MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF AERONAUTICAL ENGINEERING

III B.TECH I SEMESTER

R18 SUPPLEMENTARY PREVIOUS QUESTION PAPERS

LIST OF SUBJECTS

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| CODE | NAME OF THE SUBJECT |
|----------|--|
| R18A2112 | Aircraft Stability and Control |
| R18A2111 | Aircraft Vehicle Structures |
| R18A0553 | Data Structures using Python |
| R18A2113 | Hypersonic Aerodynamics |
| R18A0552 | Introduction to Java Programming |
| R18A2131 | Introduction to Space Technology |
| R18A0061 | Managerial Economics and Financial Analysis |

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(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Supplementary Examinations, June 2022

Aircraft Stability and Control

 (ΔF)

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| Roll No | | | | | | |
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

| 1 | Explain the wing contribution towards static longitudinal stability. | [14M] |
|---|--|-------|
| 2 | Derive an expression for stick fixed neutral point of an airplane. | [14M] |
| 3 | How Earth Axis to Body Axis transformation takes place? Show Euler's angles and explain. | [14M] |
| 4 | Explain about small perturbation approach. How it is useful in linearization of EOM? | [14M] |

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| 5 Explain the phenomenon of Dutch roll, using all the aerodynamic coefficients [14] and aircraft parameters influencing the motion. 6 Discuss qualitatively, various ways of improving the lateral and directional stability of [14] an aircraft. 7 i. Explain closed loop control systems with three examples. [7] ii. What are the Basic components of control system? [7] | 8 | Explain t | the concept of Autopilot in detail. | [14M] |
|--|---|-------------------------|--|-------|
| 5 Explain the phenomenon of Dutch roll, using all the aerodynamic coefficients [14] and aircraft parameters influencing the motion. 6 Discuss qualitatively, various ways of improving the lateral and directional stability of an aircraft. 7 i. Explain closed loop control systems with three examples. [7] | | ii. | What are the Basic components of control system? | [7M] |
| 5 Explain the phenomenon of Dutch roll, using all the aerodynamic coefficients [14] and aircraft parameters influencing the motion. 6 Discuss qualitatively, various ways of improving the lateral and directional stability of [14] an aircraft. | 7 | i. | Explain closed loop control systems with three examples. | [7M] |
| 5 Explain the phenomenon of Dutch roll, using all the aerodynamic coefficients [14] and aircraft parameters influencing the motion. | 6 | Discuss q an aircrat | ualitatively, various ways of improving the lateral and directional stability of ft. | [14M] |
| | 5 | Explain and aircr | the phenomenon of Dutch roll, using all the aerodynamic coefficients raft parameters influencing the motion. | [14M] |

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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III B.Tech I Semester Supplementary Examinations, June 2022

Aircraft Vehicle Structures

(AE)



Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

1The thin-walled Z-section shown in fig due to shear load Sy = 2000N applied[14M]through the shear Centre of the section. Also draw the shear flow distribution.



(Where h = 16cm, t = 4cm)

2 A thin rectangular plate a x b is simply supported along edges and carries [14M] uniformly distributed load of intensity q₀. Determine the deflected form of the plate and distribution of bending moment.

- 5 Find the Deflection in a Statistically Indeterminate Beam by Using Castigliano's Second [14M] Theorem
- 6 Using Castigilano's theorem obtain the deflection under a single concentrated [14M] load applied to a simply supported beam as shown in figure $EI = 2.2 \text{ MNm}^2$



a) What are the methods to find the shear flow distribution of idealized section? [7M]
 b) Explain the effect of idealization on the analysis of closed section beams with example

[7M]

[14M]

8 Explain the stress analysis in wings and fuselage

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(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Supplementary Examinations, June 2022

Data Structures Using Python

(AE)

| Roll No | | | | | |
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

- **1.a** List and explain different arithmetic operators supported by Python. Discuss the **[10M]** precedence and associativity of arithmetic operators.
- b Write the rules for choosing names of variables? [4M]
- **2.a**What is Interpreter? Explain how python Interpreter works.[7M]
- **b** Explain the steps need to be followed to install python on windows OS? [7M]
- **3.a** Explain the need for continue and break statements. Write a program to check **[7M]** whether a number is prime or not. Prompt the user for input.
 - **b** How to access, add and remove array elements using python? Explain with an **[7M]** example.

