MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

DEPARTMENT OF AERONAUTICAL ENGINEERING

QUESTION BANK

II-I (R15)

INDEX

R15

Code No: R15A0362

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester supplementary Examinations, May 2017

Mechanics of Fluids

(AE)

Roll No											

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART - A

1. (a) Explain the difference between ideal fluid and real fluid. [2M]
   (b) Define path line and stream line. [3M]
   (c) State the significance of each term of Bernoulli's equation. [2M]
   (d) What is meant by smooth boundary and a rough boundary? [3M]
   (e) What is Navier stokes equation? [2M]
   (f) Briefly explain the terms centre of buoyancy and metacentre. [3M]
   (g) What are the major and minor losses in a pipe line? [2M]
   (h) Sketch a pitot tube and explain briefly how it is used to measure the velocity of a flowing fluid. [3M]
   (i) Define the term boundary layer and pressure drag? [2M]
   (j) State Geometric similarity and Kinematic similarity. [3M]

PART - B

(50 Marks)

SECTION – I

2. What do you understand by the hydrostatic pressure variation? With the help of this equation derive the expression for the total pressure and centre of pressure on a submerged inclined plane area.

(OR)

3. Define surface tension property of a fluid. If the surface tension at air water interface is 0.073 N/m, what is the pressure difference between inside and outside of an air bubble of diameter 0.01mm?

SECTION – II

4. The two velocity components are given in the following cases, find the third component such that they satisfy the continuity equation for steady, incompressible flow.

i. $u = x^3 + y^2 + 2z^2 \; ; v = -x^2y - yz - xy$

ii. $u = 2y^2, w = 2xyz$

(OR)

5. (a) Differentiate between the Eulerian and Lagrangian methods of representing fluid flow.
(b) If stream function exists in a flow problem does it imply that velocity potential also exists? Explain.

SECTION – III

6. A pipe of diameter 350 mm carries a water at a velocity of 30 m/sec. The pressure at point A & B are given by 25.56 N/cm^2 and 20.43 N/cm^2 respectively, the datum head at point A and B is 15 mts and 35 mts respectively find the loss of head between A and B and direction of the fluid flow

(OR)

7. State and prove Eulers equation for one dimensional flow and hence obtain Bernoulli's equation. Mention the assumptions.

SECTION – IV

8. Explain the Boundary layer concepts and characteristics of boundary layer along a thin flat plate.

(OR)

9. Derive an expression for the displacement thickness in boundary layer with the necessary assumptions.

SECTION - V

10 Define the forces acting on a body placed in a fluid, derive the expression for lift and drag over an air foil

(OR)

11. What is a distorted model? How does it differ from an undistorted model? Mention the advantages and disadvantages of distorted models.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

MECHANICS OF FLUIDS (R15)

MODEL PAPER – I

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in TWO to FOUR sentences.

1. State Newton's Law of Viscosity. Differentiate Newtonian and Non – Newtonian Fluids. **(2 M)**
2. A viscous oil of 4.5 liters weighs 60 N. Calculate its specific weight, mass density, specific volume and relative density. **(3 M)**
3. Define stream line, path line, streak line and stream tube in a fluid flow. (**3 M)**
4. Define the terms velocity potential and stream function. **(2 M)**
5. State the assumptions made while deriving Bernoulli's equation. (3M)
6. State any two applications of Momentum equation. (2 M)
7. Define Boundary layer. (2 M)
8. Define pressure drag and skin – friction drag. (3 M)
9. Define hydraulic gradient line. (2 M)
10. What is a siphon? Mention its principle and purpose. (3 M)

PART B **Max Marks: 50**

i. Answer only one question among the two questions in choice.
ii. Each question answer (irrespective of the bits) carries 10M.

11. a. Two plates are placed at a distance of 0.15 mm apart. The lower plate is fixed while the upper plate having the surface area of 1.0 m^2 is pulled at 0.3 m/s. Find the force and the power required to maintain this speed, if the fluid separating them is having viscosity 1.5 poise. **(4M)**
    b. Derive an expression for total pressure and center of pressure for a vertically plane surface immersed in a liquid. **(6M)**

OR

12. Explain the working of a Bourdon tube pressure gauge using a neat sketch. **(10M)**

13. a. A 40 cm diameter pipe, conveying water, branches into two pipes of diameter 30 cm and 20 cm respectively. If the average velocity in the 40 cm pipe is 3 m/s, find the discharge in this pipe and also determine the velocity in 20 cm pipe. The average velocity in 30 cm pipe is 2 m/s.**(5M)**
b. The two velocity components are given in the following cases, find the third component such that they satisfy the continuity equation for steady, incompressible flow.
i. $u = x^3 + y^2 + 2z^2 \; ; v = -x^2y - yz - xy$
ii. $u = 2y^2, w = 2xyz$ (5M)

OR

14. The velocity vector in a flow field is given as $\boldsymbol{V} = 4x^3\boldsymbol{i} - 10x^2y\boldsymbol{j} + 2t\boldsymbol{k}$. Find the velocity and acceleration of a fluid particle at (2,1,3) at time t = 1. (10 M)

15. a. A pipe line carrying oil of specific gravity 0.8 changes in diameter from 300 mm at a position A to 500mm at position B which is 5m higher level. If the pressures at A and B are 19.6 N/cm^2 and 14.9 N/cm^2 respectively for a discharge of 150 liters per sec. Find the loss of head and the direction of flow. (4 M)
b. What is impulse momentum equation? (2 M)
c. What are the uses of dimensional analysis? Explain in brief. (4 M)

OR

16. What is the principle of orifice meter? Derive the expression for discharge through an orifice meter. (10 M)

17. The velocity profile in a laminar boundary layer is given by $\frac{u}{V\infty} = 2\left(\frac{y}{\delta}\right) - 2(\frac{y}{\delta})^3 + \left(\frac{y}{\delta}\right)^4$. Find the expressions for boundary layer thickness, shear intensity and drag force on one side of the plate. (10 M)

OR

18. A man weighing 90kgf descends to the ground from an airplane with the help of a parachute against the resistance of air. The velocity with which the parachute which is hemi – spherical in shape is 20 m/s downwards. Find the diameter of the parachute. Assume C_D = 0.5 and the density of air = 1.25 kg/m^3. (10 M)

19. Derive the relation between shear stress and velocity for the laminar flow between two parallel plates while one plate is stationary and the other is moving with a uniform velocity. (10 M)

OR

20. Using a neat sketch, show the hydraulic gradient line and energy gradient line for the flow through a pipe. What is the significance and applications of the same? (10 M)

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

MECHANICS OF FLUIDS (R15)

MODEL PAPER – II

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in TWO to FOUR sentences.

1. Define compressibility and vapor pressure of a fluid. **(3M)**
2. Determine the viscosity of an oil having kinematic viscosity of 6 stokes and a specific gravity of 2.0. **(2 M)**
3. Show that the stream lines and equipotential lines are always orthogonal to each other. **(3 M)**
4. Distinguish uniform and non – uniform flows. **(2 M)**
5. Name the different forces present in a fluid flow. (2 M)
6. Differentiate between free and forced vortex. Give one example for each. (3 M)
7. Define momentum thickness of a boundary layer. (3 M)
8. Define drag and lift on a body submerged in a fluid. (2 M)
9. List the various minor losses in a pipe system. (2 M)
10. What do you mean by equivalent pipe? (3 M)

PART B **Max Marks: 50**

i. Answer only one question among the two questions in choice.
iii. Each question answer (irrespective of the bits) carries 10M.

11. a. Define the term Buoyancy. Explain using neat sketch, the conditions for equilibrium of a submerged body in fluid. **(5 M)**
b. Define Meta center and Meta centric height. Explain the analytical method for determining meta – centric height. **(5 M)**

OR

12. The opening in a dam is 3m wide and 2m high. A vertical sluice gate is used to cover the opening. On the upstream of the gate, the liquid of specific gravity 1.5 lies up to a height of 2m above the top of the gate, whereas on the down stream side, the water is available up to a height

of top of the gate. Find the resultant force acting on the gate and the position of center of pressure. Assume that the gate is hinged at the bottom. **(10 M)**

13. Derive the 3 – D continuity equation choosing a suitable flow model. Define all the symbols used while deriving it. **(10 M)**

OR

14. a. The 2 – D stream function for a flow is $\psi = 9 + 6x - 4y + 7xy$. Find the velocity potential. (5 M)
    b. Diffentiate between Eulerian and Lagrangian methods of representing fluid flow. (5 M)

15. a. A horizontal venturimeter with inlet and throat diameter 20 cm and 10 cm is used to measure the flow of oil of specific gravity 0.8. The discharge of oil through the venturimeter is 60 liters per sec. Find the reading of the oil – mercury differential manometer. Take $C_d = 0.98$ (5 M)
    b. A pipe of diameter 400mm carries water at a velocity of 25m/s. The pressure at the points A and B are given by 29.43 N/cm^2 and 22.563 N/cm^2 respectively, while the datum head at A and B are 28 m and 30 m respectively. Find the loss of head between A and B. (5 M)

OR

16. State Bernoulli's principle. Derive the Bernoulli's equation from Euler's equation of motion. (10 M)

17. Derive Von – Karman momentum integral equation. (10 M)

OR

18. Explain boundary layer separation using a neat sketch and state the methods to avoid it. (10 M)

19. a. Determine the rate of flow of water through a pipe of diameter 10 cm and length 60 cm when one end of the pipe is connected to a tank and other end of the pipe is open to the atmosphere. The height of the water in the tank from the center of the pipe is 5 cm. The pipe is horizontal and the friction factor is 0.01. Consider minor losses. **(5M)**
    b. Determine the difference in the elevations in the water surfaces in the two tanks which are connected by a horizontal pipe of diameter 300 mm and length 400m. The rate of flow through the pipe is 300 liters per sec. Consider all the losses and take the value of f = 0.008. **(5M)**

OR

20. Derive the relation between shear stress and velocity for the laminar flow between two stationary parallel plates. (10 M)

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MECHANICS OF FLUIDS (R15)

MODEL PAPER – III

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in TWO to FOUR sentences.

