KATHMANDU UNIVERSITY
End-Semester Examination
February/March, 2018

Marks scored:

Level : B. E.
Year : II

Course : MEEG 213
Semester: I

Exam Roll No.:

Time: 30 mins.

F.M : 10

Registration No.:

Date MAR 15 2018

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Tick the most appropriate answer.

1. Ductility of a material can be defined as
   [ ] ability to undergo large permanent deformations in compression
   [ ] ability to recover its original form
   [ ] ability to undergo large permanent deformations in tension
   [ ] none of the above

2. The ability of a material to resist softening at high temperature is known as
   [ ] creep [ ] hot tempering [ ] fatigue [ ] hot hardness

3. Mild steel belong to following category
   [ ] low carbon steel [ ] medium carbon steel
   [ ] high carbon steel [ ] alloy steel

4. Which of the following constituents of steels is softest and least strong
   [ ] austenite [ ] pearlite [ ] ferrite [ ] cementite

5. A material is known as allotropic or polymorphic if it
   [ ] has a fixed structure under all conditions
   [ ] exists in several crystal forms at different temperatures
   [ ] responds to heat treatment
   [ ] has its atoms distributed in random patterns

6. Pure iron has the structure of
   [ ] ferrite [ ] pearlite [ ] austenite [ ] cementitite

7. Carbon in iron is an example of
   [ ] substitutional solution [ ] interstitial solid solution
   [ ] intermetallic compounds [ ] none of the above

8. German silver is an alloy of
   [ ] silver with some impurities [ ] refined silver
   [ ] nickel, copper and zinc [ ] silver and gold

9. The crystal structure of gamma iron is
   [ ] body centered cubic [ ] face centered cubic
   [ ] orthorohomic crystal [ ] cubic crystal

10. White cast iron contains carbon in the form of
[ ] free carbon [ ] graphite [ ] cementite [ ] ferrite

11. Eutectoid steel contains following percentage of carbon
[ ] 0.02 % [ ] 0.3 % [ ] 0.63 % [ ] 0.8 %

12. Inconel is an alloy of
[ ] nickel, chromium and iron [ ] nickel and copper
[ ] nickel and zinc [ ] nickel and lead

13. Which is false statement about annealing. Annealing is done to
[ ] relieve stresses [ ] harden steel slightly
[ ] soften material [ ] permit further cold working

14. Charpy test is conducted to measure
[ ] hardness [ ] fracture stress
[ ] fatigue resistance [ ] brittleness

15. Iron alloyed with carbon up to 2 % is called
[ ] cast iron [ ] steel [ ] iron alloy [ ] mild steel

16. Cooling during Normalizing is carried out in
[ ] furnace [ ] air [ ] water [ ] oil

17. Which of the following is non-destructive test?
[ ] tensile test [ ] impact test
[ ] charpy test [ ] radiography test

18. Euctectoid composition of carbon steel at room temperature is known as
[ ] pearlite [ ] ferrite [ ] cementite [ ] martensite

19. Pearlite is combination of
[ ] ferrite and cementite [ ] ferrite and austenite
[ ] ferrite and iron graphite [ ] cementite and gamma iron

20. The transistor is made of
[ ] silver [ ] gold [ ] German silver [ ] germanium

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Level : B. E.
Year : II
Time : 2 hrs. 30 mins.

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Semester: I
F.M. : 40

SECTION "B"

*Attempt **ALL** questions. Assume suitable data if necessary.*

Q. N. 1

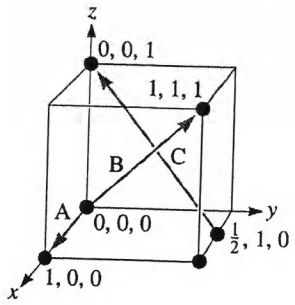
a. Steel is often coated with a thin layer of zinc if it is to be used outside. What characteristics the zinc provides to this coated, or galvanized, steel. [2]

b. For each of the following classes of materials, give two specific examples that are a regular part of your life: metals, ceramics, polymers, semiconductors. [2]

Q. N. 2

a. Define the terms: Allotropy, Metallic glasses, Liquid crystals, and Glass ceramics. [4×0.5 =2]

b. Write down the procedure for finding Miller Indices of a direction and apply the procedure to determine Miller indices of directions *A, B,* and *C.* [3]



Q. N. 3

a. Describe any three types of point defects. [3]

b. Explain the significance of dislocations. [1]

Q. N. 4

a. Draw qualitative stress - strain curve for a ductile metal and label the diagram properly. Compare the curve with curve for glass. [3]

b. What is hardness? Describe the Brinell hardness test in detail. [2]

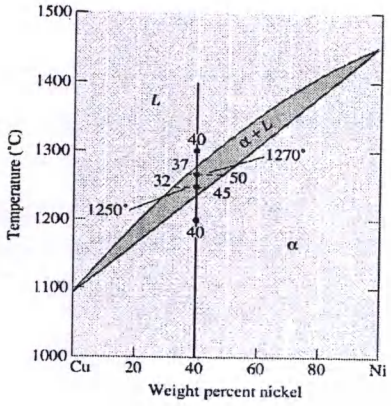
c. Describe briefly, with a proper sketch, ductile fracture in metallic materials. [2]

Q. N. 5

a. Draw and describe cooling curve for pure metal with no inoculation. How does it differ from cooling curve for metals with inoculation? [3]

b. A 5 cm diameter sphere solidifies in 1050 s. Calculate the solidification time for a 0.3 cm x 10 cm x 20 cm plate cast under the same conditions. Assume that $n = 2$. [2]

c. Applying lever rule determine the composition of each phase in a Cu-40 % Ni alloy at 1270 ^{0}C. [3]



Q. N. 6

a. Draw a self-explanatory iron-iron carbide phase diagram showing all the important phases and reactions. [3]

b. With reference to iron-iron carbide diagram describe Full Annealing, Normalizing, Process Annealing and Spheroidizing. [4×1 = 4]

c. Describe Tempering heat treatment process. Why is it performed? [2]

Q. N. 7

a. Write down two most important properties of ceramics. [1]

b. Write short notes on: Applications of Brass, Refractories. [2×1 =2]