

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
ME – SEMESTER II (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2721002

Date: 25/05/2016

Subject Name: Cryogenic plants and Equipments

Time: 10:30 am to 01:00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a) Design the inner shell, heads and stiffening rings for a 106 m³ liquid oxygen vessel. The inside diameter of the shell and heads is 3.05m. Hemispherical heads are to be used. The desired internal pressure is 800 Kpa and 10% ullage volume is required. The inner shell is supported at a point $\phi=80$. And the stiffening rings are placed inside the inner vessel. The material for the inner vessel is 304 stainless steel. Assume suitable data if necessary. 07
- (b) Which method is used for theoretical plate calculation? Explain in detail 07
- Q.2 (a) Write note on : 07
(1) Cryogenic vales (2) Collins expanders
- (b) Determine the ideal work required to separate reversibly and isothermally 3 kg mixture of 92 % gaseous Hydrogen and 8 % gaseous Methane by volume at 300 K 07
- OR**
- (b) With neat sketch explain Argon separation system. 07
- Q.3 (a) Explain in brief "Different types of rectification columns". 07
(b) Describe the following typical butt weld preparations for 16 mm thick S.S.316L material with neat sketches : 07
(i) Single 'V' (ii) Double 'V' (iii) Double 'U' (iv) Single 'U'
- OR**
- Q.3 (a) Differentiate clearly between perforated plate and bubble cap plate used in Rectification column. 07
(b) What is Cryostat? Explain Cryostat with their constructional features. 07
- Q.4 (a) Write different methods of reducing the boil-off rate in cryogenic piping. 07
(b) Explain with the help of line diagram Krypton and Xenon purification system. 07
- OR**
- Q.4 (a) Explain 'Linde multiple tube type heat exchanger' with neat sketch 07
(b) Write note on Helium separation system and its Purification. 07
- Q.5 (a) Enlist Air separation and Purification systems. Draw only neat sketch of any One system. 07
(b) Explain vapor shielded vessel with neat sketch 07
- OR**
- Q.5 (a) Describe with neat sketches the suspension systems for inner vessels of cryogenic fluid storage Dewars. 07
(b) Compare between Linde double column system and Linde-Frankl System of gas separations. 07