1. Define pressure. State Pascal's Law and Hydrostatic law. (2M)
2. A soap bubble 50 mm diameter has inside pressure of 20 N/m^3 above atmospheric pressure. Calculate the surface tension inside the soap film. **(3 M)**
3. Define convective and local accelerations. **(3 M)**
4. State 1 - D continuity equation. (2 M)
5. State Buckingham's pi theorem. (3 M)
6. Define Reynold's number in terms of forces. (2 M)
7. Differentiate between stream-lined body and a bluff body. (3 M)
8. What is meant by shape factor? (2 M)
9. Define total energy line and write darcy's Weishbach equation. (2 M)
10. Define plane Poiseulle's flow. (3 M)

PART B **Max Marks: 50**

i. Answer only one question among the two questions in choice.
iii. Each question answer (irrespective of the bits) carries 10M.

11. a. Derive an expression for Total Pressure and Center of pressure for an inclined plane surface submerged in a liquid. (5M)
b. An inclined rectangular gate of width 5 m and depth 1.5m is installed to control the discharge of water as shown in fig. **(3.55/127 Bansal)**. The end A is hinged. Determine the force normal to the gate applied at B to open it. **(5M)**

OR

12. a. Water is flowing through two different pipes to which an inverted differential manometer having an oil of sp. Gr 0.8 is connected. The pressure head in the pipe A is 2m of wate, find the pressure in the pipe B for the manometer readings as shown in fig. **(2.22/54 Bansal) (5M)**

b. A 150mm diameter vertical cylinder rotates concentrically inside another cylinder of diameter 151mm. Both the cylinders are of 250 mm height. The space between the cylinders is filled with a liquid of viscosity 10 poise. Determine the torque required to rotate the inner cylinder at 100 rpm. **(5M)**

13. a. What is a flow net? Describe the uses and limitations of a flow net. (5 M)
    b. Check whether the flow defined by the stream function ψ = 2xy is irrotational. If so, determine the corresponding velocity potential.

OR

14. For a steady incompressible flow, check the following values of u and v are possible or not.
    1. $u = 4xy + y^2, v = 6xy + 3x$
    2. $u = 2x^2 + y^2, v = -4xy$ (10 M)

15. a. What is meant by substantial derivative? Derive. **(5M)**
    b. Water is flowing through a pipe 5 cm diameter under a pressure of 29.43 N/cm^2 guage and with a mean velocity of 2m/s. Find the total head or total energy per unit weight of the water at a cross – section which is 5m above the datum line. **(5M)**

OR

16. a. Differentiate between a model and a prototype. (2 M)
    b. What are the conditions to be satisfied for both to be in dynamic similarity? (3 M)
    c. What are the aims and objectives of model studies? (5 M)

17. a. What is Magnus effect?
    b. Find the diameter of the parachute with which a man of 80 kg descends to the ground form an airplane against the resistance of air with a velocity 25 m/s. Take C_d = 0.5 and density of air = 1.25kg/m^3.

OR

18. Define boundary layer thickness, displacement thickness, momentum thickness and energy thickness. Explain the significance of each. (10 M)

19. The rate of flow of water pumped into a pipe ABC which is 200m long is 20 liters per sec. the pipe is laid on an upward slope of 1 in 40. The length of the portion AB is 100m and its diameter is 100mm, while the length of the portion BC is also 100 m but its diameter is 200 mm. The change of diameter at B is sudden. The flow is from A to C. the pressure at A is 19.62N/cm^2 and end C is connected to a tank. Find the pressure at C and draw the hydraulic gradient and total energy line. Take f = 0.008. (10 M)

OR

20. Three pipes of same length L, diameter D and friction factor f are connected in parallel. Determine the diameter of the pipe of length L and friction f which will carry the same discharge for the same head loss. Use Darcy's – Weishbach equation. (10 M)

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

MECHANICS OF FLUIDS (R15)

MODEL PAPER – IV

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in TWO to FOUR sentences.

1. Define the terms 'Total Pressure' and 'Center of pressure' with respect to a body immersed in a liquid. **(2M)**
2. Give the conditions of equilibrium of a floating body and a submerged body. **(3 M)**
3. Distinguish rotational and irrotational flows. **(3 M)**
4. Mention two practical applications of continuity. **(2 M)**
5. What is the working principle of a 2 – D wind tunnel? (2 M)
6. Define geometric, kinematic and geometric similarities. (3 M)
7. State any two methods for prevention of boundary layer separation. (2 M)
8. Sketch the development of boundary layer growth over a flat plate. (3 M)
9. What is meant by water hammer? (2 M)
10. What are the causes of losses in pipes? Define major and minor losses. (3 M)

PART B **Max Marks: 50**

i. Answer only one question among the two questions in choice.
ii. Each question answer (irrespective of the bits) carries 10M.

11. a. Explain the working of a U – tube and inverted U – tube manometer. **(6 M)**
b. Calculate the pressure and density of air at a height of 3000m above the sea level give the pressure and temperature at sea level as 10.413 N/cm^2 and 15^0C respectively. The temperature lapse rate is given as 0.0065^o K/m. The density of air at sea level is 1.285 kg/m^3. **(4 M)**

OR

12. a. Determine the Bulk modulus of elasticity of a liquid, if the pressure of the liquid is increased from 70 N/cm^2 to 130 N/cm^2. The volume of the liquid is decreased by 0.15 percent. **(5M)**

b. The velocity distribution for flow over a flat plate is given by $u = \frac{3}{2}y - y^{3/2}$, where *u* is the point velocity in m/s at a distance *y* meter above the plate. Determine the shear stress at y = 9 cm. Assume dynamic viscosity as 8 poise. **(5M)**

13. Define and derive the expressions for local and convective accelerations. (10 M)

OR

14. a. What are the types of displacement that a fluid particle undergoes while in motion of a fluid? Explain using neat sketches. **(5M)**

b. Water flows through a pipe AB 1.2m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. The branch CD is 0.8 m diameter and carries one – third of the flow in AB. The flow velocity in branch CE is 2.5m/s. Find the volume rate of flow in AB, the velocity in CD and the diameter of CE. **(5M)**

15. 250 liters of water is flowing in a pipe having diameter 300 mm. If the pipe is bent by 135^0, find the magnitude and direction of the resultant force on the bend. The pressure of water flowing is 400 kN/m^2. (10 M)

OR

16. a. Explain the working of a capillary tube viscometer. **(5M)**

b. Explain the working of a concentric – cylinder viscometer. **(5M)**

17. Using neat sketches, explain the development of lift over a circular cylinder. (10 M)

OR

18. For the velocity profile for laminar boundary layer $\frac{u}{V\infty} = \frac{3}{2}\left(\frac{y}{\delta}\right) - \frac{1}{2}\left(\frac{y}{\delta}\right)^3$. Determine the boundary layer thickness, shear stress, drag force. (10 M)

19. a. Three pipes of length 800m, 500m and 400m and of diameters of 500mm, 400mm and 300mm respectively are connected in series. These pipes are to be replaced by a single pipe of length 1700m. Find the diameter of the single pipe. (5 M)

b. What is a siphon? What are its advantages? (5 M)

OR

20. An oil of viscosity 0.1 N/m^2 and relative density 0.9 is flowing through a circular pipe of diameter 50mm and the length of 300m. The rate of flow of fluid through the pipe is 3.5 liters per second. Find the pressure drop in a length of 30 m and also the shear stress at the pipe wall. (10 M)

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

MECHANICS OF FLUIDS (R15)

MODEL PAPER – V

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in TWO to FOUR sentences.

1. If the fluid is in motion, the pressure at a point may not be equal in all directions. Comment. (3 M)
2. Using a neat sketch show/define the pressure scale. (2 M)
3. The average velocity is inversely proportional to the cross – sectional area of the tube. Under what conditions this statement is valid. (3 M)
4. If $\psi = x^2 - y^2$, determine the velocity components at (1, 1). (2 M)
5. State any two applications of Bernoulli's Principle. (2 M)
6. Give Navier – Stokes equations for a 3 – D flow. (3 M)
7. What are the conditions for a steady – state flying? (3 M)
8. What is meant by terminal velocity of a body? (2 M)
9. Define a compound pipe. (2 M)
10. State the purpose of Moody's diagram. (3 M)

PART B **Max Marks: 50**

i. Answer only one question among the two questions in choice.
i. Each question answer (irrespective of the bits) carries 10M.

11. a. Define vapor pressure and its effects. **(3M)**
    b. State and prove Hydrostatic law. **(4M)**
    c. Explain the variation of viscosity of fluids with temperature. **(3M)**

    OR

12. a. A shaft of diameter 100 mm is rotating inside a journal bearing of diameter 102mm at a pace of 360 rpm. The space between the shaft and the bearing is filled with a lubricating oil of

viscosity 5 poise. The length of the bearing is 200mm. Find the power absorbed in the lubricating oil. **(5M)**

b. A cubical tank has sides of 1.5m. It contains water for the lower 0.6m depth. The upper remaining part is filled with oil of specific gravity 0.9. Calculate for one vertical side of the tank: i. total pressure and (ii) position of center of pressure.

13. A flow field is given by $\boldsymbol{V} = x^2y\boldsymbol{i} + y^2z\boldsymbol{j} - (2xyz + yz^2)\boldsymbol{k}$. Prove that it is a possible case of steady incompressible flow. Calculate the velocity and acceleration at point (2,1,3).

