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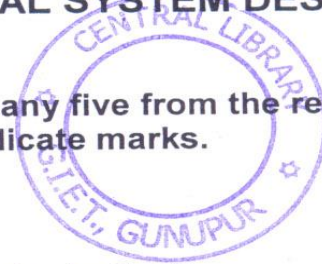
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M.TECH
MDPE108

1st Semester Regular/Back Examination – 2014
MATERIAL SELECTION IN MECHANICAL DESIGN
BRANCH(S): MACHINE DESIGN, MECHANICAL SYSTEM DESIGN

Time: 3 Hours
Max Marks: 70

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) What are the advantages of CES software.
 - b) What do you mean by shape efficiency?
 - c) What is the effect of performance indices on material selection?
 - d) Young's modulus for copper is 124 Gpa; its Poisson's ratio is 0.345. What is its shear modulus?
 - e) Which materials are both good thermal conductors and good electrical insulators?
 - f) What is "A+B+configuration +scale" method?
 - g) What are multiple constraints in material selection?
 - h) How would you find out the rate of a material?
 - i) State different electrical properties of a material.
 - j) A heat exchanger has an exchange area of $A=0.5\text{m}^2$. It passes heat from a fluid at temperature $T_1=100^\circ\text{C}$ to a second fluid at $T_2=20^\circ\text{C}$. The exchange wall is made of copper sheet of thermal conductivity 350W/m.k with thickness 2mm. How much energy flows from one fluid to the other in one hour.
- Q2 What do you mean by mechanical design? Draw the design flow chart and give brief description about each stage. (10)
- Q3 a) Discuss mechanical properties of materials with necessary diagrams and graphs. (4)
- b) Do the case study of pressure vessel. (6)
- Q4 a) Draw the stress-strain curve for ceramic material and explain how it differs from Mild steel. (5)
- b) What do you mean by hardness? Write short notes on Rockwell and Brinell hardness. (5)
- Q5 Classify different manufacturing processes and write short notes on each process with suitable diagrams. (10)
- Q6 a) Give brief description about finishing processes. (5)
- b) Explain different types of heat treatment processes to improve the property of materials. (5)
- Q7 a) What are the design requirements for manufacturing a con-rod for an engine? (5)
- b) Write the function and design requirements of a heat exchanger with neat diagram (5)
- Q8 What is the use of material property chart? Give brief description about the modulus-density chart, strength-density chart and fracture toughness-modulus chart. (10)