Total Pages—4

(Set-V_1)

B.Tech-8th(M & M)
Composite Materials

Full Marks : 70

Time : 3 hours

Answer **six** questions including
Q.No.1 which is compulsory

The figures in the right-hand margin indicate marks

Symbols carry usual meaning

1. Answer *all* questions : 2 × 10

(*a*) Define matrix and reinforcement.

(*b*) Mention at least two disadvantages of a composite material over its matrix and reinforcement.

(*c*) What is rule of mixture ? What properties of a composite can be calculated using it ?

(Turn Over)

(*d*) What is a whisker ? Mention its characteristics features.

(*e*) Schematically draw particulate, fiber and laminated composites and specify different constituents.

(*f*) What is a nanocomposite ? Mention few of its advantages over other composites.

(*g*) What do you mean by green composities ? Give few examples of green composites.

(*h*) How the interface affects the strength of a composite ?

(*i*) What is pultrusion process ?

(*j*) What is CFRP ?

2. (*a*) What is a composite ? Mention its advantages over the matrix material. 5

(*b*) Discuss classification of composite materials. Give examples and applications of each class of composites. 5

3. (*a*) Briefly discuss the effect of matrix (polymer, ceramic and metal) on the properties of composite. 5

(*b*) Briefly discuss the size and shape of reinforcement on the properties of the composite. 5

4. (*a*) Derive the 'Rule of Mixture' to predict the elastic modulus for a continuous fiber composite loaded (*i*) parallel and (*ii*) perpendicular to fiber alignment. 5

(*b*) An unidirectional Kevlar 49 fiber-epoxy composite contains 60% by volume of Kevlar and 40 % epoxy resin. The density of Kevlar 49 fiber is 1·48 Mg/m³ and that of epoxy resin is 1·20 Mg/m³. Calculate

(*i*) The weight percentage of Kevlar 49 and that of epoxy resin in the composite.

(*ii*) The average density of the composite. 5

5. (*a*) What is interfacial reaction in composites ? Briefly discuss the factors that affect the interfacial reaction. 5

(*b*) Briefly discuss the tensile behavior of continuous and discontinuous fiber composites. 5

6. (*a*) Briefly discuss at least two methods for the preparation of polymer matrix composite. 5

(*b*) Briefly discuss at least two methods for the preparation of metal matrix nanocomposite. 5

7. (*a*) Discuss the effect of particulate reinforcement on the creep behaviour of a metal matrix composite. 5

(*b*) Briefly explain various fractures modes in fiber reinforced composites. 5

8. Write short notes on any *two* : 5 × 2

(*i*) Ceramic matrix composites

(*ii*) Reinforcement mechanism

(*iii*) Composite fracture

(*iv*) Environmental effects on composites.
