

17647

21819

4 Hours / 100 Marks

Seat No.

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- 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.

Marks

1. (A) Attempt any THREE :

12

- (a) Draw symbols as per IS 3232
 - (1) Batch Reactor (Jacketed)
 - (2) Catalytic fixed bed reactor.
- (b) Draw following valve symbols :
 - (1) Gate valve
 - (2) Ball valve
 - (3) Needle valve
 - (4) Butterfly valve
- (c) Draw neat & proportionate sketch of Socket joint.
- (d) Draw free sketch of lessing ring & intalox saddle.

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

- (a) Draw specification sheet for Batch reactor.
- (b) Draw a neat labelled fabrication assembly drawing for shell and tube heat exchanger.

2. Attempt any FOUR :**16**

- (a) Draw a neat proportional drawing of
 - (1) Hemispherical dished head.
 - (2) Flanged & shallow dished head.
- (b) Draw a neat & proportionate sketch of Roller support.
- (c) Draw a neat labelled diagram of diaphragm valve.
- (d) Draw a neat sketch of cast iron flanged joint.
- (e) Draw a neat sketch of single rod hanger.
- (f) Draw a neat sketch of Butt weld joint.

3. Attempt any FOUR :**16**

- (a) Draw plain jacket and channel jacket used for pressure vessels.
- (b) Draw following tube side passes in shell (1) single pass, (2) two passes for heat exchanger.
- (c) Draw neat sketches of Hanger supports (1) Double rod hanger, (2) Double U-bolt hanger.
- (d) Draw Angular skirt support.
- (e) Draw a neat labelled sketch of Gate valve.
- (f) Draw Triangular & Square pitch arrangement for tube sheet in heat exchanger.

4. Draw a process flowsheet for following process description with its legend. **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. The ternary azeotrope of ethanol, benzene and water is formed as an overhead which is condensed & 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 ethanol + benzene is removed from the top of the recovery column which is recycled at the top of the azeotrope column. The bottom of the azeotrope column gives almost pure ethanol (99.5%).

5. (a) For process described in Q.4, draw utility line diagram with legend. **12**

- (b) Draw utility block diagram for steam. **04**

6. For process described in Q.4 draw

- (a) Equipment layout. **10**

- (b) Tank form cum utility block diagram. **06**
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