OR

14. a. Differentiate rotational and irrotational flows. Define vorticity. What are the properties of velocity potential function? (5 M)

b. The velocity components in a 2D flow are given by $u = \frac{y^3}{3} + 2x - x^2y$ and $v = xy^2 - 2y - \frac{x^3}{3}$. Show that these components represent a possible case of an irrotational flow. (5 M)

15. a. Explain the working of a pitot – static tube and mention its purpose. (5 M)

b. A pitot – tube is inserted in a pipe of 300 mm diameter. The static pressure in pipe is 100 mm of Hg vacuum. The stagnation pressure at the center of the pipe, recorded by the tube is 0.981 N/cm^2. Calculate the rate of flow of water through the pipe, if the mean velocity of the flow is 0.85 times the central velocity. Take C_v = 0.98. (5 M)

OR

16. A nozzle of diameter 20 mm is fitted into a pipe of 40 mm. Find the force exerted by the nozzle on the water which is flowing through the pipe at the rate of 1.2 m^3/minute. (10 M)

17. Derive the expressions for drag and lift on an arbitrary shaped body place in a uniform field. (10 M)

OR

18. The velocity distribution in the boundary layer is given by $\frac{u}{V\infty} = \frac{y}{\delta}$. Show that the displacement thickness is δ times the momentum thickness.

19. a. Determine the pressure gradient, the shear stress at the surface of the plates and the discharge per meter with for the laminar flow of oil having maximum velocity of 2m/s between tow horizontal parallel fixed plates which are 100 mm apart. Given μ = 2.4525 N-s/m^2. (5 M)

b. For the problem above, sketch the shear stress and velocity profile. (5 M)

OR

20. a. Define equivalent pipe using necessary illustrations for pipes in series and parallel. (5 M)

b. An old water supply distribution pipe of 250 mm diameter of a city is to be replaced by two parallel pipes of smaller equal diameter having equal lengths and identical friction factor values. Find out the new diameter required. (5 M)

R15

Code No: R15A0363

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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II B.Tech I Semester supplementary Examinations, May 2017

Mechanics of Solids

(AE)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART - A (25 Marks)

1. (a) Define (i) volumetric strain and (ii) Factor of safety. [2M]
   (b) A 1 metre long bar of rectangular cross section 50 mm x 80 mm is subjected to an axial load of 1.5 KN. Determine the maximum stress and the strain energy developed in the bar, if load applied is gradual. Take E = 205 GPa. [3M]
   © What do you mean by point of contraflexure? [2M]
   (d) Draw the S.F and B.M diagrams for a SSB of length L carrying a point load 'P' acting at the mid span of beam. [3M]
   (e) What is the meaning of 'strength of a section' [2M]
   (f)Derive section modulus of a hallow rectangular [3M]
   (g) In a bi-axial stress problem, the stresses in x and y directions are σ_x = 200 MPa and σ_y = 100 MPa. Find out maximum principal stress in MPa. [2M]
   (h) Define pure bending? [3M]
   (i) What are the assumptions made in deriving torsion equation? [2M]
   (j) Write assumptions for theory of simple bending [3M]

PART - B (50 Marks)

SECTION - I

2. (a) Distinguish between : stress and strain, normal stress and shear stress, working stress and yield stress.

   b) Two vertical rods one of steel and the other of copper are each rigidly fixed at the top and 600 mm apart. The diameter and length of each rod are 30 mm and 375 mm respectively. A cross bar fixed to the rods at the lower ends carries a load of 5 kN such that the cross bar remains horizontal even after loading. Find the stress in each rod and the position of the load on the bar. E_S = 200 GPa and E_C = 100 GPa.

OR

3. a) Define and explain the terms:
   i. Modulus of Elasticity
   ii. Modulus of Rigidity

iii. Poisson's ratio
iv. Bulk Modulus.

b) A steel bar of 4m long is 32 mm in diameter for 1m of its length, 28 mm in diameter for 2m, and 25mm in diameter for the remaining length. The bar is kept in tension, with stress in the smallest section being 110MPa. If $E = 2 \times 10^5$ MPa. Calculate the total elongation of the bar and the energy stored in it.

SECTION – II

4. a) How do you classify loads? Give Examples.

   b) A simply supported beam of length 5 meters carries a uniformly increasing load of 800N / m run at one end to 1600 N / m run at the other end. Draw the S.F and B.M diagrams for the beam.

OR

5. a) Define statically determinate and statically indeterminate beams. Give Examples.

   b) A beam of 10-m length is acted upon by forces and a couple as shown in fig 1. Draw the shear force and bending moment diagrams.

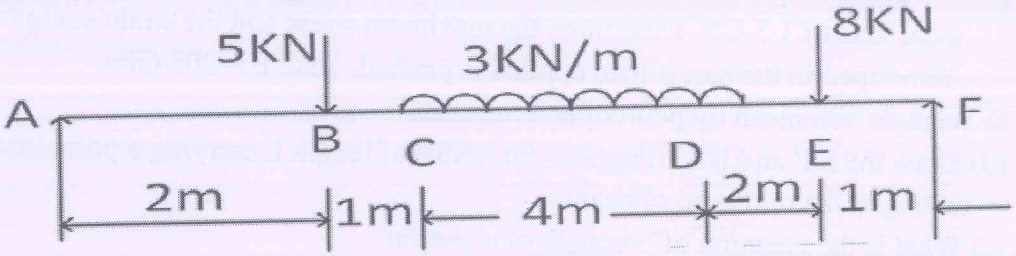

Fig.1

SECTION – III

6. a) What do you understand by neutral axis and moment of resistance?

   b) Compare the weight of two beams of the same material and equal strength. One beam is of solid circular cross section while other beam is of hollow circular section, the internal diameter being 0.78 times the external diameter.

OR

7. For a section shown in figure 2. Determine the shearing stresses at A,B, C and D for a shearing force of 23kN. Also sketch the shear stress distribution across the section.

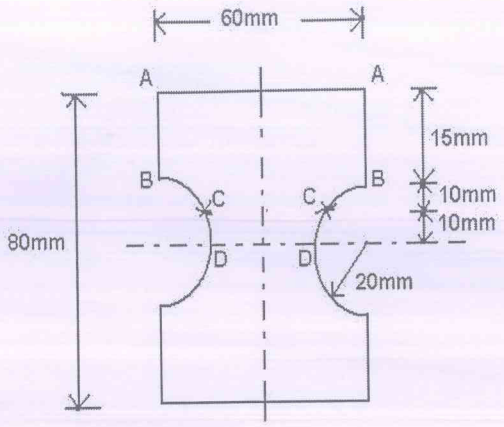

Fig.2

SECTION – IV

8. a) What is Mohr's stress circle? How is it useful in the solution of stress-analysis problems?

   b) Derive equation M/I=f/y=E/R

OR

9. Draw "Mohr's stress circle" for principal stress of 80 MPa tensile and 50 MPa compressive and find the resultant stresses on planes making 22^0 and 64^0 with the major principal plane. Find also the normal and tangential stresses on these planes.

SECTION – V

10. A hollow shaft with diameter ratio 3/8 is required to transmit 375 KW at 100 rpm with uniform twisting moment. The shear stress in the shaft must not exceed 60 MPa and the twist in a length of 4 m must not exceed two degrees. Calculate the maximum external diameter of the shaft satisfying these conditions. Take the modulus of rigidity, G = 80 GPa.

OR

11. a) A thin cylindrical shell is 3m long, 1 metre internal diameter and 15 mm metal thickness. Calculate maximum intensity of shear stress induced and also the changes in dimensions of the shell if it is subjected to an internal pressure of 1.5 MPa. Take $E = 2.04 \times 10^5$ MPa and Poisson's ratio = 0.3

    b) A seamless spherical shell is of 1.2 m internal diameter and 6 mm thickness. It is filled with fluid under pressure until its volume increases by 400×10^3 mm^3. Determine the fluid pressure. Take $E = 2 \times 10^5$ MPa.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

II B.TECH I SEMESTER AERONAUTICAL ENGINEERING

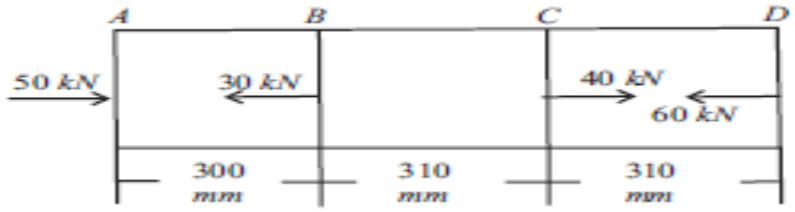
MECHANICS OF SOLIDS (R15)

MODEL PAPER – I

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in six to eight sentences.

