



A Charutar Vidya Mandal's Institution
V.P. & R.P.T.P. SCIENCE COLLEGE

(AUTONOMOUS) (Grant-in-Aid)
 Affiliated to Sardar Patel University
 VALLABH VIDYANAGAR-388120



Bachelor of Science (Semester III) Internal Examination - 2025

US03MAICH01 : CHEMICAL PLANT UTILITIES & INSTRUMENTATION

Date: 23-09-2025 Day: TUESDAY

Time: 02:45 p.m to 4:15 p.m.

Total marks :30

Note: Figures to the right indicate marks of the question.

Q-1 Write the most appropriate answer from the following multiple-choice questions. [06]

- 1 Priming in boilers is caused by.....
 - (a) Low pressure
 - (b) High TDS in water
 - (c) Steam heating
 - (d) Soft water
- 2 Which process exchanges $\text{Ca}^{2+}/\text{Mg}^{2+}$ with Na^{+} ions?
 - (a) Zeolite process
 - (b) Sedimentation
 - (c) Lime-soda process
 - (d) Electrolysis
- 3 Water is an example ofrefrigerant.
 - (a) Organic
 - (b) Inorganic
 - (c) Azeotropic
 - (d) Halocarbon
- 4 Which instrument is commonly used to measure atmospheric pressure?
 - (a) U-tube Manometer
 - (b) Barometer
 - (c) Bourdon Gauge
 - (d) McLeod Gauge
- 5 The operating principle of a diaphragm pressure gauge is based on _____.
 - (a) Buoyancy principle
 - (b) Elastic deflection of a thin membrane
 - (c) Piezoresistive effect
 - (d) Hydrostatic pressure head
- 6 In a float operated level gauge, the principle of operation is based on _____.
 - (a) Pascal's law
 - (b) Capacitance change
 - (c) Buoyancy (Archimedes' principle)
 - (d) Hydrostatic pressure

Q-2 Write the answer of following long Questions. [06]

[A] Describe the construction and working of Bomb Calorimeter.

OR

[A] Write the industrial applications of Nitrogen, Hydrogen and Carbon dioxide gases.

Q-3 Write the answer of following long Questions [06]

[A] Explain with the help of neat sketch work done by single stage, single acting reciprocating compressor.

OR

[A] Write the difference between heat engine, refrigerator and Heat Pump.

Q-4 Write the answer of following long Questions [06]

[A] Explain construction and working of U-Tube manometer and Well Manometer.

OR

[A] Explain Bourdon pressure gauge, With neat sketch labeled sketch.

Q-5 Write the answer of following long Questions. [06]

[A] Explain (i) Hook Gauge method (ii) Bob and Tape method for level measurement.

OR

[A] Describe the sight glass method with a neat sketch.



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Supervisor sign.....
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Seat no.....



B.Sc (Semester-3) –Quiz-2025

US03MAICH01: CHEMICAL PLANT UTILITIES & INSTRUMENTATION

Date: 23/09/2025

Day: Tuesday

Total Marks:15

Q-1 Fill in the blanks with the appropriate answer given in the bracket. [8 Marks]

1. The calorific value of fuel is determined using a _____ calorimeter.
(bomb/copper)
2. Temporary hardness of water is due to _____ salts.
(bicarbonate/carbonate)
3. The work done per cycle in a single-stage reciprocating compressor is given by the area under the _____ diagram.(Pressure-Volume/ Mole-Temperature)
4. The boiler in which water flows inside the tubes and hot gases surround them is called a _____ boiler. (water-tube/fire tube)
5. Bourdon tube pressure gauges belong to _____ (Meanometers/Elastic Pressure Transducers).
6. Ultrasonic level detectors are advantageous because they _____
(Provide continuous non-contact measurement/ are cheaper than all other methods).
7. Radiation method of the level measurement is mainly used when _____
(Tank wall is transparent/Process fluid is corrosive or opaque)
8. Differential pressure gauges are mainly used in _____
(Liquid Level measurement/ Flow measurement across an orifice).

Q-2 State whether the following statement is true or false. [Write your answer in the box]

[8Marks]

True/False

1. Water used for steam generation should be free from dissolved salts and suspended impurities. (True/False).
2. Oxygen is used in welding and metal cutting. (True/False).
3. The Carnot refrigeration cycle gives the maximum possible COP. (True/False).
4. The main components of a steam power plant are boiler, turbine, condenser, and pump. (True/False).
5. Absolute pressure= (Gauge pressure + Atmospheric Pressure). (True/False).
6. Radiation method for level measurement is contact-based. (True/False).
7. Bellows gauges work on the principle of elastic deformation. (True/False).

