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# SF-8353

## B. E. - III (Sem. - VI) (Mechanical) Examination

**May/June – 2011**

## Computer Aided Design

*(New Syllebus)*

Time : **3** Hours] [Total Marks : **100**

**Instructions :**

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
**Fillup strictly the details of ☛ signs on your answer book.**

Name of the Examination :

☛ **B. E. - 2 (SEM. - 6) (MECHANICAL)**

Name of the Subject :

☛ **COMPUTER AIDED DESIGN (NEW SYLLABUS)**

☛ Subject Code No. : **8 3 5 3** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Answer all questions.

(3) Figures to the **right** indicate full marks.

(4) Assume suitable data, if necessary.

**1** Attempt any Eight : **16**

(i) What is view port ?

(ii) Explain revolve features.

(iii) Compare input devices used in CAD system ?

(iv) Compare 2D and 2 1/2D modelling.

(v) List out CAD softwares available in markets.

(vi) What is geometric modeling ?

(vii) Explain reflection transformation.

(viii) What is raster scan display technique ?

(ix) Explain sweep features.

(x) What is window ?

**2** Attempt any **two** : **16**

(i) A rectangle ABCD having diagonal corner A (2,2) and C (10,8) is to be reflected about line Y=1.7321 X -3. Determine :

(a) Composite matrix

(b) The coordinate of the rectangle after transformation

(ii) P0(1,1), P1(2,3), P2(4,3), P3(3,1) are control points of Bezier polygon. Determine seven points on Bezier curve.

(iii) 3D point (3,2,1,1) is first translate in x,y,z directions by -1,-1,-1 respectively, followed successively by $+30^{\circ}$ rotation about x-axis and $+45^{\circ}$ rotation about y-axis. Determine composite transformation.

**3** Short notes (attempt any **three**) **18**

(i) Explain method of geometric modeling.

(ii) Characteristics of Bezier curve

(iii) Generate a parabolic segment in a first quadrant for $1 \leq \times \leq 4$. (generate at least 6 points)

(iv) Explain DDA algorithm for generation of line.

**4** Attempt any **three** : **24**

(i) Consider the bar shown in fig.1 An axial load $p=200*10^{3}N$ is applied as shown, Using the penalty approach for handling boundary conditioned, do the following.

(a) Determine the nodal displacement

(b) Determine the stress in each material

(c) Determine the reaction forces.

(ii) Fig.2 shows a cluster of six springs. One end of the assembly is fixed and a force of 2000N is applied at the other end. Using finite element method, determine :

(a) The reaction force at support

(b) The deflection of each spring

(iii) A steel tapered bar of 1200mm length has the cross sectional areas of 450 $mm^2$ and $150mm^2$ at two ends. It is fixed at large end and subjected to tensile load of 35KN at free end. The modulus of elasticity for the bar material is $2*10^{5}$ $N/mm^2$. Model the bar with three finite elements each having length of 400mm and calculate the dresses in each element.

(iv) Explain principle of minimum potential energy briefly.

5 (i) A hollow transmission of length 500mm is used for transmitting a torque of 200 N-m. the permissible angle of twist of 1°. Design the shaft with an objective of minimizing the mass of the shaft using following data :
Shock and fatigue factor in torsion = 1.5
Upper limit on the outer diameter of the shaft = 80mm
Lower limit on the inner diameter of the shaft = 40mm
Allowable shear stress for shaft material = 140N/mm$^2$
Modulus of rigidity for shaft material = 80*10$^3$N/m$^2$
Density of shaft material = 8000kg/m$^3$
Use the following relation :

$$\tau = 16K_tTD_0/\pi\left(d_0{}^4 - d_i{}^4\right)$$

$$\theta = \frac{32TL}{\pi\left(d_0{}^4 - d_i{}^4\right)} * 180/\pi$$

**OR**

(i) What are the optimization techniques and explain langrage multiplier method briefly.

6 Attempt any **three** : **18**

(i) Explain data exchange translator
(ii) Classify modeling data.
(iii) Types of finite elements.
(iv) Advantages and disadvantage of finite element method
(v) What is optimization and optimum design.

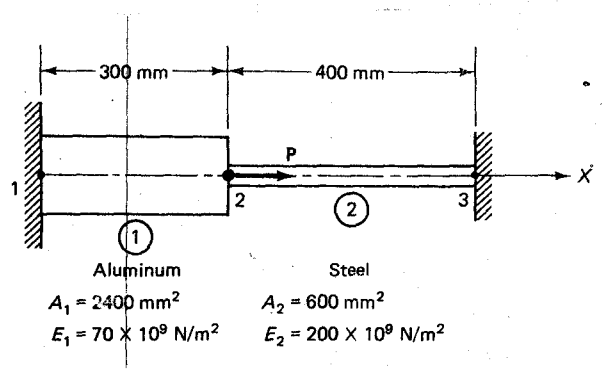


Fig.1

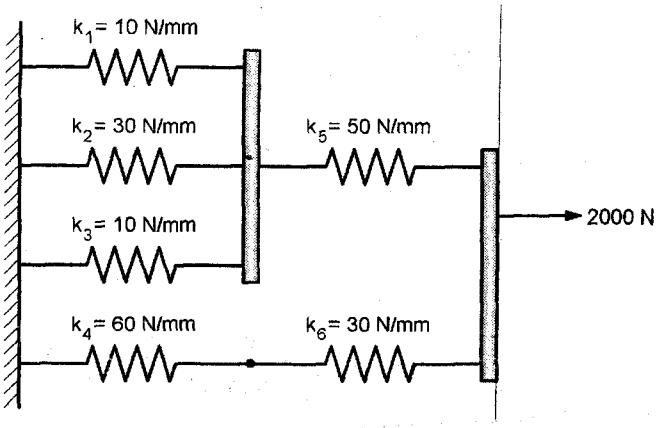


Fig.2

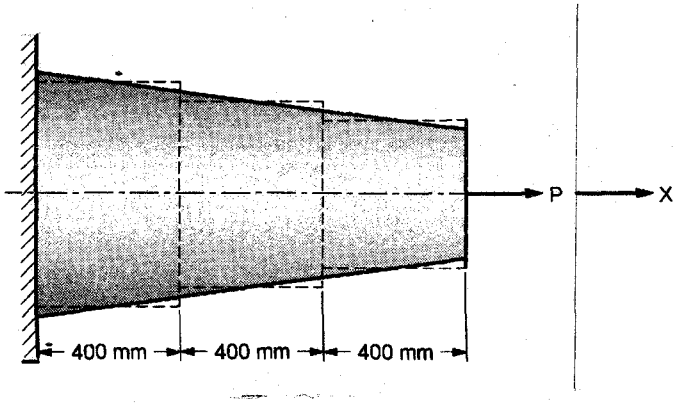


Fig.3