

Register Number: .....

**B.E /B.TECH DEGREE EXAMINATIONS: APRIL/MAY 2014**

(Regulation 2009)

Third Semester

**AUTOMOBILE ENGINEERING**

AUE102:Automotive Materials and Metallurgy

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. Dislocation is \_\_\_\_\_ defect.
  - a) One dimensional
  - b) Two dimensional
  - c) Three dimensional
  - d) Multi dimensional
2. Eutectoid reaction involves
  - a) Solid –solid transformation
  - b) Liquid-liquid transformation
  - c) Liquid –solid transformation
  - d) Transformation of two solids in to third solid
3. Medium temperature tempering is carried out in the temperature range of
  - a) 350° C – 450° C
  - b) 150° C – 250° C
  - c) 500° C – 650° C
  - d) 200° C– 300° C
4. The process of introducing carbon and nitrogen in to the surface of steel by heating is
  - a) Nitriding
  - b) Carburizing
  - c) Carbonitriding
  - d) Cyaniding
5. During austempering \_\_\_\_\_ is produced.
  - a) Martensite
  - b) Bainite
  - c) Austenite
  - d) Ferrite
6. Cermet and Tufnol are the examples of
  - a) Composite materials
  - b) Refractory materials
  - c) Polymer materials
  - d) Ceramic materials
7. Hardness tests give information about
  - a) Impact strength of material
  - b) Bending strength of material
  - c) Wear resistance and machinability of material
  - d) Compressive and elongating strength of material

8. The two scales used in a Rock well hardness testing machine is
  - a) A and B
  - b) A and C
  - c) B and C
  - d) Steel and diamond scale
9. Aluminum alloys, alloy number 300, Y-alloy are used as materials for
  - a) Cylinder block
  - b) Cylinder head
  - c) Connecting rod
  - d) Piston
10. The casted piston ring material must have the hardness
  - a) 250 – 400 Brinell
  - b) 50 – 200 Brinell
  - c) 150 – 700 Brinell
  - d) 100 – 500 Brinell

**PART B (10 x 2 = 20 Marks)**

11. Define phase diagram.
12. What is isomorphism?
13. What do you mean by stress relief?
14. Define hardenability.
15. Mention the applications of PMMA and ABS.
16. What are the automotive applications of PSZ?
17. Define slip and twinning.
18. What for Izod and Charpy tests are conducted?
19. Mention few materials used for exhaust valve and inlet valve.
20. What are the materials preferred for piston pins?

**PART C (5 x 14 = 70 Marks)**

21. a) Discuss about various types of crystal structures and different crystal defects.

**(OR)**

- b) Explain the iron carbon equilibrium diagram. Also explain the transformation takes place in the structure of steels.

22. a) Discuss the annealing, normalizing and tempering of steels.

**(OR)**

- b) Explain the case hardening, carburizing and induction hardening processes.

23. a) Discuss briefly about the properties and applications of PET, PTFE, PVC and PPO.

**(OR)**

b) Explain the properties and engineering applications of engineering ceramics, fiber and particulate reinforced composites.

24. a) (i) Discuss the various types of fracture. (7)  
(ii) Explain the Brinell and Vickers hardness tests. (7)

**(OR)**

b) (i) Explain the mechanism of plastic deformation. (7)  
(ii) Discuss briefly about testing of materials under tension and compression. (7)

25. a) (i) How do you select the materials for cylinder head and cylinder block? (7)  
(ii) Write a detailed note on crank shaft, cam shaft and connecting rod materials. (7)

**(OR)**

b) (i) Explain the criteria for selecting piston and gear materials. (7)  
(ii) Explain the various materials used for clutch plate and brake lining. (7)

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