M.E. Fourth Semester (Production Tech. & Mgt.) (P.T.) (CGS)

13547 : Elective : Product Design : 4 SPTM 3

P. Pages : 2 | AU - 3255

Time : Three Hours | Max. Marks : 80

Notes :
1. Due credit will be given to neatness and adequate dimensions.
2. Assume suitable data wherever necessary.
3. Illustrate your answer necessary with the help of neat sketches.
4. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1.	a)	Differentiate between physical prototyping and virtual prototyping. Give suitable example for each.	7
	b)	Explain the solid ground curing process- with the help of neat sketch.	6
2.	a)	Explain the principle of fused deposition modelling process. Explain the advantages of this method over laser based techniques. State its disadvantages over the metal R.P.	7
	b)	Why rapid prototyping is called as generative manufacturing? Explain your answer with suitable diagram.	7
3.	a)	Discuss various types and forms of raw materials used in different RP processes. Also describe their characteristics.	7
	b)	What are the application areas of RP? Explain any one in detail with the help of suitable example.	6
4.	a)	Explain the stereolithography process with the help of neat sketch state its advantages.	7
	b)	What is post-processing in RP? What types of post processing are required in various RP techniques.	6
5.	a)	List out the command required to generate a 3D model of splined shaft.	7
	b)	Explain the concept of virtual manufacturing.	6

SECTION - B

6.	a)	Describe the basic stages in solving FEM problems.	5
	b)	Prove that strain as well as stress over the element domain is always same.	8
7.	a)	Explain the principle of minimum potential energy. Describe the necessary expression for it.	8
	b)	Describe the design science approach of product design.	5

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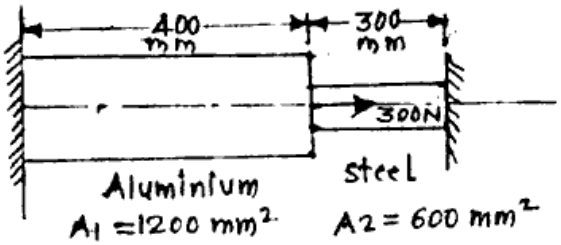
8. A stepped bimetallic bar made of aluminum and steel is subjected to an axial load of 300 kN using the finite element method, determine **14**
   i) The nodal displacements.
   ii) The reaction forces at the supports
   iii) The stresses in each material.
   (Refer Figure No. 1)



For steel, $E = 200 \times 10^3$ N/mm^2 &
For Aluminum, $E = 70 \times 10^3$ N/mm^2
Figure No. 1

9. a) Discuss the statistical techniques used for design & analysis of experiments. **7**

   b) What is value Analysis? Explain by giving suitable example. **6**

10. a) Describe the design related tasks performed by the components of CIM. **7**

    b) What is Group Technology? How it helps to expedite the product development process in concurrent engineering approach? **6**

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