MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF AERONAUTICAL ENGINEERING

IV B.TECH I SEMESTER

R18 SUPPLEMENTARY PREVIOUS QUESTION PAPERS

LIST OF SUBJECTS

CODE	NAME OF THE SUBJECT
R18A2117	Mechanical Vibrations
R18A2119	Avionics
R18A2137	CAD/CAM
R18A2116	Computational Aerodynamics
R18A2118	Flight Vehicle Design

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, June 2022

Mechanical vibrations

(ANE)



Time: 3 hours

3

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

1 Find the natural frequency of the system shown in the following figure. **[14M]**

2 Explain in detail the effect of decrease in mass on the frequency of a system.

In a spring-mass damper system the amplitude decays to half the original value in 4 oscillations and it takes 0.2 seconds to complete these oscillations. If the mass is set in to free vibrations with an initial displacement of 5 mm and initial velocity of 0.5 m/sec, determine (i) the subsequent motion (ii) maximum amplitude of the mass (iii) time elapsed while the amplitude decays to less than or equal to 0.5 mm [14M]

R18

The mass of a simple spring mass system has a value of 10 kg and immersed in a viscous fluid. A steel bar attached to it, is of 10 cm width,2 cm thick and 75cm long. When the mass is executing free damped vibration, the amplitudes of oscillations on the same side for three successive cycles are 8 mm 6 mm and 4.5 mm. Determine *(i)* Logarithmic decrement, *(ii)* Damping co-efficient of the fluid and *(iii)* The ratio between the damped and undamped natural frequencies, E = 210 GPa.

5 Develop the response spectrum of an undamped system subject to the rectangular pulse as shown in Figure.

4

7

8



6 Use the convolution integral to develop the response of an undamped 1-degree-offreedom system of mass *m* and natural frequency ω_n subject to an excitation of the form F(t) = F_o sin ω_n t. The system is at rest in equilibrium at *t* = 0.

The coupling of three identical railroad cars of mass m is shown in Figure. The stiffness in the coupling between each car is k.



Describe the time history of motion of the three cars after coupling.

[14M]

A bar of uniform cross-section having length l, is fixed at both ends. The bar is subjected to longitudinal vibrations having a constant velocity V_o at all points. Derive suitable mathematical expression of longitudinal vibration in the bar.

[14M]

[14M]

[14M]

[14M]

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, June 2022

Avionics

(ANE)

Roll No					

Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

- Explain in brief about the development of avionics architecture. Also Explain the need [14M] of avionics in civil and military aircrafts.
- 2 Explain the interference of seven segments LED with the microprocessor to display a [14M] binary data.

3 Describe about voice recognition & speech synthesis technology. [14M]

- 4 Draw the functional representation of ROM memory cell and explain the concept [14M] underlying the ROM.
- **5** What is GPS? Explain about the working of it with codes of communication used for locating **[14M]** the object.

6	Mention the types of inertial navigation system and explain any one type with neat sketch.	[14M]
7	Explain about the theory and principle of collision avoidance system.	[14M]
8	What is FBW? Explain its salient features with the block diagram in comparison with the conventional flight control system.	[14M]

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, June 2022

CAD/CAM

(ANE)

Roll No					

Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

1	а	Explain in detail design process involved in the product cycle?	[7M]
	b	Explain the 3D transformations and clipping.	[7M]
2	а	Explain the working principle of various CAD display devices?	[7M]
	b	What are the differences between calligraphic and raster refresh display devices? Explain the principle of raster display?	[7M]
3	Sta	te and explain the CSG and B-Rep representation of solid models with an example?	[14M]
4	а	Explain any three common characteristics of Bezier curve and B-spline curve?	[7M]

5 Prepare part program for milling operation for the Figure by using I, J, K parameters. [14M]
Compensate the following: 10 mm positive tool (T03) length compensation and cutter radius 5 mm



6 Prepare a part program for simple step turning operation as per the specifications of [14M] BILLET Size (Length: 60 mm and Ø20) as shown in below figure. Consider the following machining data: Tool position (03) and offset combinations (25), feed rate 10 mm/rev, spindle rotational speed is 2500 Rpm. Assume data if needed.



7	а	Explain the parts classification and coding systems in Group Technology	[7M]
	b	Discuss the principle of variant process planning.	[7M]
8	а	Explain the role of human labor in the manufacturing systems.	[7M]
	b	What are the objectives of computer aided quality control?	[7M]

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, June 2022

Computational Aerodynamics

(ANE)

Roll No					

Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

1	Derive expression for Substantial derivative and state its significance with examples in Computational Fluid Dynamics.	[14M]
2	Briefly explain the general Procedure of Computational Fluid Dynamics.	[14M]
3	Derive the energy equation in differential conservation form.	[14M]
4	Explain the following briefly:	
	(a) shock fitting (b) shock canturing	[7M]
		[7M]
5	Using the Taylor's series approximation, derive the finite difference expressions for first order and second order differential terms of variable Φ .	[14M]
6	Explain in detail with an example the difference between explicit and implicit approaches in discretization.	[14M]

R18

7	Discuss difference between structured and unstructured grid. Write short note on the following types of grids with neat sketches:	[14M]
	a) Adaptive grids	
	(b) Stretched grids	
	(c) Overset grids	
8	Describe how MacCormack's method is used for discretization of the numerical	[14M]

solution of hyperbolic partial differential equations.

Set-1

Code No: R18A2118 MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

IV B.Tech I Semester Supplementary Examinations, June 2022

Flight Vehicle Design

(ANE)

Roll No					

Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

- 1 a Demonstrate the simple cruise mission profile. [7M]
 - b List out the factors involved in deciding the location of the wing with [7M] respect to the fuselage.
- It is observed that propeller aircraft is designed for a loiter of three hours at [14M] a distance of 8000 km. The crew weight is 300 Kg and the payload weight is 5000 Kg. The aircraft revises at a Mach 0.8 at an altitude of 7.5 Km where the speed of the sound can be considered as 320m/sec. The maximum value of L/D is 16. Calculate the total take-off weight. Take specific fuel consumption of 0.015 gm/n/sec and $W_e / W_o = 2.05 / (W_o -0.18)$ stop calculations after one or two iterations.
- 3 a Describe different methods for estimation of the size of aircraft parts. [7M]
 - b Recommend the best way of wing geometry selection and sizing process. [7M]
- 4aList out the different methods for estimation of the size of aircraft parts.[7M]bUtilize Haack volume distribution for a wing design.[7M]
- 5 a Prove that the design parameters of the airplane are affected by the payload [7M] requirements.
 - b Describe the air load distribution over an elliptic wing. What is the effect **[7M]** of changing the wing planform to swept back?

R18

6	а	Show how a designer can minimize the $\frac{D}{W}$ with respect to $\frac{W}{s}$ with	[7M]				
	b	relation $\frac{W}{s} = \frac{q C_{lmax}}{n}$ Identify the various landing gear arrangements for cargo aircraft.	[7M]				
7	a	Discuss aircraft operating envelope.	[7M]				
	b	Determine the final baseline design configuration of an aircraft.					
8	a	Illustrate the concept of delta and double delta wings with neat sketches.	[7M]				

b Compare and analyze the advantages of the double delta wing over the [7M] delta wing.
