

17647

21415

4 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each Section on same / separate answer sheet.
 - (3) Answer each next main Question on a new page.
 - (4) Illustrate your answers with neat sketches wherever necessary.
 - (5) Figures to the right indicate full marks.
 - (6) Assume suitable data, if necessary.
 - (7) Use of Non-Programmable Electronic Pocket Calculator is permissible.
 - (8) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

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| 1. [A] Attempt any THREE : | 12 |
| <ul style="list-style-type: none">(a) Draw a neat proportionate symbol of globe & needle valve.(b) Draw a proportionate instrumentation symbol of pneumatic rate & Rotameter.(c) Draw free hand sketch of Raschig ring and partition type packings used in a packed column.(d) Draw a neat sketch of cross & union joint. | |
| [B] Attempt any ONE : | 8 |
| <ul style="list-style-type: none">(a) Prepare a specification sheet of shell & tube heat exchanger.(b) Draw a neat & proportionate drawing of a bubble cap type tray in a distillation column. | |
| 2. Attempt any FOUR : | 16 |
| <ul style="list-style-type: none">(a) Draw a neat sketch of elliptical dished head and conical dished head.(b) Draw a neat sketch of socket and spigot joint.(c) Draw a neat sketch of bracket support.(d) Draw a neat sketch of a ball valve.(e) Draw a neat sketch of a diaphragm valve.(f) Draw a neat sketch of a Reducer and Tee joint. | |

P.T.O.

3. Attempt any FOUR :**16**

- (a) Draw specific application of Limpid coils & draw proportionate sketch as attached to a reactor.
- (b) Draw a proportionate sketch of hydraulic joint.
- (c) Draw a proportionate sketch of Hanger support for steam pipe.
- (d) Draw a proportionate drawing of gate valve with nomenclature.
- (e) Draw a proportionate sketch of leg support.
- (f) Show by a neat proportionate drawing of a swing check valve.

4. Read the process & attempt the following :**16**

Process – Carbon monoxide & hydrogen are reacted over copper based catalyst at 250 °C to produce methanol. CO₂ & H₂ are compressed to a desired pressure & mixed with hot recycle gas into a converter [Fixed bed multi-tubular reactor.] The heat evolved during reaction is removed by circulating water through internal cooling coils provided to produce steam. The feed to the reactor is heated in heat exchanger by exchanging heat with product gases leaving the reactor. The product gases are cooled further in water cooler & then separated in high pressure separator. The purge gas from separator is recycled back. The liquid product from bottom of separator are taken to purification unit, where fractionating columns separate formaldehyde & methanol. The overhead from first column is aldehyde & bottom from it contains methanol and water. It is fed to a second fractionating column. The methanol is taken out as overhead product and water is drained as bottom from this column.

Draw a neat & detailed process flow diagram of the above process.

5. Answer the following :**16**

- (a) Draw a utility diagram for the above process.
- (b) Draw a equipment layout diagram for the above process.

6. Attempt the following :**16**

- (a) Draw a tank form diagram for the above process.
 - (b) Draw piping instrumentation & utility diagram of a reactor.
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