

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF AERONAUTICAL ENGINEERING

III B.TECH I SEMESTER

R18 REGULAR

PREVIOUS QUESTION PAPERS

LIST OF SUBJECTS

<i>CODE</i>	<i>NAME OF THE SUBJECT</i>
R18A2106	Aircraft Materials& Composites
R18A2112	Aircraft Stability and Control
R18A2111	Aircraft Vehicle Structures
R18A0553	Data Structures Using Python
R18A2113	High Speed Aerodynamics
R18A0552	Introduction to Java Programming
R18A2131	Introduction to Space Technology
R18A0061	Managerial Economics Financial Analysis

RA

Code No: R18A2106

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Regular Examinations, February 2021

Aircraft Materials & Composites

(AE)

Roll No									
----------------	--	--	--	--	--	--	--	--	--

Time: 2 hours 30 min

Max. Marks: 70

Answer Any **Five** Questions
All Questions carries equal marks.

- 1 Give a comparative study on ceramic matrix composites & Metal matrix composites [14M]
- 2 Discuss in detail about the hardening of steels? [14M]
- 3 Detail about any five corrosion types in metals and give its preventive measures. [14M]
- 4 Discuss in detail about the heat treatment temperature, holding time and tempering [14M]
for a 0.2% carbon steel, 0.8% carbon steel and 1.25% carbon steel.
- 5 Classify the composites based on reinforcements and explain about particulate [14M]
reinforced composites
- 6 Present your understanding on the following and give suitable applications [14M]
 - i. Metal Matrix Composites
 - ii. Ceramic matrix composites
- 7 Why strength to weight ratio of materials is on high priority for aerospace vehicle [14M]
structures in contrast with automobiles and list the factors affecting the material
selection for different parts of an airplane.
- 8 Give the applications of following composites in Aerospace Field. [14M]
 - i. Indigenous materials (Ti6AL4v, Si-Al-Cu)
 - ii. Super Alloys (Ni & Mg Alloys)

Code No: R18A2111

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Regular Examinations, February 2021

Aircraft Vehicle Structures

(AE)

Roll No									
----------------	--	--	--	--	--	--	--	--	--

Time: 2 hours 30 min

Max. Marks: 70

Answer Any **Five** Questions
All Questions carries equal marks.

1. A plate 10mm thick is subjected to bending moments M_x equal to 10 Nm/mm and M_y equal to 5 Nm/mm. Find the maximum twisting moment per unit length in the plate and the direction of the planes on which this occurs. [14M]
2. A thin square plate of side a and thickness t is simply supported along each edge, and has a slight initial curvature giving an initial deflected shape. [14M]

$$w_0 = \delta \sin \frac{\pi x}{a} \sin \frac{\pi y}{a}$$

If the plate is subjected to a uniform compressive stress σ in the x -direction (figure 1), find an expression for the elastic deflection w normal to the plate.

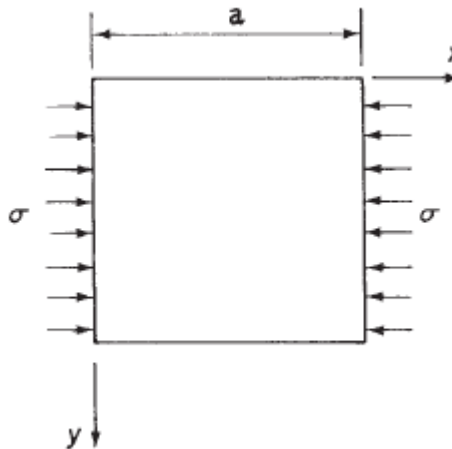


Figure 1

3. Part of a wing section is in the form of the two-cell box shown in figure 2 in which the vertical spars are connected to the wing skin through angle sections all having a cross-sectional area of 300mm². Idealize the section into an arrangement of direct stress carrying booms and shear stress only carrying panels suitable for resisting bending moments in a vertical plane. Position the booms at the spar/skin junctions. [14M]

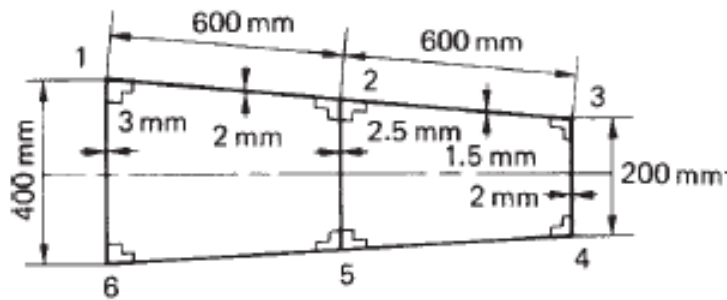


Figure 2

4. A thin-walled beam has the cross-section shown in Figure 3. Determine the direct stress distribution produced by a hogging bending moment M_x . [14M]