1. Draw Stress-strain diagram a ductile material and show the elastic limit, yield point and ultimate point and breaking point? Write the salient points.[2]
2. A steel bar is subjected to loads as shown in fig. 1. Determine the change in length of the bar *ABCD* of 18 cm diameter. $E = 180\ kN/mm^2$ [3]

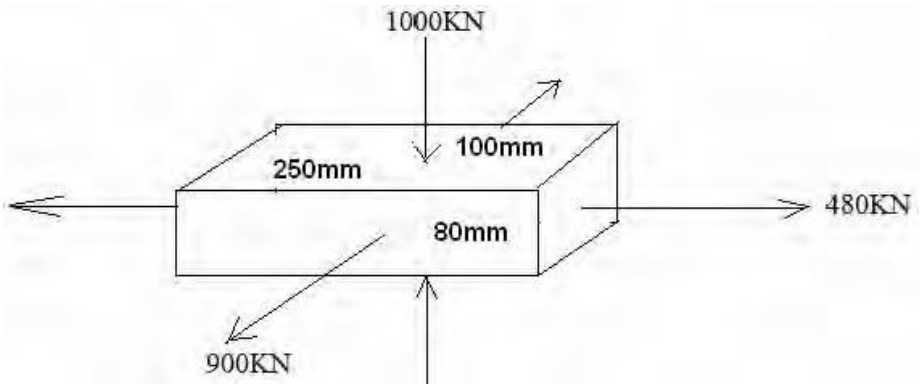


3. Explain the concept of shear force and bending moments with sign conventions? [2]
4. Draw the SFD and BMD for a simply supported beam of span `l'm, carrying a uniformly varying load.The load varies from 5 kN/m run at the left end to 10kN/m run at the right end. [3]
5. Define shear stress? And derive the shear stress equation $\tau = \frac{FAY}{IB}$? [2]
6. Define section modulus? And discuss the assumptions involved in the theory of simple bending? [3]
7. Define the term polar M.I and write the expressions for circular section and hollow rectangular section [2]
8. Explain the Moh r's circle construction for like stresses 3]
9. Derive the expression for power transmitted by a shaft? [3]
10. Explain briefly about the effect of internal pressure on the dimensions of a thin cylindrical shell [2]

PART B **Max Marks: 50**

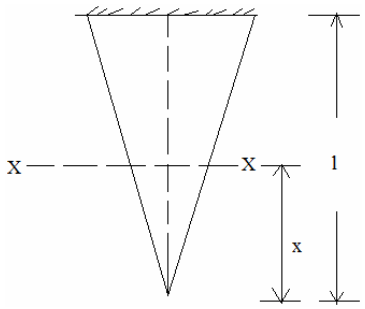
i. Answer only one question among the two questions in choice.
ii. Each question answer (irrespective of the bits) carries 10M.

11 a) A rectangular block 250 mm × 100 mm × 80 mm is subjected to axial loads as follows:
i) 480KN tensile in the direction of its length
ii) 900KN tensile on the 250mmx80mm faces
iii) 100KN compressive on the 250mmx100mm faces.
Assuming Poisson's ratio as 0.25, Find in terms of the modulus of Elasticity E of the material, the strains in the direction of each force, If $E=2.0x10^5$ N/mm^2, Find the values of the modulus of rigidity and bulk modulus for the material of the block. Also, calculate the change in the volume of the block due to the applications of the loading specified in Fig.1.

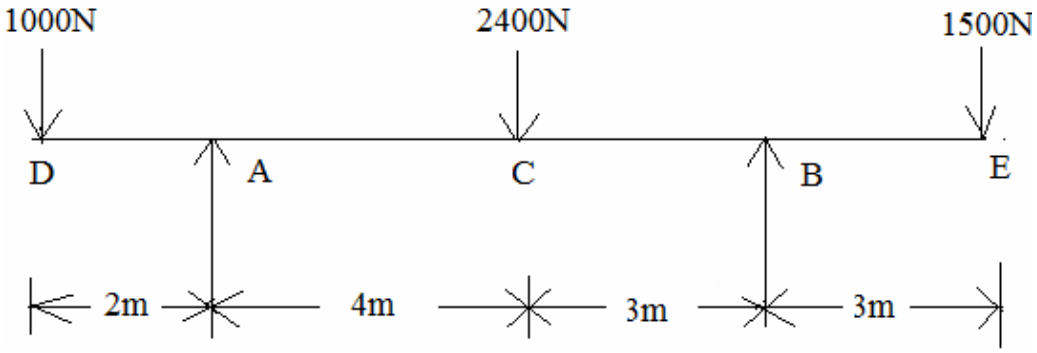


OR

b) A solid conical bar of circular section is suspended vertically as shown inFig.2. If the length of the bar is 'l' and the weight per unit volume of the material of the bar is 'w', determine the total elongation of the bar due to its own weight.



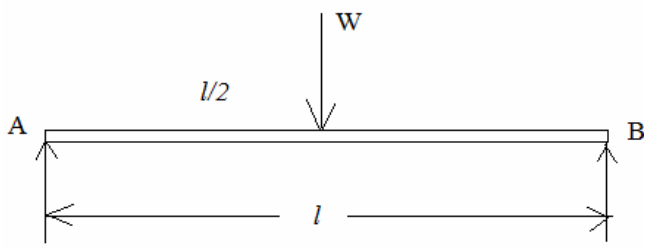
12a) Calculate the reactions at the supports A and B of the beam shown in Fig. Draw the B.M.D and S.F.D. Determine also the points of contra flexure within the span AB and show their positions on the bending moment diagram



OR

b) A cantilever PQRS 7m long is fixed at P such that Pq= QR= 2m and RS=3m . It carries loads of 5,3 and 2kN at Q,R and S respectively in addition to UDL of 1kN/m run between P and Q and 2kN/m run between R and S .Draw SFD and BMD.

13a) A timber beam of rectangular section is simply supported at the ends and carries a point load at the center of a beam. The maximum bending stress is 12N/mm^2 and maximum shearing stress is 1 N/mm^2, find the ratio of the span to the depth as shown in fig.



OR

b) A cast iron beam section of T-section with a top flange 8cmX2cm thick, bottom flange 16cmX4cm thick and the web 20cm deep and 2cm thick. The beam is freely supported on a span of 5metres. If the tensile stress is not to exceed 20 MN/m^2, find the safe uniformly distributed load which the beam can carry. Find also the Maximum compressive stress.

14a) A cylindrical shell is 3 m long, 1m internal diameter and 15mm thickness. Calculate the Maximum intensity of the shear stress and also the change in dimensions of the shell if it is subjected to an internal fluid pressure of 1.5N/mm^2.

OR

b) A steel shaft transmits 105kW at 160rpm. If the shaft is 100mmin diameter, find the torque on the shaft and the maximum shearing stress induced. Also find the twist of the shaft in a length of 6m, take C= 8X10^{4}N/mm^2

15a) In a shaft tranmitting power the shearing stress at the surface of the shaft is 60N/mm^2. In addition there is a bending moment producing a bending stress of 85N/mm^2 at the surface. Find the magnitude and the directions of the principal stresses. If the shaft diameter is 75mm find the eqivalent bending moment which acting alone on the shaft would produce a strain equal to the greater principal strain. Take poisso's ratio=0.286.

OR

b)A shaft section 100mm in diameter is subjected to a bending moment of 4000n-m and a torque of 6000 N-m. Find the maximum direct stress induced on the section, and specify the position of the plane on which it acts. Find also, what stress acting alone can produce the same maximum atrain. Take poisso's ratio = 0.25.

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

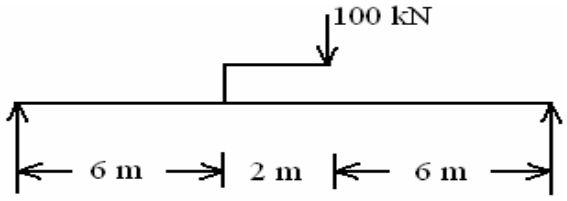
MECHANICS OF SOLIDS (R15)

MODEL PAPER – II

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in six to eight sentences.

1. Explain the deformations of the bars with varying cross-sections in step wise? [3]
2. Write short notes on Thermal stresses and Thermal strains [2]
3. Develop Bending moment and Shear force for the Figure given below indicating the maximum and minimum values.[2]



4. Derive the relation among loading, shear force and bending moment in a beam?[3]
5. Explain the theory of pure bending concept and state their assumptions? [2]
6. A'T'shaped cross section of a flange 200mm x 50mm and web 200mm x 50mm is subjected to shear force of 100kN calculate the shear stress at the neutral axis and at junction of the web and flange. Moment of inertia about the horizontal neutral axis is 0.0001134 m^4 [3]
7. Write short notes on principal Planes and Principal stresses[2]
8. Write short notes on stresses due to pure shear[3]
9. Distinguish between cylindrical cylindrical vessels and thin spherical vessels.[3]
10. Write short notes on Polar Modulus and torsional rigidity.[2]

PART B **Max Marks: 50**

i. Answer only one question among the two questions in choice.
ii. Each question answer (irrespective of the bits) carries 10M.

11a) A bar of 30mm diameter is subjected to a pull of 60KN. The measured extension on a gauge length of 200mm is 0.09mm and the change in diameter is 0.0039mm. Calculate the Poisson's ratio and the values of the three moduli (E,G & K).

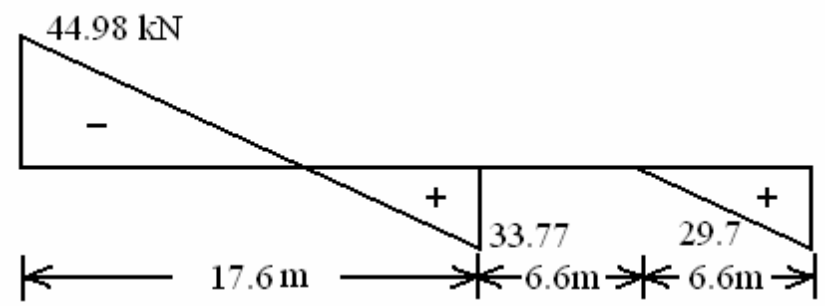
OR

b) A steel bar is placed between two copper bars, each having the same area and length as steel bar at 20°C, At this stage , they are rigidly connected together at both the ends. When the temperature is raised to 320°C , the length of the bars increases by 1.5mm. Determine the original length and find stresses in the bars.

Take E_s=220GN/m^2 , E_c=110GN/m^2

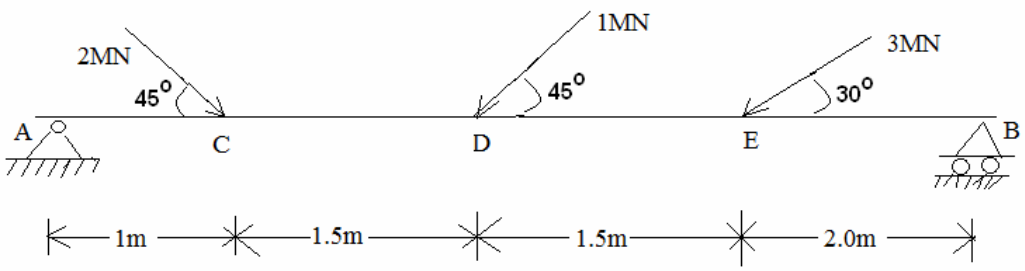
α_s=0.000012 per°C and α_c=0.0000175 per°C

12a) The following Figure 2 indicates the Shear Force diagram. Develop the loading and Bending Moment diagram for the beam.



