**Reg. No. \_\_\_\_\_\_\_\_**

**Karunya University**

**(Karunya Institute of Technology and Sciences)**

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec - 2016**

**Subject Title : CRYOGENIC PROPULSION Time : 3 hours**

**Subject Code: 12AE228 Maximum Marks: 100**

**Answer ALL questions**

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| **Qn. No.** | **Question**  **PART-A (10 x 1 = 10 Marks)** | **Mark** |
| 1. | \_\_\_\_\_\_\_is the temperature below which the cryogenic range begins. | 1 |
| 2. | Write the isotopes of oxygen. | 1 |
| 3. | Write the expression for coefficient of isentropic expansion. | 1 |
| 4. | What is figure of merit (FOM)? | 1 |
| 5. | Define accommodation coefficient? | 1 |
| 6. | Cryogenic vessels need insulation to minimize \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | 1 |
| 7. | What is advantage of vacuum-insulated lines? | 1 |
| 8. | What is cryostat? | 1 |
| 9. | Write any one advantage of magnetic refrigerator. | 1 |
| 10. | What is cryo-pumping? | 1 |
|  | **PART-A (5 x 3 = 15 Marks)** |  |
| 11. | Draw the T-S diagram of a cryogen. | 3 |
| 12. | Write the applications of superconductivity? | 3 |
| 13. | Write the advantage of expanded foam insulation | 3 |
| 14. | What is heat exchanger? | 3 |
| 15. | What is regenerative cryo-cooler? | 3 |
|  | **PART-C (5 x 15 = 75 Marks)** |  |
| 16. | Explain the phase change of Helium with neat sketches of T-S and P-T diagram. | 15 |
|  | **(OR)** |  |
| 17. | Explain joule Thomson effect? Show that Joule Thompson coefficient is zero for a perfect gas. | 15 |
| 18. | With the help of neat sketch and T-S diagram explain thermodynamically idealliquefaction system. | 15 |
|  |
|  | **(OR)** |  |
| 19. | Explain Claude system of Liquefaction with T-S diagram. | 15 |
| 20. | Briefly discuss the types of insulations used in cryogenic systems. | 15 |
|  | **(OR)** |  |
| 21. | Discuss the advantages and disadvantages of the insulations used in cryogenic storage systems. | 15 |
| 22. | Explain the construction and components of cryogenic storage vessel with neat sketch. | 15 |
|  | **(OR)** | |
| 23. | Explain in detail about any two methods of cryogenic-fluid transfer systems. | 15 |
| 24. | Explain the working principle of He3 – He4 dilution refrigerator with neat sketch. | 15 |
|  | **(OR)** |  |
| 25. | Explain various applications of cryogenics in detail. | 15 |