| 4.a | Write a Python program to find those numbers which are divisible by 7 and multiple of 5, between 1000 and 2000. | [7M] |
|-----------------------------|--|------------------------------|
| b | When To Use a Nested Loop in Python? Write a program for printing a multiplication table of the first ten numbers using nested loop and range () functions . | [7M] |
| 5.a | What is lambda function? What are the characteristics of a lambda function? Give an example. | [7M] |
| b | Write a recursive Python function that recursively computes sum of elements in a list of lists. | [7M] |
| | | |
| | | |
| 6.a | Explain about different types of arguments in Python. | [7M] |
| 6.a b | Explain about different types of arguments in Python. What are fruitful functions? illustrate with an example? | [7M] [7M] |
| 6.a b 7.a | Explain about different types of arguments in Python. What are fruitful functions? illustrate with an example? What is a tuple? What are the characteristics of tuple. | [7M] [7M] [7M] |
| 6.a b 7.a b | Explain about different types of arguments in Python. What are fruitful functions? illustrate with an example? What is a tuple? What are the characteristics of tuple. Write a python program to Check if all items in the tuple are the same. | [7M] [7M] [7M] [7M] |
| 6.a b 7.a b | Explain about different types of arguments in Python. What are fruitful functions? illustrate with an example? What is a tuple? What are the characteristics of tuple. Write a python program to Check if all items in the tuple are the same. | [7M] [7M] [7M] [7M] |
| 6.a b 7.a b 8.a | Explain about different types of arguments in Python. What are fruitful functions? illustrate with an example? What is a tuple? What are the characteristics of tuple. Write a python program to Check if all items in the tuple are the same. Write a Python program to search a specific item in a singly linked list and return true if the item is found otherwise return false. | [7M] [7M] [7M] [7M] |

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III B.Tech I Semester Supplementary Examinations, June 2022

High Speed Aerodynamics

(AE)

| Roll No | | | | | |
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Time: 3 hours

detached shock.

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

- 1 Show the effect of Mach number on compressibility. Find the highest possible [14M] velocity which could result from the expansion of air at a standard temperature of 15°C.
- 2 Prove that the Mach number across the normal shock is subsonic [14M]
- **3** Establish from the propagation of plane pressure propagation that $Sin \ \mu = \frac{1}{M}$, where μ is Mach angle and M is Mach number.
- 4 Show from θ - β -M relations that for even a wedge shape, there can be formation of a
- a)Explain the Von Karman's Rule of supersonic flow.

b) Free stream conditions ahead of a shock wave are $T_1 = 313K$, $P_1 = 0.9$ atm. The

[14M]

[4M]

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downstream conditions are T_2 = 720 K, P_2 = 8.75 atm. Calculate change in entropy, internal energy and entropy across the shock.

Write short notes on 6

8

- i. Critical Mach number [4M] ii. Drag divergence Mach number [5M]
- Super critical aero foil iii.

[10M]

- [5M]
- A supersonic stream of air at M=2, at $P_1 = 19400Pa T_1 = 217k$, passes through an [14M] 7 oblique shock wave making angle β = 53° with free stream. Find the stream properties downstream of the weak shock wave, attached to the semi wedge angle θ . Determine the semi wedge angle θ as well. Is it that the downstream Mach number M₂ > 1, always? If so, why?
 - Develop and explain the relation $\frac{dA}{A} = (M^2 1)\frac{dv}{v}$. Also describe flow through a [14M] convergent-divergent diffuser, making use of oblique shock

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Supplementary Examinations, June 2022

Introduction to Java Programming

(EEE, ME, ECE & AE)

| Roll No | | | | | |
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

- 1 What are the naming conventions for Java identifiers? Discuss the importance of **[14M]** Inheritance in java.
- 2 What is Type Casting. Explain the Overloading methods and constructors in java [14M]
- 3 How java supports multiple inheritance? Explain the concept of overriding [14M] binding.
- 4 Illustrate the usage of 'this' keyword. Write a Java interface to check whether a given **[14M]** number is palindrome or not?

