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

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**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **16AE2004** | **Duration :** | **3hrs** |
| **Sub. Name :** | **CRYOGENIC PROPULSION** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q.**  **No.** | **Sub**  **Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Briefly discuss about the response of mechanical properties in the material when it’s subjected to cryogenic temperature. | CO1 | 10 |
| b. | Explain the response of thermal properties in amaterial when it’s subjected to cryogenic temperature. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Draw the phase and T-S diagram for liquid helium and also briefly discuss about its properties and application. | CO1 | 10 |
| b. | Draw the phase and T-S diagram for liquid hydrogen and also briefly discuss about its properties and application. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Critically explain the following processes.  i) Joule-Thomson expansion ii) Adiabatic reversible turbine expansion | CO2 | 5+5 |
| b. | With neat sketch, explain the working principle of Simple Linde Hampson system. | CO2 | 10 |
| **(OR)** | | | | |
| 4. | a. | Illustrate in detail about the following systems.  i) Diffusion pumps ii) Ion pumps | CO2 | 10 +10 |
|  |  |  |  |  |
| 5. | a. | With neat sketch (T-s plot) explain the working principle of Gifford-McMahon refrigerator. | CO2 | 10 |
| b. | With neat sketch explain the working principle of Dilution refrigerator. | CO2 | 10 |
| **(OR)** | | | | |
| 6. | a. | With neat sketch explain the working principle of Solvay refrigerator. | CO2 | 10 |
|  | b. | With neat sketch explain the working principle Magnetic refrigeration system. | CO2 | 10 |
|  |  |  |  |  |
| 7. |  | Briefly discuss about the different types of cryogenic insulation system. | CO2 | 20 |
| **(OR)** | | | | |
| 8. | a. | Critically analyse about the following systems.  i) Cascade system ii) Kapitza system | CO2 | 10 +10 |
|  |  | **Compulsory:** |  |  |
| 9. |  | Briefly discuss about different cryogenic production techniques and its application in aerospace and non-aerospace industries. | CO3 | 20 |