22513

12425

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. Answer any FIVE : **10**

(a) Give any two examples each of

(i) Inorganic membrane material

(ii) Synthetic membrane material

(b) Explain principle of reverse osmosis.

(c) Give different types of membrane fouling.

(d) Give any two industrial applications of membrane technology.

(e) Name any two cation exchange resin and anion exchange resin.

(f) Define irreversible fouling.

(g) Define membrane modules.

2. Answer any THREE : **12**

(a) Explain principle and advantages of membrane technology.

(b) Explain the concept of bio fouling factor.

(c) Compare membrane separation process with conventional separation processes.

(d) Compare membrane distillation and conventional distillation.

3. Answer any THREE : **12**

(a) Give any two industrial application each of
(i) Ultrafiltration and (ii) Microfiltration.

(b) Compare reversible and irreversible fouling.

(c) Explain polymerics and ceramic membrane materials.

(d) Explain the concept of dialysis in detail.

4. Answer any THREE : **12**

(a) Compare plate and frame module, hollow fila. module, spiral wound module.

(b) Distinguish microfiltration and ultrafiltration.

(c) Explain working of ion exchange equipment.

(d) Describe future scope of nanotechnology.

(e) Explain feasibility of membrane technology in chemical industry.

5. Answer any TWO : **12**

(a) Draw neat and labelled sketch of Electrodialysis.

(b) Explain mechanism involved in fouling of membrane.

(c) With neat labelled diagram explain construction and working of membrane bioreactor.

6. Answer any TWO : **12**

(a) Distinguish osmosis and reverse osmosis with neat sketch.

(b) Explain tabular membrane module with schematic drawing. Give any two disadvantages of this module.

(c) Explain the factors responsible for membrane fouling.
