

Indian Institute of Technology
Centre for Biomedical Engineering
BIOMATERIALS (BM820)

Dt: 30.04.08

Marks: 50+25

Time: 2hr

Use separate answer books for Part A and Part B. Both the parts carry equal weightage

Part A

Q1) Answer any four of the following:

- a) Give preparation and properties of silicon rubber and its advantage over natural rubber. How will you synthesise room curable (RTV) and heat curable silicon rubber(HTV). Give two biomedical application in each case.
- b) Give preparation and biomedical applications of polycarbonate and its advantage over polymethylmethacrylate.
- c) Give preparation of acrylic cement, its limitation, improvement and biomedical applications.
- d) Graft Copolymerisation and its biomedical application.
- e) How will you synthesise polymeric micro and nano particles? Give two important biomedical applications in each case. (20)

Q2) Recommend ideal material for the following biomedical applications:

- | | |
|--------------------------------|--|
| (a) Blood oxygenator | (b) Hip joint |
| (c) Artificial heart | (d) Ankle joint |
| (e) Bone support plate | (f) Intraocular lenses |
| (g) Disposable syringes | (h) Artificial jaws |
| (i) Suture for internal injury | (k) Clippers for polio effected children |
- (5)

Q3) Write short note on any three of the following:

- (i) Non-aqueous and aqueous redox initiators and their applications
- (ii) Chemical attachment of drugs/enzymes (any three) onto polymers at room temperature.
- (iii) Preparation of hard and soft contact lenses, their drawbacks and advantages?
- (iv) Write chemical structure of Starch, cellulose and chitin. Suggest one applications in each case. (15)

Q4) Write preparation, properties and biomedical applications of polyvinyl chloride (PVC). Why PVC is rigid and brittle at room temp. Mention in brief about various plasticizers used to make PVC flexible. What are the drawbacks of flexible PVC as a biomaterial and how can you improve them by chemical and physical methods?

(6)

Q5) Separate biodegradable, biostable and biosoluble polymers from the list given below:

Silk, Polymethyl methacrylate, Starch, Polymethacrylic acid, Silicon rubber, PolyN-vinyl-2pyrrolidone, Polytetrafluoroethylene, Cellulose, Polyglycolic acid, Collagen, Poly vinyl alcohol, Polycarbonate, Nylon 66, Polycarbonate, Polyethylene adipate, polyethylene glycol 4000

(4)