

CBCS SCHEME

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18AS732

Seventh Semester B.E. Degree Examination, July/August 2022 Space Vehicle Design

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain in detail about the various classification of launch vehicles. (10 Marks)
b. Explain in detail about the launch vehicle capabilities. (10 Marks)

OR

- 2 a. Explain the process of deciding which launch vehicle to use. (10 Marks)
b. Describe the functions of the launch vehicle structure along with its subsystems. (10 Marks)

Module-2

- 3 a. Describe with neat sketch about the nozzle expansion theory. (10 Marks)
b. Explain in detail about the various non-conventional nozzle. (10 Marks)

OR

- 4 a. Explain in detail about the aero assisted orbit transfer. (10 Marks)
b. Derive the equation for planar flight of launch vehicle. (10 Marks)

Module-3

- 5 a. Explain in detail about the major loads acting on a launch vehicle structures at various launch scenario. (10 Marks)
b. Describe in detail about the loads acting on the heat shield. (10 Marks)

OR

- 6 a. Explain about the Finite Element Analysis done in the launch vehicle structure. (10 Marks)
b. Write a short note on functions and load acting on :
i) Base shroud
ii) Motor case. (10 Marks)

Module-4

- 7 a. Writing short note on the following :
i) Force and free vibration
ii) Natural frequency and amplitude
iii) Damped and undamped vibrations. (12 Marks)
b. Find natural frequency of given system, take $m = 5\text{kg}$, $k_1 = k_2 = 1500\text{N/m}$, $k_3 = 2000\text{N/m}$.

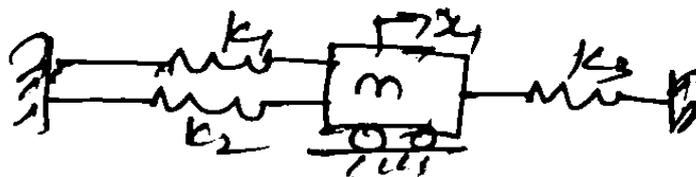


Fig.Q7(b)
1 of 2

(08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8=50, will be treated as malpractice.

OR

- 8 a. Find the natural frequency and mode shape of the given system. Refer Fig.Q8(a).

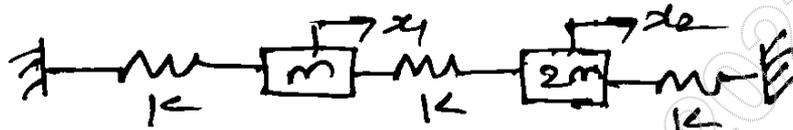


Fig.Q8(a)

- b. Write short note on pogo orbital vibration.

(16 Marks)

(04 Marks)

Module-5

- 9 a. Write a short note on :
i) Inflatable structure
ii) Nanotubing.

(10 Marks)

- b. Explain about the material selection analysis with examples.

(10 Marks)

OR

- 10 a. Explain about the reaction wheels with examples.

(10 Marks)

- b. Explain how the load and deflection nodal analysis will be happen for a launch vehicle.

(10 Marks)