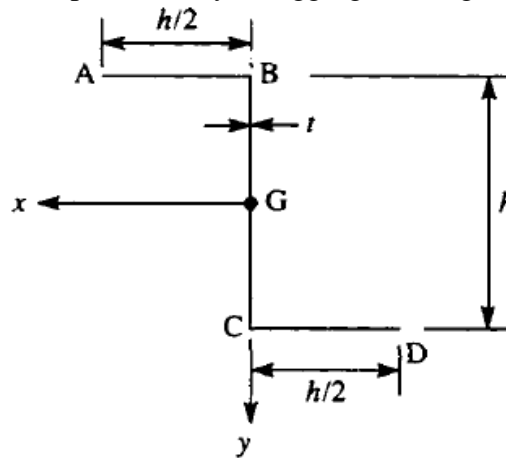


Figure 3

5. Find the tip deflection of propped cantilever beam as shown in Figure 4 using Castiglino's theorem and Rayleigh Ritz method. [14M]



Figure 4

6. Explain and derive Rayleigh Ritz method and function to find out the slope and deflection of beam using energy principles. [14M]
7. Derive the expression of the torsion bending constant for an open section beam fully built-in at one end. [14M]
8. The wing section shown in figure 5 has been idealized such that the booms carry all the direct stresses. If the wing section is subjected to a bending moment of 300 kNm applied in a vertical plane, calculate the direct stresses in the booms. [14M]

Boom areas: $B_1 = B_6 = 2580 \text{ mm}^2$ $B_2 = B_5 = 3880 \text{ mm}^2$ $B_3 = B_4 = 3230 \text{ mm}^2$

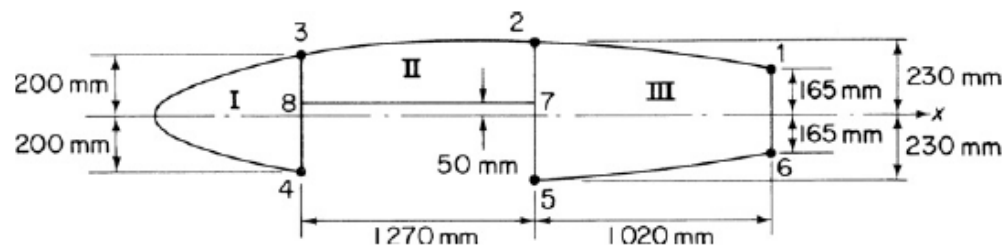


Figure 5

Code No: **R18A2113****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****III B.Tech I Semester Regular Examinations, February 2021****High Speed Aerodynamics****(AE)**

Roll No									
----------------	--	--	--	--	--	--	--	--	--

Time: 2 hours 30 min**Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.

- 1 What is a compressible flow? What is so special about it? Derive the energy equation for an inviscid compressible flow in differential form. **[14M]**
- 2 Derive an expression for speed of sound in a gas medium? What is its value in air medium at sea level conditions? **[14M]**
- 3 What is an oblique shock? Explain how the concept of normal shock relations can be used in deriving the oblique shock relations? **[14M]**
- 4 An oblique shock wave is formed when a supersonic flow with a supersonic flow with a Mach number of 2.0 is deflected inward by a concave corner having a deviation angle of 15° . Find out the Mach number downstream of the shock, if the wave is a i) strong wave and ii) weak wave. **[14M]**
- 5 What do you mean by linearization of the flow? Derive the linearized pressure coefficient for a subsonic flow? **[14M]**
- 6 a) At a given point on the surface of an aerofoil, the pressure coefficient is -0.3 at very low speeds. If the free stream Mach number is 0.6, calculate C_p at this point. **[4M]**
b) Define Critical Mach number and drag divergence number.
c) What are the advantages of supercritical aerofoils? **[6M]**
- 7 What is a hypersonic flow? Explain the Newtonian flow model for deriving the governing equations? **[14M]**
- 8 Explain how does a shock wave develop in the diverging section of a supersonic **[14M]**

nozzle? When does this wave move towards the exit?

