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Code No. : 14109 SMA

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (CBCS) IV-Semester Main Examinations, May-2018

Smart Materials and Applications

(Open Elective-III)

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. List out the properties of ferroelectric materials.
2. Mention any four applications of piezo electrics.
3. What are photo chromic lenses?
4. Why Tungsten trioxide (WO_3) is widely used as electro chromic material?
5. Write the key features of shape memory products.
6. Classify different types of metal alloys.
7. Mention any four SMAs that are suitable for commercial utilization.
8. What are the merits and demerits of copper based SMA?
9. How pyro electricity is different from thermoelectricity?
10. Give the limitations of ferrous metal alloys.

Part-B (5 × 10 = 50 Marks)

11. a) Explain construction and working of magnetostriction oscillator. [6]
b) Name any two ferroelectric materials and mention four applications of ferroelectric materials. [4]
12. a) What is thermoelectric effect? Explain thermoelectric power generation. [6]
b) Define thermocouple, neutral temperature and temperature of inversion. [4]
13. a) What are shape memory alloys and explain briefly different phases of SMA? [5]
b) Study the effect of temperature and mechanical load on the phases of shape memory alloy. [5]
14. a) Define characteristic temperatures and explain transformation hysteresis based on them. [5]
b) List out any four applications of shape memory alloys. [5]
15. a) Write differences between electrostriction and piezoelectricity. [5]
b) Mention applications of Electro chromic materials. [5]
16. a) What are various types of ferrous alloys and mention their applications? [6]
b) Write a note on Nickel – Titanium shape memory alloy. [4]
17. Answer any *two* of the following:
 - a) Explain briefly Curie Weiss law in of ferroelectric materials. [5]
 - b) Write a note on different types shape memory effects. [5]
 - c) Briefly explain Smart Fluids use in industry. [5]

