation scheme :

(i) Wire frame

(ii) CSG

(iii) B - rep

(iv) None

(h) Define an orientable face for a CAD model.

(i) FEM gives :

(i) exact solution

(ii) approximate solution

(iii) approximate solution nearing exact one

(iv) none

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(j) CAD process involves :

(i) Iterative procedure

(ii) Approximate procedure

(iii) Mixed procedure

(iv) None

(k) A CAD system is better if it is :

(i) Turnkey type

(ii) Main frame type

(iii) Workstation type

(iv) None

(l) Define Silhouette edge of a solid model.

(m) Write rendering steps.

(n) What is difference between Constant shading and Gourand shading models ?

(o) List major characteristics of a graphics software.

(p) List major characteristics of a CAD hardware.

(q) What is stereographic projection ?

(r) Write parametric equations for hyperbola.

(s) Which design model is better :

(i) Shigly

(ii) Pahl

(iii) Beitz

(iv) All are better

(v) None

(t) A seven plane raster display has a resolution of 1380 horizontal $\times$ 1024 vertical and a refresh rate of 60 Hz. Find its RAM size of bit map.

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2. Attempt *any two* of the following : **(10x2=20)**

(a) Why do you prefer Bezier form of cubic curves over the Hermite form for the interactive computer graphics ? Explain by examples.

(b) For a 5 unit side cuboid CAD model, show mathematically to find visible and invisible faces.

(c) Differentiate between : Bazier, H - spline and B-spline surface patch.

3. Attempt *any two* of the following : **(10x2=20)**

(a) List and explain basic properties of space curves (in brief).

(b) Find out the equation of a closed (periodic) B-spline curve defined by the four control points as :

$P_0 = [2\ 2\ 0]^T$, $P_1 = [2\ 3\ 0]^T$, $P_2 = [3\ 3\ 0]^T$, $P_3 = [3\ 2\ 0]^T$. Also find points on the same curve at $u = ½$ and 3.

(c) What are the options available in VIEWPORTS command ? Explain.

4. (a) List FEM steps and explain how an FEM problem is solved. 5

(b) Consider the bar as shown in Figure below. An axial load $P = 200 \times 10^3$ N is applied as shown. Using FEM concept (i) Determine the nodal displacement and (ii) Determine the stresses in each material. Material data given are : 15

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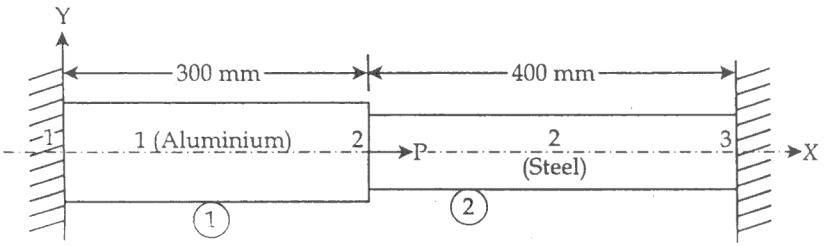
$$\text{Aluminium} \begin{cases} \text{Area} = 2400\,\text{mm}^2 \\ E = 70 \times 10^9\,\text{N/m}^2 \end{cases}$$

$$\text{Steel} \begin{cases} \text{Area} = 600\,\text{mm}^2 \\ E = 200 \times 10^9\,\text{N/m}^2 \end{cases}$$



5. Attempt *any two* of the following : **(10x2=20)**

(a) List various types of Graphics Input Devices used in CAD. Explain functions of each.

(b) What are the techniques used in computer graphics for the generation of picture on CRT screen ? How do you obtain colour pictures on the screen ?

(c) What is role of database in computer graphics system ? Explain briefly the following :

(i) Object oriented database system

(ii) Relational database.

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