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Total Number of Pages: 02

M.TECH
MDPE108

1st Sem M.Tech Regular/ Back Examination – 2015-16
SUBJECT NAME: MATERIAL SELECTION IN MECHANICAL DESIGN
BRANCH(S): MECHANICAL SYSTEM DESIGN

Time: 3 Hours

Max marks: 70

Q.CODE:T874

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

- Q1 Answer the following questions: (2 x 10)
- a) Define the shape factor for elastic bending of beams.
 - b) Draw the stress-strain diagram of mild steel.
 - c) What do you mean by fixed parameters and free parameters in mechanical design? Explain with an example.
 - d) A tube has a radius $r=10\text{mm}$ and a wall thickness $t=1\text{mm}$. How much stiffer is it in bending than a solid cylinder of the same mass per unit length?
 - e) What is a sandwich structure?
 - f) State the application of leaf spring and how it differs from helical spring?
 - g) What do you mean by the fracture toughness?
 - h) Young's modulus for copper is 124 Gpa its Poisson's ratio is 0.345. What is its shear modulus?
 - i) What are the advantages of CES software.
 - j) What is "A+B+configuration +scale" method?
- Q2 a) Discuss mechanical properties of materials with necessary diagrams and graphs (5)
b) What do you mean by toughness? Differentiate between Charpy and Izod test. (5)
- Q3 a) Classify different manufacturing processes and write short notes on each process with suitable diagrams. (10)
- Q4 What do you mean by mechanical design? Draw the design flow chart and give brief description about each stage with an example. (10)
- Q5 a) Give brief description about finishing processes. (5)
b) What are the design requirements for a light pressure vessel? (5)
- Q6 a) Write the function and design requirements of a heat exchanger with neat diagram (5)
b) Discuss about different joining processes. (5)
- Q7 a) Explain different types of heat treatment processes to improve the properties of materials. (5)
b) Do the case study for forming a fan. (5)
- Q8 Write short notes on any two (5 x 2)
- a) Strength and Density chart
 - b) Fracture toughness and modulus chart
 - c) Case study of flywheel
 - d) Design requirements of connecting rod of IC engine