Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

SECOND SEMESTER M.TECH. (AEROSPACE ENGG.)

END SEMESTER EXAMINATIONS, APRIL - 2018

SUBJECT: SPACECRAFT ENGINEERING [ICE 5241]

Duration: 3 Hour Max. Marks:50

Instructions to Candidates:

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

1A	With block diagram explain the various subsystems associated with spacecraft. List the various mission types and the orbit types used for the respective missions.	5
1B	Write about the major disturbances acting on the human system (manned spacecraft mission) in space environment.	3
1C	What are the advantages and disadvantages of spin stabilized spacecraft?	2
2A	A two stage rocket has the following masses: first stage propellant mass 1,20,000 kg; first stage dry mass 9,000 kg; second stage propellant mass 3,000 kg; second stage dry mass 3,000 kg and payload mass, 3,000 kg. The specific impulses of the 1st stage and 2nd stage are 260sec and 320 sec respectively. Calculate the rockets total ΔV.	4
2B	With diagram briefly explain electric ion thruster. List the advantages of electric propulsion over chemical propulsion.	3
2C	Briefly explain different types of disturbance torques affecting the attitude of a spacecraft.	3
3A	List the steps involved in setting up an attitude control system for a spacecraft and with flow chart explain the design cycle for an ACS.	5
3B	Write about following types of reference sensors used for attitude measurement of spacecraft. (i) Sun Sensor (ii) Star Sensor	5
4A	Discuss about the properties that the material of a spacecraft structure should possess.	3
4B	With diagram, illustrate the operation of a fuel cell.	4

4C	Explain the operation of following components in a power management, distribution and control unit: (i) Array regulator (ii) Battery management unit (iii) Power control and distribution unit	3
5A	Write about the various one-shot devices that are used in spacecraft mechanisms	3
5B	What are the various types of data that are being transferred using telemetry	4
5C	Explain the operation of a transponder system used in communication payload	3

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