Ex/MT 41C/63/2006

B. METALLURGYCAL ENGG. FINAL EXAMINATION, 2006

(1st Semester)

TECHNOLOGY OF N. F. METALS AND

NON-METALIC MATERIALS

Time: Three hours Full Marks: 100

Answer any five questions.

All questions carry equal marks.

1.Answer any four of the following: $5 \times 4=20$

(a) Mention the outstanding properties of copper. Give some examples of copper and its alloys in electrical engineering applications.

(b) Discuss the role of aluminium alloys as electrical conductors.

(c) Name an aluminium alloy whose strength can be compare to steel and low alloy steel. What are some of its advantages? What are the limitations of this alloy.

(d) Compare the lead base and tin base babbitts with regard to properties and applications.

(e) Which type of soft solder is preferred for electrical equipment and why?

[Turn over

2. (a) What are polymers? Give a few examples of polymeric products. Compare and contrast thermo-plastic and thermosetting polymers.

(b) What are fiber reinforced plastics? Give some of their application areas. What are particulate composites? Give examples. 10 + 10=20

3. What are the following and where are they used? (any eight)

(i)	Invar	(ii)	Inconel
(iii)	Nickel silver	(iv)	Stellite
(v)	Phosphur bronze	(vi)	Alnico
(vii)	Monel	(viii)	Gun metal
(ix)	Duralumin	(x)	Constantan.

20

4. (a) Show schematically the methods for pro-ducing carbon fibers.

(b) Cite the application of metal matrix compo-sites with suitable examples.

(c) What is ceramic matrix composites? Give two important uses.

(d) Select the right polymer for the following:

(i) a surgeon's gloves (ii) a beverage container

(iii) a pulley (iv) non stick cookware (v) compact disk. 5 × 4=20

5. Give the structural formula and the areas of applications of the following: (***any five***)

(i) Polyethylene (ii) Polypropylene (iii) Teflon (iv) PEEK (v) PAI (v) PET (vii) PMMA (viii) Nylon.

4×5=20

6. (a) Calculate composite modulus for polyester reinforced with 60 vol% E glass under isostrain condition.

Given E polyester =. 6.9×10^3 Mpa

E glass = 72.4×10^3 MPa.

(b) A silver-tungsten composite for an electrical contact is produced by first making a porous tungsten powder metallurgy compact, then infiltrating pure silver into the pores. The density of the tungsten compact before infiltratration is 14.5 gm/cm^3. Calculate the vol. fraction of porosity and the final weight percent of silver In the compact after infiltration.

(c) Design the material to be used to contain liquid hydrogen fuel for the space shuttle. 6 + 10 + 4

7. Write short technical note on any *four* of the following : $5 \times 4=20$

(i) Use of non metallic materials in bearing application

(ii) Substitution of glass filter for copper cable

(iii) Materials for nuclear application

(iv) Toughened zirconia

(v) Use of tantalum

(vi) Use of aluminium in packaging industry

(vii) Use of copper in electronics industry

(viii) Materials in disaster management

(ix) Nano composite.