OR

b) Analyse the beam shown in Fig. Draw S.F.D, B.M.D and Thrust Diagram



13a) The shear force acting on a section of a beam is 100KN. The section of the beam is of T-shaped of dimensions 200 mm × 250 mm × 50 mm. The flange thickness and web thickness are 50 mm. Moment of inertia about the horizontal neutral axis is 1.134×10^8 mm^4. Find the shear stress at the neutral axis and at the junction of the web and the flange.

OR

b) A cantilever of square section 200 mm × 200 mm, 2.0 m long, just fails in flexure when a load of 12KN is placed at its free end. A beam of the same material and having a rectangular cross-section 150 mm wide and 300 mm deep is simply supported over a span of 3.0 m.Calculate the minimum central concentrated load required to break the beam.

14a) A bronze spherical shell is made of 1.5cm thick plate. It is subjected to an internal pressure of 1MN/m^2. If the permissible stress in the bronze is %%MN/m^2, calculate the diameter of the spherical shell taking the efficiency as 80%.

OR

b) A solid shaft of 200mm diameter has the same cross-sectional area as that of hollow shaft of the same material with inside diameter 150mm. Find the ratio of power transmitted by the two shafts at the same speed.

15a) An I- beam with flanges of size 200mmX 20mm and a web of 600mm X 12 mm is subjected to a bending moment of 450kN-m and a shear force of 400kN at a section. Determine the magnitude of the bending stress and shear stress at a point 200mm above the neutral axis. Find also the principal stresses at this point.

OR

b) A horizontal steel bar of 40mm diameter solid section is 2.4m long and is rigidly held at both ends so that no angular rotation occurs either axially or circumferentially at the ends. If a bracket at the centre of the span supports a vertical load of 250N at a horizontal lever arm of 0.5m, what is the maximum tensile stress in the bar.

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

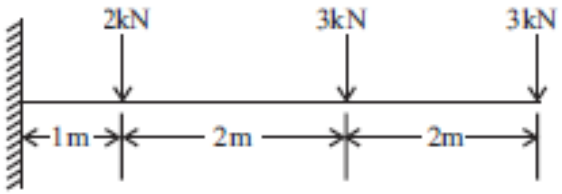
MECHANICS OF SOLIDS (R15)

MODEL PAPER – III

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in six to eight sentences.

1. Derive the relation between two elastic constants E and G?[3]
2. Define the terms stress, strain, shear strain, volumetric strain [2]
3. Draw the SF and BM diagram for the beam as shown in fig Also indicate the principal values on the diagrams. [3]



4. Write short notes on point of contraflexure?[2]
5. Derive the expression of shear stress distribution for I-sections.[3]
6. Define the term Moment of inertia and derive the expression for M.O.I of a Rectangular section? [2]
7. Write the procedure to construct the mohr's circle to calculate principal stresses[3]
8. Write the procedure to find Principal stresses when a body is subjected to two perpendicular direct stresses with state of simple shear in analytical and graphical method.[2]
9. Derive the formula for the thickness of the thin cylindrical shell.[3]
10. Write the short notes on wire wound cylinders.[2]

PART B **Max Marks: 50**

i. Answer only one question among the two questions in choice.
ii. Each question answer (irrespective of the bits) carries 10M.

11a) A prismatic member of length l and unit weight w is suspended freely from its end. Determine the elongation of the member under gravity.

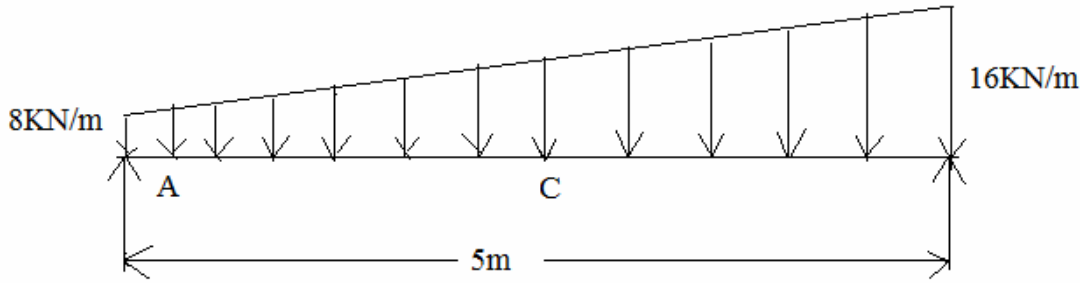
OR

b) A steel tube 50mm in external diameter and 3.0mm thick encloses centrally a solid copper bar of 35mm diameter. The bar and the tube are rigidly connected together at the ends at a temperature of 20^0 C.Find the stress in each metal when heated to 170^0 C.Find the stress in each metal when heated to 170^0 C .Also find the increase in length, if the original length of the assembly is 350mm.Coefficients of expansion for steel and copper are 1.08×10^{-5} per ^{0} C and 1.7×10^{-5} per ^{0} C respectively.
Take $E_s=2.0\times10^5$ N/mm^2, $E_c=1.0\times10^5$ N/mm^2.

12a) A Beam of length 6.0m is simply supported at the ends and carries a u.d.l of intensity 1.5KN/m run and three concentrated loads of 1KN, 2KN and 3KN acting at a distance of 1.5m, 3.0m and 4.5m respectively from left end. Draw the S.F.D and B.M.D and also determine the maximum bending moment.

OR

b) The intensity of loading on a simply supported beam of 5.0m span increases uniformly from 8KN/m at one end to 16KN/m at the other end as shown in Fig.1. Find the position and magnitude of the maximum bending moment. Also draw S.F.D and B.M.D.



13a) A circular beam of 100mm diameter is subjected to a shear force of 5KN. Calculate:
i) Average shear stress,
ii) Maximum shear stress, &
iii) Shear Stress at a distance of 40mm from N.A.

b) Derive an expression for the shear stress at any point in a circular section of a beam, which is subjected to a shear force 'F'.

OR

c) A beam consists of a symmetrical rolled steel joist. The beam is simply supported at its ends and carries a point load at the centre of the span. If the maximum stress due to bending is 140MPa, find the ratio of depth of the beam to span on order that the central deflection nay not exceed 1/480 of the span. Take E= 200GPa.

14a) A boiler shell is to made of 15mm thick plate having a limiting tensile stress of 120MN/m^2. If the longitudinal and circumferential efficiencies are 70% and 30% respectively , determine what maximum diameter of the shell would be allowed for a maximum pressure of 2MN/m^2.

OR

b) A hollow shaft of diameter ratio 3/5 is required to transmit 450kW at 120 rpm with a uniform twisting moment. The shearing stress in the shaft must not exceed 60 N/mm^2 and the twist in a length of 2.5 m must not exceed 1°. Calculate the minimum external diameter of the shaft satisfying these conditions. Take the modulus of rigidity C= $8X10^4$ N/mm^2

15a)A simply supported beam of rectangular section is 200mm wide and 300mm deep.It supports a uniformly distributed load of 6 kN/m over an effective length of 4m. Calculate the magnitude and direction of the principal stresses at a point located 0.5m from the left support and 50mm above the neutral axis.

OR

b) At a certain point in a strained material the principal stresses are 100 N/mm^2 and 40N/mm^2 both tensile. Find the normal, tangential and resultant stresses across a plane through the point at 48° to the major principal plane, using Mohr's circle of stress.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

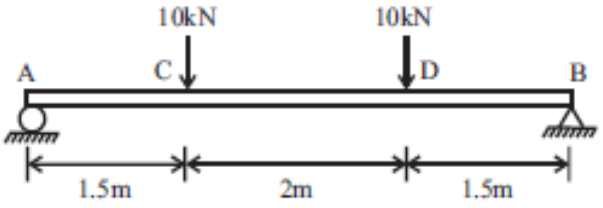
MECHANICS OF SOLIDS (R15)

MODEL PAPER – IV

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in six to eight sentences.

1. Explain strain energy for any three types of loading conditions and give their strain energy equations?[2]
2. Define the terms Poisson's ratio, Youngs modulus, Bulk modulus and Shear modulus.[3]
3. Draw the SFD and BMD for the beam shown in the figure[3]

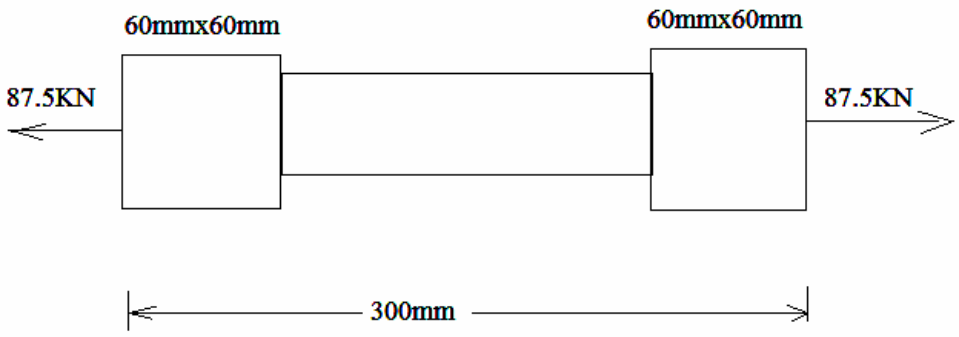


4. Classify the Beams and loads which are acting on beams? [2]
5. Derive section modulus of rectangle and circular (both solid and hollow sections)[2]
6. Write short notes on direct stress and indirect stresses with neat diagrams?[3]
7. Write notes on Tresca failure theory and Rankine failure theory.[2]
8. Derive the expression of Torsion?[3]
9. Write the procedure to find centroids of composite areas with example.[2]
10. Explain how to find resultant stresses when a body subjected to two mutually perpendicular direct stresses.[3]

PART B **Max Marks: 50**

i. Answer only one question among the two questions in choice.
ii. Each question answer (irrespective of the bits) carries 10M.