Code No: R18A0552

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech I Semester Regular Examinations, February 2021
Introduction to Java Programming
(EEE, ME, ECE & AE)

Roll No										
---------	--	--	--	--	--	--	--	--	--	--

Time: 2 hours 30 min

Max. Marks: 70

Answer Any **Five** Questions
All Questions carries equal marks.

- | | | |
|---|---|---------------|
| 1 | a) Discuss the features of Object oriented programming details
b) Write a Java program to demonstrate Polymorphism | [9M]
[5M] |
| 2 | a) Explain about method overloading and constructors? Explain with syntax and example program
b) Explain about method overriding | [9M]
[5M] |
| 3 | What is inheritance? List different types of Inheritance? Explain about any three types of inheritance with example program | [14M] |
| 4 | a) Explain about abstract classes and methods with example program.
b) What is package and how to create a package | [7M]
[7M] |
| 5 | a) Explain about user-defined exception handling with a Java program.
b) Write a program to demonstrate finally | [10M]
[4M] |
| 6 | a)What is a thread and Explain about thread life cycle?
b)Write a program to demonstrate thread | [7M]
[7M] |
| 7 | a) Explain about Applet and life cycle of an applet
b) Compare the differences between applets and applications | [10M]
[4M] |
| 8 | a) Explain various layout managers. Explain about grid and flow layout with program
b) Explain about Swings | [10M]
[4M] |

Code No: **R18A2131****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****III B.Tech I Semester Regular Examinations, February 2021****Introduction to Space Technology****(AE)**

Roll No									
----------------	--	--	--	--	--	--	--	--	--

Time: 2 hours 30 min**Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.

- 1 Consider a multi-stage satellite launch vehicle for placing a satellite in an earth orbit. Illustrate the design considerations and operational sequences with the help of neat sketches **[14M]**
- 2 Derive and explain about the Two- Dimensional trajectories of the Rockets? **[14M]**
- 3 Describe the Re-entry co-ordinate system and explain about its stages with neat sketches? **[14M]**
- 4 Explain in detail with equations about the Lifting Body Reentry dynamics? **[14M]**
- 5 (a) Briefly explain the characteristics of an Elliptical orbit. **[7+7M]**
(b) Determine the characteristics of an earth satellite with a perigee altitude of 5500 km and an apogee altitude of 20000 km.
- 6 Explain how Hohmann trajectory is useful for interplanetary missions with less propellant consumption. **[14M]**
- 7 Explain briefly about the attitude control for spinning space craft. **[14M]**
- 8 What is the significance of space mission? How long does it take to prepare for a space mission? **[14M]**

*********Code No: **R18A0061**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech I Semester Regular Examinations, February 2021
Managerial Economics Financial Analysis
(ME&AE)

Roll No									
----------------	--	--	--	--	--	--	--	--	--

Time: 2 hours 30 min**Max. Marks: 70**

Answer Any **Five** Questions
 All Questions carries equal marks.

- 1 (a) Define Managerial Economics. Explain its Nature. **[7M+7M]**
 (b) Discuss the importance of Managerial Economics in decision making.

- 2 State the 'Law of Demand', its exceptions. What are the various factors that determine the demand for a Mobile Phone? **[14M]**

- 3 A company reported the following results for two periods. **[14M]**

Period	Sales	Profit
I	Rs.20,00,000	Rs.2,00,000
II	Rs.25,00,000	Rs.3,00,000

- 4 Ascertain the BEP, P/V Ratio, Fixed cost and Margin of Safety **[10M+4M]**
 (a) Explain Iso costs & Iso quant
 (b) Explain Cobb-Douglas Production Function

- 5 (a) How is market price determined under conditions of Perfect Market Competition? **[7M+7M]**
 (b) Explain in detail, the important features of perfect competition

- 6 a) What are the causes for the emergence of Monopoly? **[7M+7M]**
 b) How is the equilibrium position attained by a monopolist under varying cost Conditions?

- 7** Explain the purpose of preparing the following accounts/statements and also elaborate the various items that appear in each of them. **[7M+7M]**
- a) Trading Account
 - b) Profit & Loss Account
- 8** Determine the Pay Back Period, NPV@ 10% for the information given below **[7M+7M]**
- a) The project cost is Rs. 20,000
 - b) The life of the project is 5 years
 - c) The cash flows for the 5 years are Rs.10,000, Rs.12,000; Rs.13,000; Rs.11,000; and Rs. 10,000 respectively and
