

22608

21222

3 Hours / 70 Marks

Seat No.

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15 minutes extra for each hour

- Instructions* – (1) All Questions are *Compulsory*.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (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. Attempt any FIVE of the following :** **10**
- a) State any two applications of computer aided drafting (CAD) software.
- b) State any two drawing commands used in CAD with their use.
- c) Give the necessity of diaphragm valve in chemical industry.
- d) Name any two types of vessel supports used for vertical vessel.
- e) Name any two types of jackets used in batch reactor.
- f) Draw a neat sketch of triangular pitch used in shell and tube heat exchanger.
- g) Draw IS-3232 symbols of
- i) Tray dryer
- ii) Reciprocating pump

P.T.O.

- 2. Attempt any THREE of the following :** **12**
- a) State the use of CAD initial setting commands for
 - i) Snap
 - ii) Grid
 - iii) Ortho
 - iv) Osnap
 - b) Give the procedure of any four modify commands used in CAD.
 - c) Draw a neat sketch of socket and spigot joint.
 - d) Draw a neat sketch of angular skirt support.
- 3. Attempt any THREE of the following :** **12**
- a) Explain the use of computer aided drafting. (CAD) software in chemical industry with example.
 - b) State the command prompts used to draw the batch reactor in sequential order.
 - c) Draw a neat sketch of welded neck flange.
 - d) Draw a neat sketch of saddle support.
- 4. Attempt any THREE of the following :** **12**
- a) Draw a schematic view of control valve with nomenclature.
 - b) Draw a neat and proportionate sketch of any two types of pipe hanger.
 - c) Draw any two types of agitators used in a batch reactor.
 - d) Draw a temperature control scheme for a batch reactor.
 - e) Write a specification sheet for heat exchanger.

5. Attempt any TWO of the following :**12**

- a) Draw a neat and proportionate sketch of 1-2 type shell and tube heat exchanger.
- b) Benzene sulphonic acid is to be prepared on a continuous basis by sulphonation of benzene. Sulphuric acid is continuously pumped from a storage tank to a sulphonator (Jacketed and agitated type - CSTR). The steam heating is required to the sulphonator. Liquid benzene is continuously pumped from the storage tank to a vaporiser (for which steam is used as utility), where it is converted into superheated vapour. Part of benzene vapour are fed to the sulphonator and the remaining part of benzene vapours are fed to a sulphonator tower (Plate column) from bottom. In the sulphonator, benzene reacts with sulphuric acid and the reaction mass containing 30% sulphuric acid (unreacted) from the sulphonator is fed continuously to the top of the sulphonation tower. The reaction mass flows in the downward direction through the tower while doing so it further reacts with benzene vapour rising through the column. The benzene-water vapour mixture from the top of the tower is fed to a condenser and then to a separator. Benzene from separator is then returned to the benzene vaporiser. The product benzene sulphonic acid containing small amount of sulphone, sulphuric acid is continuously removed from the bottom of the tower. Sulphonation is carried at a temperature of 160-180°C. Draw the block diagram of this plant.
- c) Draw the process flow diagram of this plant.

6. Attempt any TWO of the following :**12**

- a) Draw a neat sketch of equipment layout for benzene sulphonic acid plant. [see Q.5 (b)]
 - b) Draw the tank farm diagram for benzene sulphonic acid plant. [see Q. 5 (b)]
 - c) Draw any three types of heads used for the chemical process equipments.
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