17647

11819

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

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. (A) Attempt any THREE of the following : **12**

(a) Draw symbols as per Indian Standard 3232 for any two size reduction equipments.

(b) Draw symbols used in flow sheet as per IS 3232 for filter press and centrifugal compressor.

(c) Draw free hand sketch of any two packings used in packed towers.

(d) Draw the sectional view of reducing socket and plug used for piping purpose.

(B) Attempt any ONE of the following : **8**

(a) Draw specification sheet for a centrifugal pump.

(b) Draw a neat labelled fabrication drawing for a 2-4 pass, fixed tube-sheet shell and tube heat exchanger.

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

(a) Draw a neat sketch of elliptical and torispherical dished head used in batch reactor.

(b) Draw sectional view of welded neck and hub type flange.

(c) Draw neat and proportionate sketch of any two types of pipe hanger support.

(d) Draw a neat sketch of plug valve.

(e) Draw a neat labelled diagram of spring loaded safety valve.

(f) Draw a neat sketch of hydraulic joint used in piping.

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

(a) Draw any two types of jackets used for reactors.

(b) Draw a neat sketch of union joint.

(c) Draw a neat sketch of straight and angular skirt support.

(d) Draw a neat sketch of wear plates used in saddle support.

(e) Draw a neat, proportionate, labelled diagram of globe valve.

(f) Draw a neat and proportionate sketch of diaphragm valve.

4. Read the following process description and attempt following : **16**

Ortho nitro aniline (ONA) is to be manufactured by ammination of ortho-nitro chlorobenzene (ONCB). Water is taken into a reactor (high pressure batch reactor) and ammonia (excess) is taken into it at a low temperature. Molten ONCB is then added to the reactor and mass in the reactor is heated with a low pressure steam, so as to reach the reaction temperature and pressure. The reaction temperature is held constant over a period of eight hours for complete conversion of ONCB to ONA.

After the reaction is over ammonia recovery is started. Ammonia from the reaction vessel is sparged into a mechanically agitated vessel via a pressure reducing valve. Ammonia is absorbed in water in the mechanically agitated vessel which is maintained at temperature less than 20 °C by recirculating chilled water through a coil dipped in it.

The unabsorbed gas from the mechanically agitated vessel is sent to two scrubbers in series where it is further absorbed in water spread from the top of the scrubbers. Scrubbers are packed columns containing saddle packings. NH_3 liquor from the bottom of scrubber goes to a liquor storage tank which is kept in circulation till NH_3 recovery is complete. After recovery of ammonia, the product mass containing ONA is cooled to room temperature by cooling tower water, the product mass, i.e. slurry of ONA is then fed via a screw pump to a batch centrifuge. Wet ONA is then dried in a tray dryer and dried ONA is pulverised in a hummer mill to get product ONA in powder form. The reaction conditions are Temp = 169 °C, Press = 41 Kgf/cm^2. Draw a process flow sheet of this plant.

5. Answer the following : **16**

(a) Draw utility line diagram (ULD) for above described process.

(b) Draw process instrumentation diagram for the above described process.

6. Answer the following : **16**

(a) Draw the equipment layout for the process given above.

(b) Draw the tank farm for the process given above.
