Total No. of printed pages = 4

END SEMESTER (REGULAR/RETEST) EXAMINATION, NOVEMBER/DECEMBER – 2024

Semester : 3rd

Branch : Chemical

Subject Code : Ch-301

PRINCIPLES OF UNIT OPERATION – I

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

(i) Question Nos. 1 and 2 are compulsory.

(ii) Answer any *five* questions from Question Nos. 3 to 8.

1. Fill in the blanks : 1×10=10

   (a) Dimension of viscosity is _____.

   (b) 1 poise =_____cp.

   (c) Pipe has a moderate length of _____.

[Turn over

(d) _____ is used to close the end of the pipe.

(e) _____ valve is good choice for on-off service.

(f) Venturimeter works on the principle of _____.

(g) A pitot tube is used to measure the _____.

(h) Pump _____ the mechanical energy of the liquid.

(i) Compressor discharge a pressure of _____.

(j) Heat rate =_____.

2. Answer the following questions : 1×5=5

(a) What is Reynold number ?

(b) Which flow meter is used to measure the flow rate of petroleum product ?

(c) What is Union joint ?

(d) What is Priming ?

(e) What is Black body ?

3. (a) Define Potential flow and Boundary layer. 2

(b) Describe Reynold experiment with diagram. 9

4. (a) Describe the construction, operation and uses of venturimeter with diagram along with its uses. 8

(b) Explain U-tube manometer with a diagram. 3

5. (a) Explain the construction, operation and uses of check valve with diagram. 8

(b) What are the considerations for the selection of valve ? 3

6. (a) Describe the construction and operation of diffuser ring centrifugal pump with diagram. 7

(b) How can you identify cavitation in centrifugal pump. 4

7. (a) Derive the expression for heat flow in composite medium in series. 6

(b) Explain Fourier law of conduction of heat. 3

(c) Classify heat exchangers. 2

8. (a) A pitot tube with discharge co-efficient of .9 is connected to a manometer containing water and light oil of sp. Gravity .8 is flowing through a pipe of .8 cm internal diameter. When the pitot tube is kept at the centre of the pipe, the manometer reads 9 cm.Calculate the flow rate of oil if average velocity is 80% of maximum velocity. 5

(b) Explain shell and tube (1-1) heat exchanger with diagram. 6