17647

15116

4 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

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

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any THREE of the following:** **12**

(i) Draw a process symbol of packed bed reactor and centrifugal pump.

(ii) Draw process instrumentation symbol of gate valve and ball valve.

(iii) Draw a neat sketch of reactor jacket with half coil.

(iv) Draw a neat proportionate sketch of loop joint.

b) **Attempt any ONE of the following:** **8**

(i) Write down a specification sheet of batch reactor.

(ii) Draw a neat sketch of shell and tube heat exchanger showing internal details with nomenclature.

Marks

2. Attempt any FOUR of the following: **16**

a) Draw a neat sketch of segmental buffer and tube sheet for two pass.

b) Show by a neat sketch elbow and bend.

c) List the supports used for pipeline. When yard support is used?

d) Show by neat sketch level safety valve.

e) Write proper nomenclature by drawing ball valve.

f) Draw a proportionate diagram of welded neck flange.

3. Attempt any FOUR of the following: **16**

a) Draw a neat sketch of bubble cap tray.

b) Draw a neat sketch of hydraulic joint.

c) Draw a neat sketch of leg support.

d) Draw a neat sketch of saddle support.

e) Draw a neat sketch of gate valve with proper labelling.

f) Draw a neat sketch of butterfly valve. State its use.

Marks

4. Read the following process and draw a neat detailed process flow diagram with legends and block diagram: **16**

Acetone is produced by catalytic dehydrogenation of isopropyl alcohol. Isopropyl alcohol is vaporized, heated and fed to a catalytic fixed bed reactor. Acetone is formed in the reactor. The reactor exit gases (acetone, hydrogen and isopropyl alcohol) pass to a condenser where most of the acetone, water and alcohol condense out. The final traces of acetone and alcohol are removed in water scrubber. The effluent from scrubber is combined with the condensate from condenser and distilled in a column to separate the excess water. The product from second column is an azeotrope of water and isopropyl alcohol containing approximately 11% alcohol. It is recycled to the reactor. Zinc oxide is used as catalyst. Reaction temperature is 400 - 500°C and pressure is 40 - 50 Psig. Product is taken out from top of first column.

5. Attempt any TWO of the following: **16**

a) Draw utility line diagram of the process given in question no. 4.

b) Draw piping and instrumentation diagram for the process in question no. 4.

c) Draw piping and instrumentation diagram of reactor temperature control and heat exchanger temperature control.

6. Attempt the following: **16**

a) Draw equipment layout diagram for the process given in question no. 4

b) Draw utility block diagram and tank form for the process given in question no. 4