17647

21718

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 : **12**

(a) Draw flow sheet symbols of jacketed reactor and kettle reboiler.

(b) Draw neat instrumentation symbol of instrument air signal and main panel mounted temperature indicator.

(c) Draw neat and proportionate sketch of bubble cap.

(d) Draw a neat and proportionate sketch of rolled tube and welded tube in tube sheet.

(e) Draw neat and proportionate sketches of hot fluid temperature control of heat exchanger.

(B) Attempt any ONE : **08**

(a) Prepare a neat specification sheet for shell and tube heat exchanger.

(b) Draw a neat and proportionate sketch of batch reactor.

2. Draw neat and proportionate sketches of any **FOUR** of the following : **16**

(a) Standard dished head and hemispherical dished head.

(b) Welded neck flange and lap type flange.

(c) Globe valve.

(d) Bracket support for vertical vessels.

(e) Socket and spigot joint.

(f) Lift check valve and swing check valve.

3. Draw neat and proportionate sketches of any **FOUR** of the following : **16**

(a) Lever safety valve.

(b) Fanged bend and threaded socket.

(c) Diaphragm on valve.

(d) C.I. flanged joint.

(e) Straight skirt support for tall vertical vessels.

(f) Plain and half coil jacket for pressure vessels.

4. Read the process description and draw a process flow diagram of the process : **16**

Absolute alcohol is obtained by carrying out the fractional distillation of 96% by weight ethyl alcohol. The fresh feed (ethyl alcohol) is fed to an azeotropic column where benzene is used as an entrainer/azeotrope breaker. The ternary azeotrope of ethanol, benzene and water is formed as an overhead which is condensed and phase separation is achieved in a decanter. From the decanter, the benzene rich layer is recycled to the azeotrope column (as reflux) and water rich layer is sent to a second fractionating column (a recovery column). Where water is drained as bottoms. Almost all ethanol + Benzene is removed from the top of the recovery column which is recycled to the top of the azeotrope column. The bottom of the azeotrope column gives almost pure ethanol (99.5%).

5. Draw a utility line diagram and utility block diagram of the process given in Q. No. 4. **16**

6. **(A)** Draw an equipment layout of the process given in Q. No. 4. **8**

(B) **Attempt any ONE :** **8**

(a) Draw a tank farm drawing of the process given in Q. No. 4.

(b) Draw a piping and instrumentation diagram of a continuous distillation column (plate type) with reflux and reboiler.
