

**MALLA REDDY COLLEGE OF ENGINEERING
AND TECHNOLOGY**

DEPARTMENT OF AERONAUTICAL ENGINEERING

II B.TECH I SEMESTER

***R18 SUPPLEMENTARY
PREVIOUS QUESTION PAPERS***

LIST OF SUBJECTS

| <i>CODE</i> | <i>NAME OF THE SUBJECT</i> |
|-------------|--|
| R18A2102 | Applied Mechanics |
| R18A2106 | Aerospace Materials and Composites |
| R18A2101 | Mechanics of Fluids |
| R18A2105 | Aircraft Production Technology |
| R18A2103 | Thermodynamics |
| R18A2104 | Introduction to Aeronautical Engineering |

Code No: R18A2102

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June 2022

Applied Mechanics

(AE)

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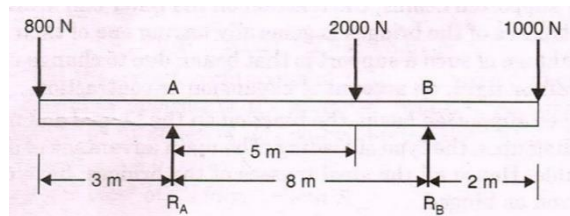
Time: 3 hours

Max. Marks: 70

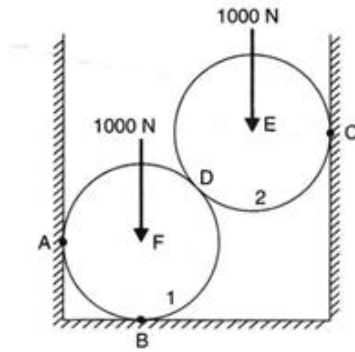
Answer Any **Five** Questions

All Questions carries equal marks.

- 1 A beam of AB of span 8 m overhanging on both sides, is loaded as shown in figure. [14M]
Calculate the reactions at both ends.

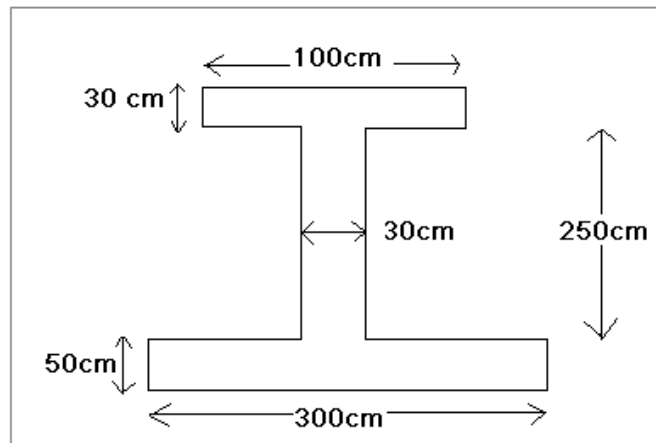


- 2 Two spheres, each weight 1000N and the radius 25cm rest in horizontal channel of [14M]
width 90 cm shown in figure below find the reaction on the points of contact A,B
and C.



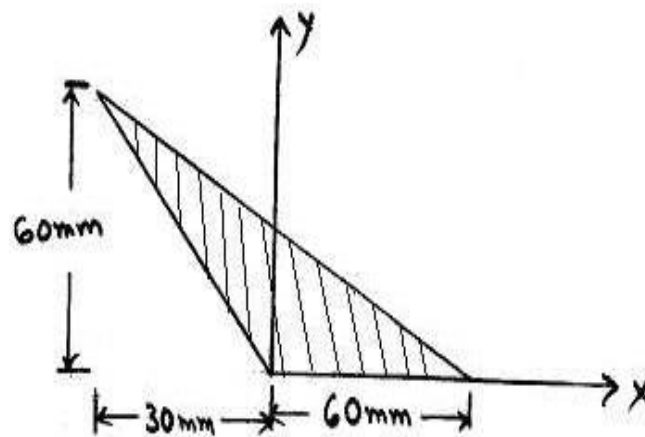
- 3 Find the centroid of the plain laminas given below

[14M]



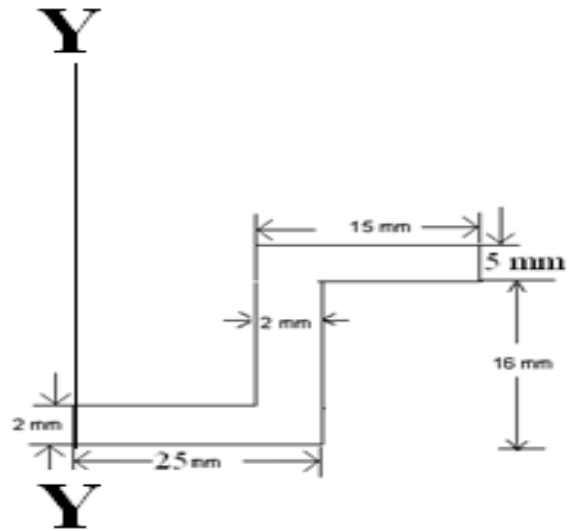
- 4 Find the centroid of the shaded region given below

