

Code: 9A21802

1

B. Tech IV Year II Semester (R09) Regular Examinations, March/April 2013

AEROSPACE TRANSPORTATION SYSTEMS

(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 What are the principal models of transportation? What are the elements of air transportation system? Discuss them briefly.
- 2 Describe with a diagram the principal components of an aircraft and their functions.
- 3 Describe the pressure distribution over an airfoil with a diagram. Discuss using sketches how the lift distribution changes with the angle of attack.
- 4 (a) Discuss aircraft force system needed for formulating the performance equations of motion.
(b) Explain minimum drag speed and minimum power speed and their importance in aircraft performance analysis.
- 5 What are controlled and uncontrolled airspaces? Enumerate the differences between them.
- 6 What are the regulatory bodies that coordinate and control civil aviation activities in India? Explain them briefly.
- 7 Draw a sketch of a typical launch vehicle and indicate its parts. Explain briefly different types of propulsion systems used in launch vehicles.
- 8 Discuss typical avionic sub-systems used in civilian aircraft.

Code: 9A21802

2

B. Tech IV Year II Semester (R09) Regular Examinations, March/April 2013

AEROSPACE TRANSPORTATION SYSTEMS

(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 What are the reasons for rapid growth of aviation activities in India in recent times?
- 2 What are the defining geometric characteristics of airfoils? Explain them with a diagram. Discuss the criteria for the selection of an airfoil.
- 3 Discuss the aerodynamic characteristics of swept wing configurations at subsonic speeds.
- 4 Explain the process of aircraft take-off with the help of a diagram and discuss how take-off distances are estimated.
- 5 Describe with the help of a diagram the mission profile of a civil transport aircraft. Discuss the different navigational aids used in airfield of an airport.
- 6 Discuss various security-sensitive areas found at airports.
- 7 Derive rocket equation for the burnout velocity of a single stage vehicle neglecting losses due to gravity and aerodynamic drag. Discuss the purpose of coasting and gravity turn in the trajectory design of a launch vehicle.
- 8 Explain the three types of inertial navigation system (INS) local inertial platform, strap-down and space stabilized platform used in aerospace vehicles.

Code: 9A21802

3

B. Tech IV Year II Semester (R09) Regular Examinations, March/April 2013

AEROSPACE TRANSPORTATION SYSTEMS

(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Discuss the applications of satellites in low earth orbits, polar orbits and geostationary orbits with examples.
- 2 How do high-lift devices function to increase the maximum lift coefficient? Describe the differences in the effects on wing lift from trailing edge flap deflection and from leading edge devices.
- 3 Why is structural weight more critical in aircraft structures? Why is buckling such an important failure mode in aircraft structures?
- 4 Define the terms static stability and dynamic stability. Discuss the criteria for longitudinal static stability.
- 5 Describe the passenger facilitation systems at airports and discuss their principal features.
- 6 State Kepler's laws. Derive expressions for velocity and time period for circular satellite orbits.
- 7 Explain the need of avionics in civil and military aircrafts. Define fly by wire (FBW) control system and explain its advantages.
- 8 Discuss briefly the responsibilities of the international regulatory bodies ICAO and IATA.

Code: 9A21802

4

B. Tech IV Year II Semester (R09) Regular Examinations, March/April 2013

AEROSPACE TRANSPORTATION SYSTEMS

(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Explain how air transportation industry contributes to the economy of a country.
- 2 (a) Explain with the help of diagrams the lift characteristic of a plain, cambered airfoil and how they can be modified by leading edge and trailing edge flaps.
(b) Explain minimum drag speed and minimum power speed and their importance in aircraft performance analysis.
- 3 Why climb performance is one of the critical areas in both the design and operation of an aircraft? Derive expressions for climb gradient and climb rate for aircraft with thrust producing engines.
- 4 Discuss the criteria for static lateral stability of an aircraft.
- 5 What are the procedures that exist as part of passenger screening? What technologies are used to perform the screening of checked luggage at airports?
- 6 What is a navigation system? Explain the different navigation systems used in aerospace vehicles.
- 7 Explain Hohmann transfer for coplanar orbits. Define geostationary orbit and explain the steps involved in placing a satellite in geostationary orbit.
- 8 Explain briefly the main functions of Director General of Civil Aviation (DGCA) and Airports Authority of India.