11a) A tie bar has enlarged ends of square section 60 mm × 60 mm as shown in Fig.1.If the middle portion of the bar is also of square section, find the size and length of the middle portion if the stress there is 140N/mm^2 and the total extension of the bar is 0.14mm. Take E= 2.0×10^5 N/mm^2.



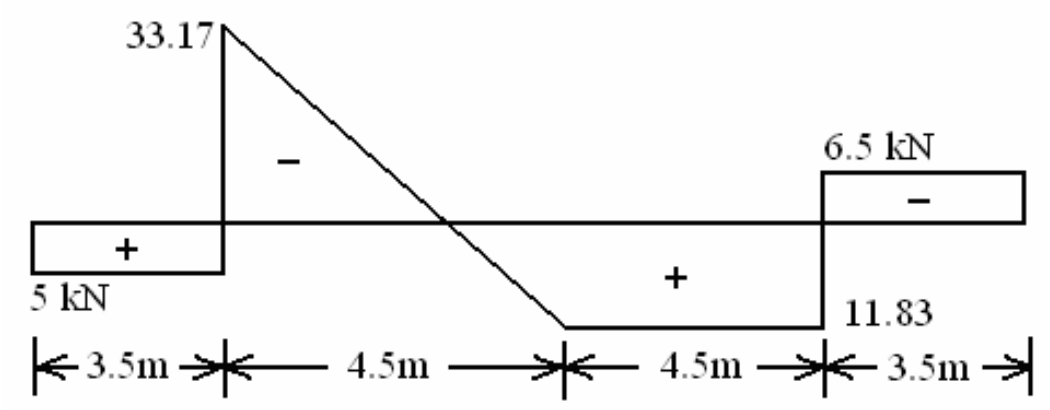
OR

b)A steel rod 25m long is at a temperature of 20^{0}C. Find the free expansion of the rod when the temperature is raised to 65^{0}C. Find the temperature stress produced:

i) When the expansion of the rod is prevented and

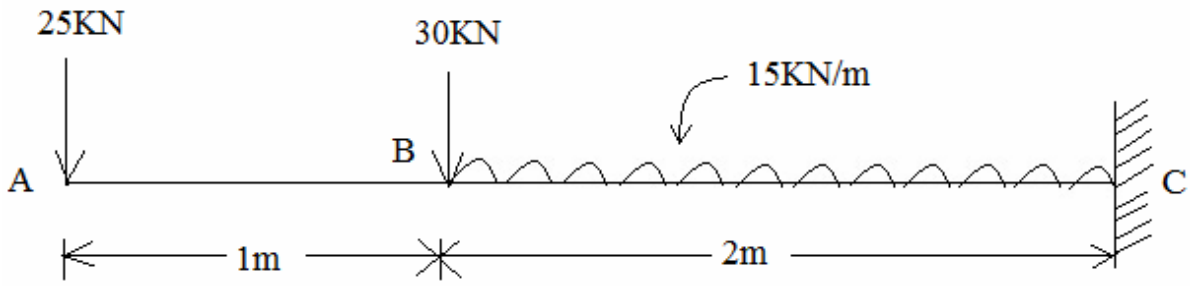
ii) When the rod is allowed to expand by 6.0mm. Take α=12.0×10^{-6} per ^{0}C and E=2.0×10^5 N/mm^2.

12a) The following Figure indicates the Shear Force diagram. Develop the loading and Bending Moment diagram for the beam.



OR

b) Draw SFD and BMD for the given loading diagram shown in fig.



13a) Two wooden planks 150mmX 50mm each are connected to form a T- section of a beam, If a moment of 3.4kN-m is applied around the horizontal neutral axis, inducing tension below the neutral axis, find the stresses at the extream fibres of the cross section. Also calculate the total tensile force on the cross-section.

OR

b) An I-section, with rectangular ends, has the following dimensions: Flange- 15cmX 2cm and web: 30cm X1cm. Find the maximum shearing stress developed in the beam for a shearing force of 10kN.

14a) A gunmetal tube of 50mm bore, wall thickness 1.25mm is closely wound externally by a steel wire 0.5mm diameter. Determine the tension under which the wire must be wound on the tube, if an internal radial pressure of $1.5MN/m^2$is required before the tube is subjected to the tensile stress in the circumferential direction.
Take E (for tube) =102 GN/m^2, E(for wire) = $210GN/m^2$ and poisson's ratio is 0.35.

OR

b) A hollow mild steel shaft having 100mm external diameter and 50mm internal diameter is subjected to a twisting moment of 8kNm and a bending moment of 2.5 kN/m. Calculate the principal stresses and find direct stress which acting alone, would produce the same.
(i) Max elastic strain energy
(ii)Max elastic shear strain energy, as that produced by the principal stresses acting together.

15a) A rectangular block of material is subjected to a tensile stress of 100 N/mm^2 on one plane and a tensile stress of $50N/mm^2$ on a plane at right angles, together with shear stress of $60N/mm^2$ on the same planes. Find i) The direction of the Principal Planes
ii) The magnitude of the Principal stresses
iii) The magnitude of the greatest shear stresses.

OR

b) Two planes AB and BC are at right angles carry shear stresses of intensity 17.5 N/mm^2 while these planes also carry a tensile stress of $70N/mm^2$ and a compressive stress of $35N/mm^2$ respectively. Determine the Principal planes and the principal stresses. Also determine the maximum shear stresses and planes on which it acts.

R15

Code No: R15A2102

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester supplementary Examinations, May 2017

Aircraft Engineering Drawing

(AE)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 15 marks.

SECTION-I

Q.No.1

A Pentagonal pyramid, side of base 30mm and axis 60mm long, rests with its base on H.P and one of the edges of its base is perpendicular to V.P . It is cut by a section plane perpendicular to V.P, parallel to H.P, and passing through the axis at a point 35mm above the base. Draw the front view and sectional top view. (15)

(OR)

Q.No.2

A Hexagonal prism edge of base 20mm and axis 50mm long rest with its base on HP such that one of its rectangular faces is parallel to VP. It is cut by a plane perpendicular to VP inclined at 45 to HP and passing through the right corner of the top face of the prism. Draw the sectional top view and develop the lateral surface of the truncated prism. (15)

SECTION-II

Q.No.3

(a) Draw the conventional representation of (15)

a. Straight knurling.
b. Cylindrical compression spring.
c. Concrete.

(b) Draw the conventional representation of

d. Square on shaft.
e. Bearings.
f. Wood.

(OR)

Q.No.4

(a) Draw the conventional representation of (15)

g. Glass.
h. Screw thread assembly.
i. Tension spring.

(b) Draw the conventional representation of

j. Liquids.
k. Internal thread.
l. Packing and insulating material.

SECTION-III

Q.No.5

The dimensions of a shaft and a hole with a basic size of 60mm are given below:
Shaft Ø 60-0.020
Hole Ø 60-0.005
Find out

a. Tolerance of Shaft b. Tolerance of Hole
c. Maximum allowance d. Minimum Allowance, and e. Type of fit (15)

(OR)

Q.No.6

Draw a 3D view of the following aircraft structural components:
a. Trusses used in wings and fuselage, b. Stringers and ribs, c. Brackets
d. Monocoque and Semi-monocoque structure (15)

SECTION-IV

Q.No.7

Taking the diameter of rods d = 20 mm, draw the front view showing Top half in section of a SOCKET & SPIGOT COTTER JOINT. Add a view looking from the socket end. Show all dimensions in terms of 'd'. (15)

(OR)

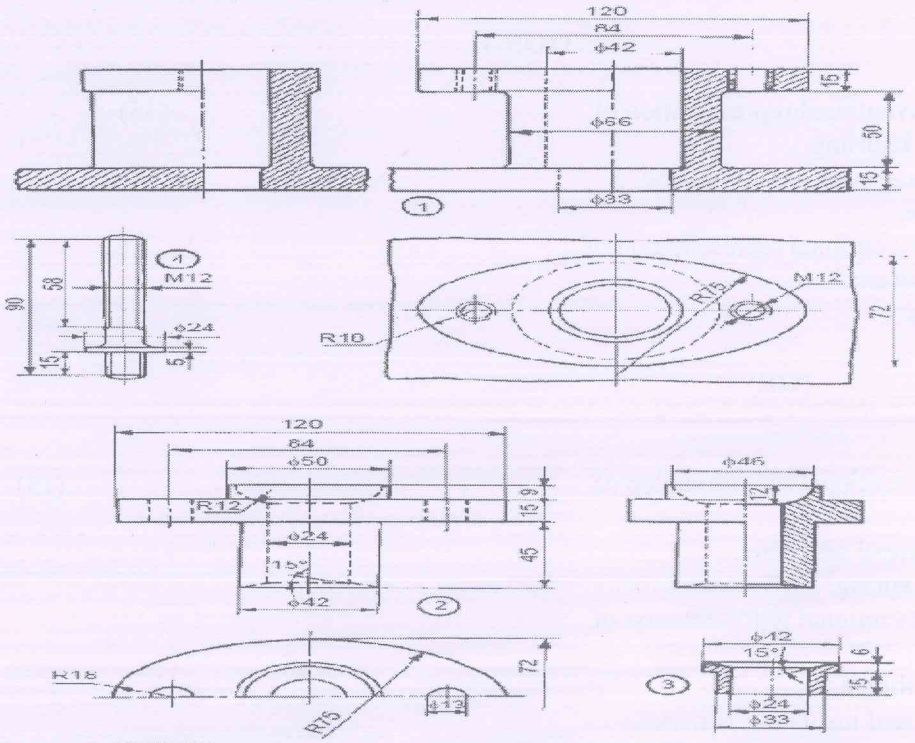
Q.No.8

Draw to 1:1 scale the top view and sectional front view of double riveted lap joint with chain riveting. The thickness of the plate is 9 mm. Show at least three rivets in each row. Indicate all dimensions. Use snap head rivets.
(15)

SECTION-V

Q.No.9

Below figure shows details of STUFFING BOX. Assemble all the parts and draw (15)
a. Sectional front view
b. View from the top.



Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Gland	Brass	1
3	bush	brass	1
4	Stud	MS	2
5	Nut, M12	MS	2

Fig: STUFFING BOX

(OR)

Q.No.10

Figure gives the part drawings of single wheel landing gear. Assemble all the parts and draw the following assembled views.

a) Front view

b) Side view

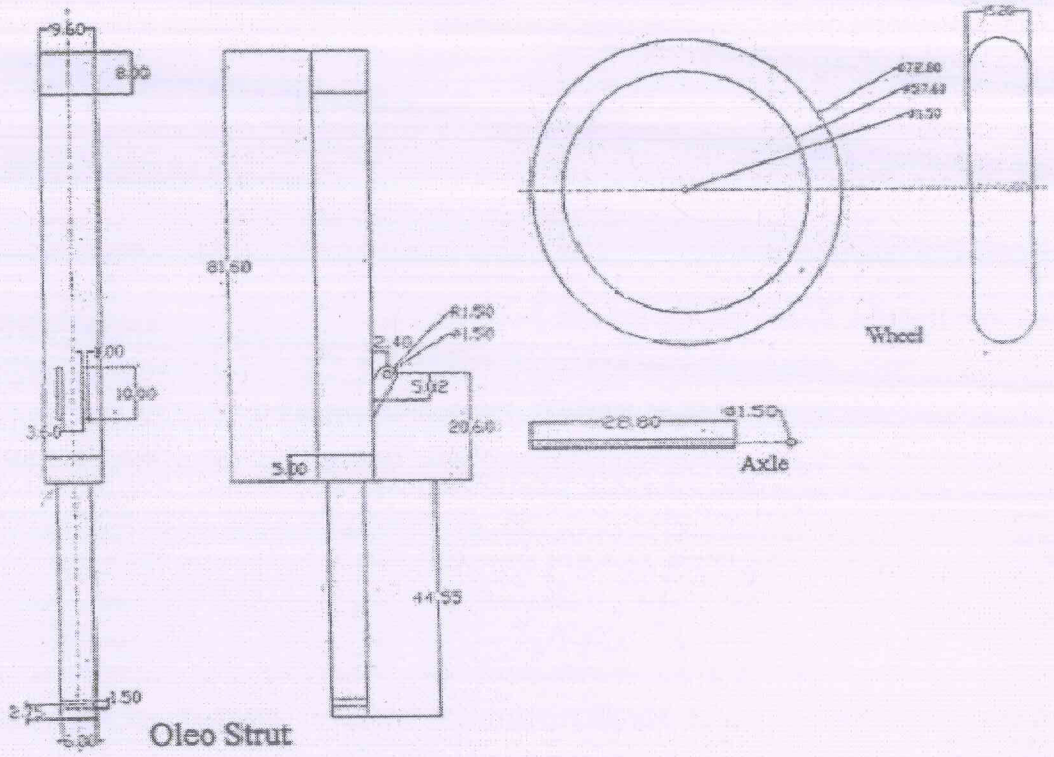


Fig: Single wheel landing gear

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

AIRCRAFT ENGINEERING DRAWING (R15)

MODEL PAPER – I

1. A pentagonal pyramid, having a base with a 30 mm side and a 70 mm long axis, is resting on its base in the H.P. with an edge of the base nearer the V.P., parallel to it. A vertical section plane inclined at 45^o to the V.P. cuts the pyramid at a distance of 8 mm from the axis. Draw its sectional front view, top view and true shape of the section.

(OR)

2. A pentagonal prism, having a base with a 30mm side and a 70 mm axis has an edge of its base on the HP and axis parallel to the VP and inclined at 60^o to the HP. It is cut by an AIP inclined at 60^o to the HP and passing through the highest corner of the prism. Draw its sectional top view and true shape of the section.

3. Draw the sectional front view and top view of a double riveted zig-zag lap joint. Take the thickness of main plates=10 mm.

(OR)

4. Draw the sectional front view and top view of a double riveted double strap lap joint. Take the thickness of main plates=10 mm.

5. Draw (a) half sectional front view, top half in section and (b) side view of a rigid flange coupling to connect two shafts, each of diameter 25 mm.

(OR)

6. Draw the half sectional view from the front, with top half in section and the view from the side of a cotter joint with socket and spigot ends, to connect two rods of 25 mm diameter each.

7. The dimensions of a shaft and a hole are given below:
   Shaft, Basic size = 60mm and given as 60 – 0.020
   Hole, Basic size = 60mm and given as 60 – 0.005
   Find out: (a) Tolerance of shaft (b) Tolerance of hole (c) Maximum allowance (d) Minimum allowance (e) Type of fit

(OR)

8. Calculate the maximum and minimum limits for both the shaft and hole in the following; using the tables for tolerances and name the type of fit obtained:
   (a)45H8/d7 (b)180H7/n6 (c)120H7/s6 (d)40G7/h6 (e)35 C11/h10

9. Assemble different parts of eccentric (Fig 1) and draw the following views for the assembled unit

i) Half sectional Front view ii) Side view.

10. Assemble different parts of cross head (Fig 2) and draw the following views for the assembled unit
    i) Half sectional Front view ii) Side view.

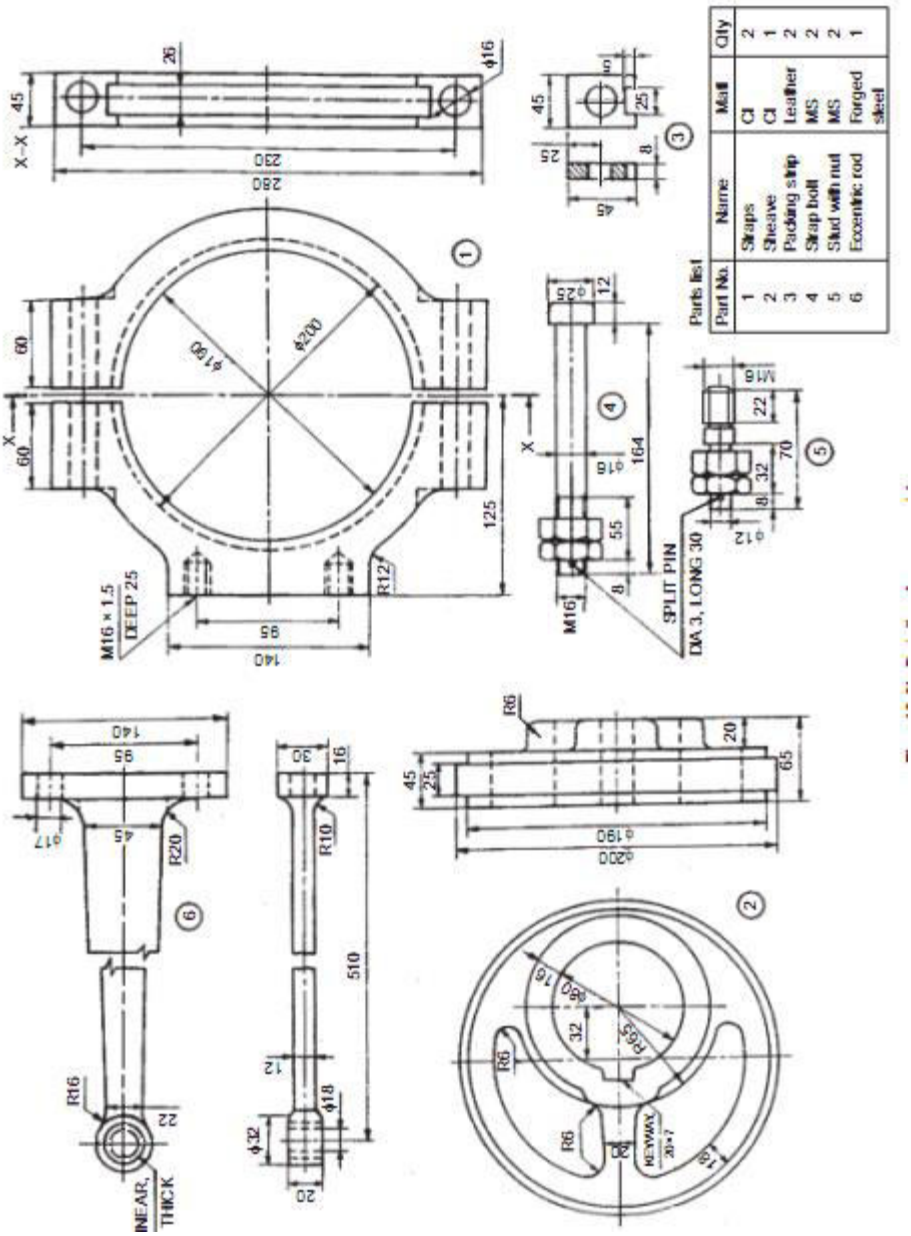

Parts list
Part No. | Name | Mat | Qty
1 | Straps | CI | 2
2 | Sheave | CI | 1
3 | Packing strip | Leather | 2
4 | Strap bolt | MS | 2
5 | Stud with nut | MS | 2
6 | Eccentric rod | Forged steel | 1
X–X
SPLIT PIN DIA 3, LONG 30
M16 × 1.5 DEEP 25
KEYWAY 20×7