[14M]



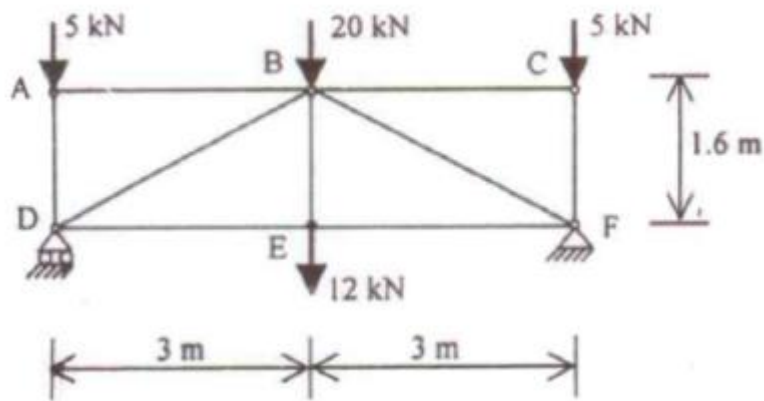
- 5 Find the area MOI for the given figures about Y-axis

[14M]



6 Determine the mass MOI for a cone of base radius R and height H [14M]

7 Using method of joints, determine the forces in the members of the trusses shown [14M]



8 What do you understand about columns? Explain about different applications in aircrafts. [14M]

Code No: R18A2106

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June 2022

Aerospace Materials and Composites

(AE)

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Time: 3 hours

Max. Marks: 70

Answer Any **Five** Questions

All Questions carries equal marks.

- 1 (i) Describe linear and non-linear elastic properties [8M]
(ii) Explain: Yielding, Strain hardening, and Fracture [6M]
- 2 Discuss the following:
(i) Bauschinger's effect, [7M]
(ii) Notch effect testing and flaw detection of materials and composites. [7M]
- 3 Explain the need for heat treatment. Discuss how the properties can be improved by heat treatment with examples. [14M]
- 4 (i) Explain the corrosion prevention and protective treatments [7M]
(ii) Discuss the properties and applications of maraging steels [7M]

- 5 Compare polymer matrix composites, metal matrix composites, ceramic matrix composites, and carbon-carbon composites [14M]
- 6 (i) Compare reinforced composites and nature-made composites [7M]
(ii) Discuss the aircraft structural components made of composite materials. [7M]
- 7 Describe in detail about the failure modes of sandwich panels with neat sketches. [14M]
- 8 Describe the non –destructive flaw detection techniques used in aerospace industry with neat sketches. [14M]

Code No: R18A2105

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June 2022

Aircraft Production Technology

(AE)

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Time: 3 hours

Max. Marks: 70

Answer Any **Five** Questions

All Questions carries equal marks.

- 1 Explain the steps involved in sand casting with the neat sketch and also write the advantages, disadvantages and applications. **[14M]**
- 2 Explain about the working principle of laser welding with neat sketch. **[14M]**
- 3
 - a. List out the operations of Milling and explain them with neat sketches. **[7M]**
 - b. Explain the working Principle of Milling machine **[7M]**
- 4 Explain about the super plastic forming and diffusion bonding. **[14M]**
- 5 Explain the working principle plasma arc machining and also write the applications. **[14M]**

6 Explain about the working principle EBM and also write the applications. **[14M]**

7 Explain about the protective treatment for Ti alloys **[14M]**

8 Differentiate between NDT & DT and also explain about the ultrasonic testing **[14M]**

Code No: R18A2103

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June 2022

Engineering Thermodynamics

(AE)

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Time: 3 hours

Max. Marks: 70

Answer Any **Five** Questions

All Questions carries equal marks.

SECTION-I

- 1 a) What is property? Distinguish between different types of Properties? What is thermodynamic equilibrium? **[7M]**

b) A 0.5 m^3 vessel is fitted with air at atmospheric pressure. The air is churned by a paddle wheel attached to a shaft 0.1 m in dia, rotating at a speed of 1800 rpm . A force of 5 N acts on the rim of the shaft. What would be the pressure in the vessel after 10 second of operation? **[7M]**

- 2 a) What is the zeroth law of thermodynamics. Consider a system whose temperature is 18°C . Express this temperature in R, K, and $^\circ\text{F}$ **[7M]**

b) The main water line into a tall building has a pressure of 600 kPa at 5 m below ground level. A pump brings the pressure up so the water can be delivered at 200 kPa at the top floor 150 m above ground level. Assume a flow rate of 10 kg/s liquid water at 10°C and neglect any difference in kinetic energy and internal energy u . **[7M]**

Find the pump work.