| 5 | What happens when there is no suitable try block to handle exception? List some unchecked Exceptions | [14M] |
|---|--|-------|
| 6 | List the Exceptions related to File I/O and Describe the Thread Life cycle. | [14M] |
| 7 | Distinguish between applets and applications and write a java program using applet | [14M] |
| 8 | What are the limitations of AWT and discuss the important features of Swings. | [14M] |
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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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III B.Tech I Semester Supplementary Examinations, June 2022

Introduction to Space Technology

(AE)

| Roll No | | | | | |
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

1 Explain detailed note on radiation effects to both manned and unmanned [14M] spacecraft and write short note on the following: Launch vehicles and Satellite and Interplanetary probes.

| [7M] [7M] |
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| |

- 4 Discuss about ballistic orbital re-entry skip re-entry with a neat diagram [14M]
- A three stage rocket has been designed with the following characteristics, to deliver [14M] small pay loads to low Earth orbit: Specific Impulse of 1 st stage (I sp) =300s, Specific Impulse of 2 nd stage (I sp) =350s Specific Impulse of 3 rd stage (I sp) =400s, Mass of

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the payload=1500 kg Structural mass of the 1 st stage =10,000 kg, Structural mass of the 2 nd stage and 3 rd stage= 7,500 kg each, Mass of the propellant for 1 st stage =50,000kg, Mass of the propellant for

2 nd stage =40,000 kg, Mass of the propellant for 3 rd stage =35,000 kg

Estimate:

- i. Initial mass of the entire vehicle
- ii. Final mass of the 1st stage,
- iii. Final mass of the 2nd stage,
- iv. Final mass of the 3nd stage
- v. Velocity change (DELTA V) for the 1st stage,
- vi. Velocity change (DELTA V) for the 2nd stage,
- Velocity change (DELTA V) for the 3rd stage,
- vii. Initial mass of the 2^{nd} stage,
- viii. Initial mass of the 3rd stage
- ix. Total velocity change(DELTA V) of the rocket
- 6 What are the origin, principal directions and fundamental plane for the geocentric [14M] equatorial coordinate system?
- 7 A satellite is launched into Earth's orbit when its launch vehicle burns out at an altitude of 250 km. At this instant, the satellite's velocity is 7,900 m/s with ø (fight path angle, the angle between the local horizontal and the velocity vector) equal to two degrees.
 - (a) Calculate the satellite's altitude at perigee and at apogee.
 - (b) Calculate the eccentricity of the orbit for the satellite in the above problem

[7M]

[7M]

8 Differentiate between mission phase and core operations of Space flight. Show its [14M] block diagram.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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III B.Tech I Semester Supplementary Examinations, June 2022

Managerial Economics Financial Analysis

(ME&AE)

| Roll No | | | | | |
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Time: 3 hours

Max. Marks: 70

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Answer Any Five Questions

All Questions carries equal marks.

1 Explain the concept of Cross Elasticity of Demand. Illustrate your answer with [14M] Examples.
2 What are the possible approaches to forecasting demand for new products? [14M] Illustrate all the methods of Demand Forecasting.
3 a. Discuss the role and importance of cost analysis in managerial decisions b. Sales are Rs. 1, 10,000 Yielding a profit of Rs. 4,000. in period-I; Sales are Rs. 1, 50,000 with a profit of Rs. 12,000 [7M]

in period-II. Determine $\ensuremath{\mathsf{BEP}}$ and $\ensuremath{\mathsf{Fixed}}$ Cost.

| 4 | Define 'Cost' Describe different cost concepts useful for organizations. | [14M] |
|---|---|--------------|
| 5 | What are the salient features Partnership firm, Explain Different kinds of partners and their advantages? | [14M] |
| 6 | Illustrate the different types of competition Markets with suitable examples. | [14M] |
| 7 | Explain the purpose of preparing the following accounts/statements and also elaborate the various items that appear in each of them. a) Trading Account b) Profit & Loss Account | [7M] [7M] |
| 8 | How are ratios classified for the purpose of financial analysis? With assumed data, illustrate any two types of ratios under each category | [14M] |