Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

SECOND SEMESTER M.TECH (AEROSPACE ENGINEERING)

END SEMESTER EXAMINATIONS, JUNE 2017

SUBJECT: RENDEZVOUS AND DOCKING OF SPACECRAFT [ICE 5236]

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** questions.
- Missing data may be suitably assumed.

1A. List the main phases of an RVD/B mission. Write the objectives and end conditions to be attained for each phase. **4**

1B. What are the various complexities and constraints involved in rendezvous approach and mating process? **4**

1C. Write any four applications of Rendezvous and Docking/Berthing mission? **2**

2A. What are the design rules for trajectory safety? List the potential causes of deviations of the actual trajectory from the planned one. **4**

2B. For an initial position measurement error of 10m in z – direction, compute for the following cases: **3**

i. If the chaser is moving in a parallel orbit, what will be the position uncertainty in x-direction after one orbital revolution?
ii. If the chaser is moving with the same velocity as off target, what will be the position uncertainty in x – direction after one orbital revolution?

2C. *"For collision avoidance maneuver on the R – bar, a pure radial ΔV will not be sufficient when the chaser is very close to the target."* – Justify the statement. **3**

3A. Explain trajectory deviations (position measurement error and velocity measurement error) due to navigation errors in RVD/B mission. **4**

3B. How does the geometrical and equipment constraint act as a driver for approach strategy during docking? **3**

3C. Briefly explain the approach strategy for R-bar port approach. Sketch the trajectory. **3**

4A. Write about any two time flexible elements in phasing and approach? **4**

4B. Explain the functional principle of a scanning laser range finder. **4**

4C. List the drivers and constraints for the definition of the diameter of the approach and departure corridors. Sketch the control zones of ISS **2**

5A.	Describe various steps in the berthing process for a manned RVD mission.	**5**
5B.	With block diagram explain the functional principle of Relative GPS.	**3**
5C.	What are the sizing features of the pressurized mating system?	**2**

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