- | | | |
|----------|---|--------------|
| 3 | a) Deduce clausius inequality and interpret it. | [7M] |
| | b) Define irreversibility. Show that irreversibility of a process is given by the product of the temperature of surroundings and the net entropy change. | [7M] |
| 4 | a) Explain carnot cycle on T-S and P-V diagram. Give the reason, why carnot cycle is practically not possible? | [7M] |
| | b) An inventor claims to have developed a refrigerator that maintains the refrigerated space at -3°C while operating in a room where the temperature is 22°C and that has a coefficient of performance of 13.5. Is this claim reasonable? | [7M] |
| 5 | a) Write Clapeyron equation, what is its importance in thermodynamics. | [7M] |
| | b) What is a compressibility factor? What is the generalized compressibility chart in thermodynamics? | [7M] |
| 6 | Write short notes on: | [7M] |
| | a) Throttling process and | |
| | b) Throttling calorimeter | [7M] |
| 7 | Write a short Note for gaseous mixture | |
| | a) Mole Fraction | [5M] |
| | b) Volume Fraction | [5M] |
| | c) Mass Fraction | [4M] |
| 8 | a) Differentiate between Otto cycle and Diesel Cycle | [4M] |
| | b) Consider a air standard Otto cycle that a heat addition of 2800kJ/kg of air, a compression ratio 8 and a pressure and temperature at the beginning of | [10M] |

compression process of 1 bar, 300 k

Determine

- i) Maximum pressure and temperature in the cycle
- ii) Thermal Efficiency
- iii) Mean Effective Pressure

Assume for air $C_p = 1.005 \text{ kJ/kg K}$, $C_v = 0.718 \text{ kJ/kg K}$ and $R = 287 \text{ kJ/kg K}$.

Code No: R18A2104

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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II B.Tech I Semester Supplementary Examinations, June 2022

Introduction to Aeronautical Engineering

(AE)

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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 a) Differentiate between jet aircrafts and helicopters with respect to flying principle. [7M]
b) Explain any two types of flight vehicles. [7M]
- 2 a) Write notes on the following. [7M]
i. Temperature extremes of space ii. Commercial use of space
b) What are Hot air balloons? How they changed the face of the aeronautical history? [7M]
- 3 a) Differentiate between the aerodynamics on wings and aerodynamics on bodies. [7M]
b) Explain the terms: i) Lift ii) Drag iii) Thrust [7M]
- 4 a) Classify aerodynamic forces and moments in flight. [7M]
b) What is the significance of mach number and how it is related to the compressibility of the air? [7M]

- 5 Explain the working principle of turbofan engine with a schematic diagram. [14M]
- 6 a) List out the merits and demerits of turbojet engine. [7M]
b) List out various aircrafts using the power plants of jet and piston engines. [7M]
- 7 State the advantages of aluminium which makes it suitable for aircraft industry. [14M]
- 8 Derive the equation of thrust required for steady level flight and also explain the relation between thrust required and angle of attack. [14M]

Code No: R18A2101

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June 2022

Mechanics of Fluids

(AE)

| | | | | | | | | | |
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Time: 3 hours

Max. Marks: 70

Answer Any **Five** Questions

All Questions carries equal marks.

- 1 a) Define terms Weight density, Specific Gravity, Viscosity. [4M]
b) Differentiate between
i) Absolute and gauge pressure, [3M]
ii) simple manometers and differential manometers, and [4M]
iii) Piezometer and pressure gauge. [3M]
- 2 A U- tube mercury manometer is used to measure the pressure of oil flowing through a pipe whose specific gravity is 0.85. The center of the pipe is 15 cm below the level of mercury. The mercury level difference in the manometer is 25cm; determine the absolute pressure of the oil flowing through the pipe. Atmospheric pressure is 750 mm of Hg. [14M]
- 3 a) What is meant by one-dimensional, two-dimensional and three- dimensional flows? [7M]
b) Distinguish between:
i) velocity potential function and stream function.
ii) Compressible and Incompressible flow [4M]

[3M]

- 4** A 30 cm diameter pipe conveying water, branches into two pipes of diameters 20cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s. **[14M]**
- 5** State and Prove Bernoulli's equation from Euler's equation of motion. Also state its assumptions **[14M]**
- 6** Derive an expression for Darcy – weisbach formula. **[14M]**
- 7** Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $u/U = 2(y/\delta) - (y/\delta)^2$ **[14M]**
- 8** Explain different Types of similarities and Similarity laws? **[14M]**