Fig 1

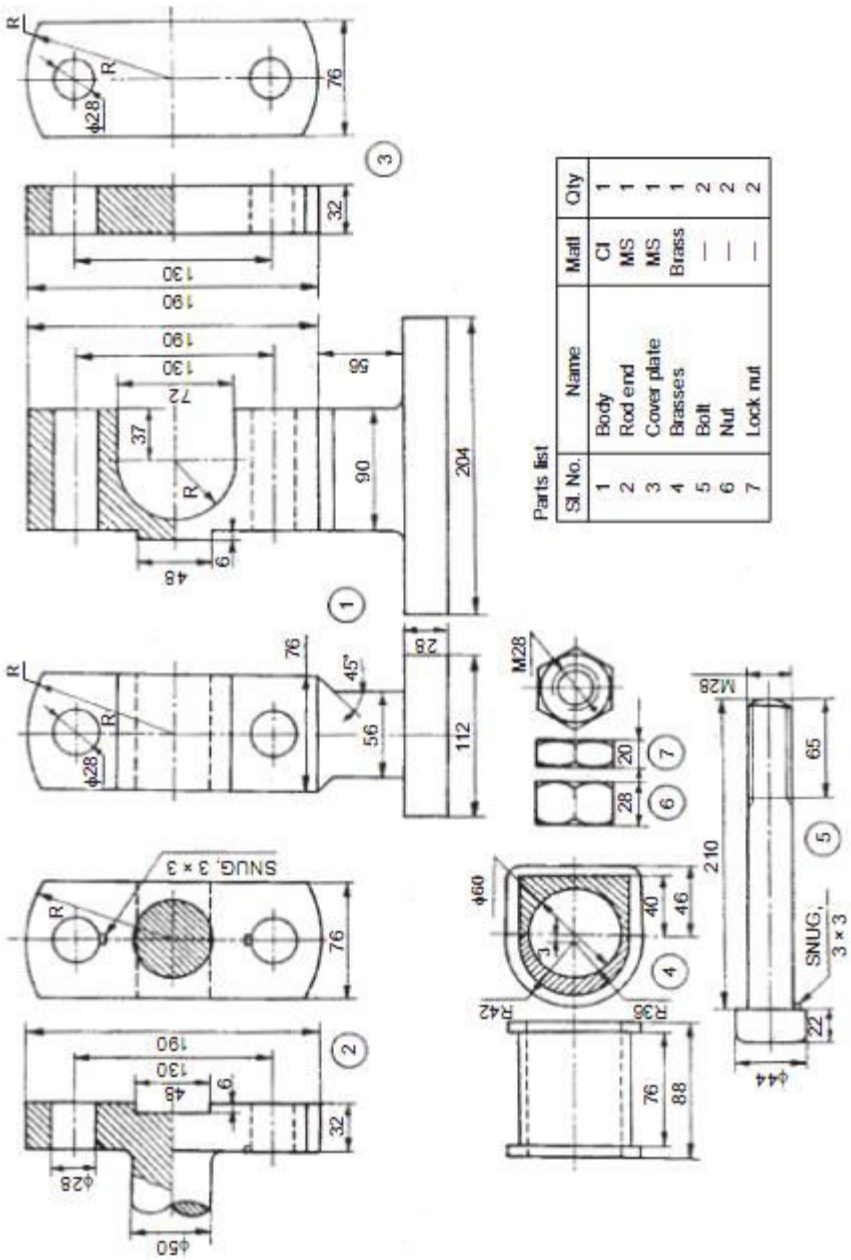

Parts list
Sl. No. | Name | Matl | Qty
1 | Body | CI | 1
2 | Rod end | MS | 1
3 | Cover plate | MS | 1
4 | Brasses | Brass | 1
5 | Bolt | — | 2
6 | Nut | — | 2
7 | Lock nut | — | 2
SNUG, 3 × 3
M28
φ28
φ60
φ44
φ50
R42
R36

Fig 2

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

AIRCRAFT ENGINEERING DRAWING (R15)

MODEL PAPER – II

1. A hexagonal prism, having a base with a 30 mm side and a 70 mm axis, is resting on a face on the ground with axis parallel to the VP. It is cut by a an AVP which makes an angle of 45^o with the VP and passes through a point distant 25 mm on the axis from one of its ends. Draw its sectional front view and obtain true shape of the section.

(OR)

2. A pentagonal pyramid, having a base with a 40 mm side and a 70 mm long axis, is resting on the HP on an edge of its base such that the axis is inclined 45^o to the HP and parallel to the VP. It is cut by a section plane such that HT and VT of the section plane are perpendicular to the xy line and passes through the edge on which the pyramid is resting. Draw the front view, top view and sectional side view.

3. Draw (a) sectional view from the front and (b) view from above, of the following riveted joints, to join plates of thickness 10 mm:
   (i) Double riveted chain lap joint (ii) Single riveted, double strap butt joint

(OR)

4. Draw (a) sectional view from the front and (b) view from above, of the following riveted joints, to join plates of thickness 10 mm:
   (i) Double riveted zig-zag lap joint (ii) Single riveted, single strap butt joint

5. Draw the half sectional view from the front, with top half in section and the view from the side of a cotter joint with socket and spigot ends, to connect two rods of 25 mm diameter each.

(OR)

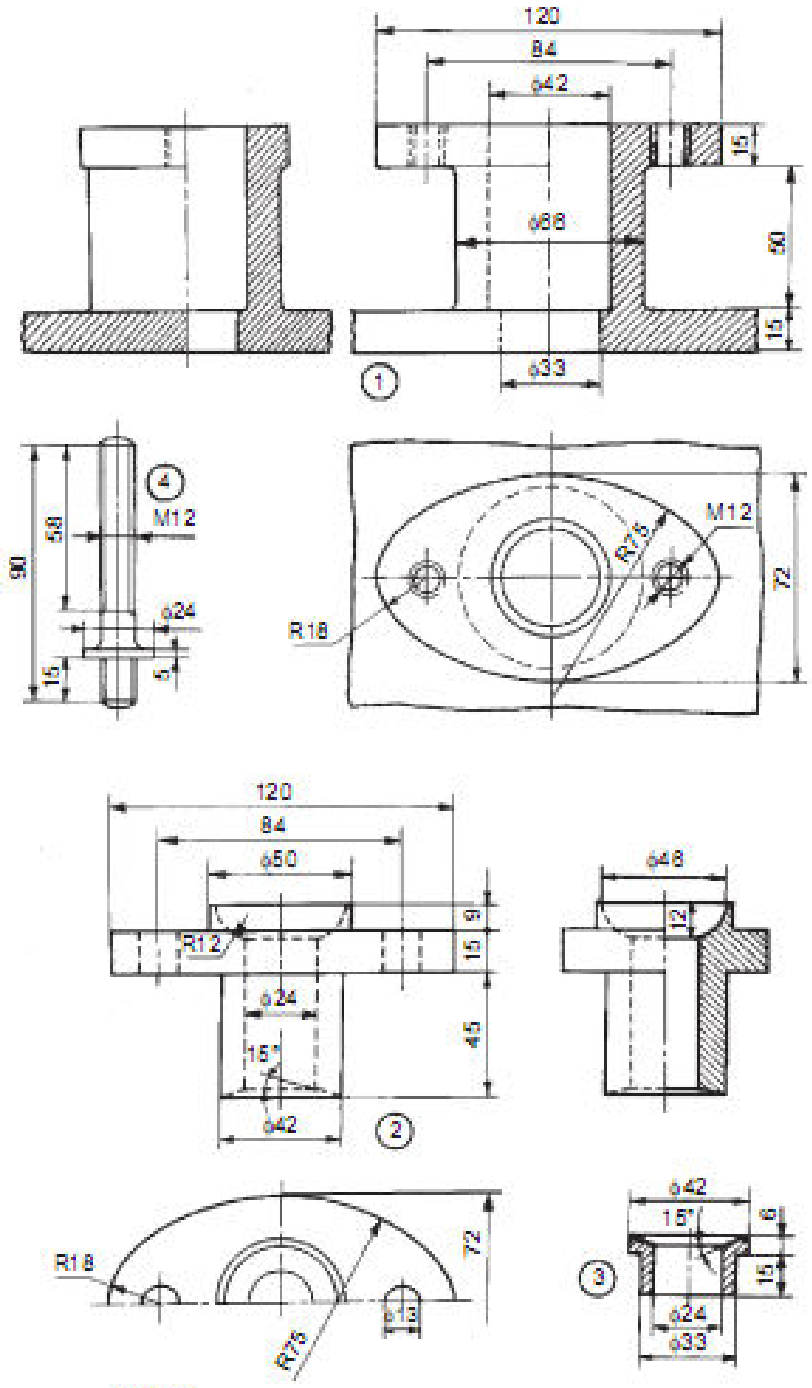
6. Draw the sectional view from the front, and view from the side of a cotter joint with sleeve used to connect two rods of 25 mm diameter each.
7. A journal bearing consists of a bronze bush of diameter 100 mm fitted into a housing and a steel shaft of 50 mm diameter, running in the bush, with oil as lubricant. Determine the working dimensions of (a) bore of the housing, (b) bush and (c) shaft. Calculate the maximum and minimum interference or clearance.

(OR)

8. What are the roughness values that can be normally obtained by (a) fine turning, (b) machine reaming, (c) milling, (d) precision grinding and (e) chrome plating
9. Assemble different parts of stuffing box (Fig 1) and draw the following views for the assembled unit
   i) Sectional Front view ii) Side view. Iii) Top view

(OR)

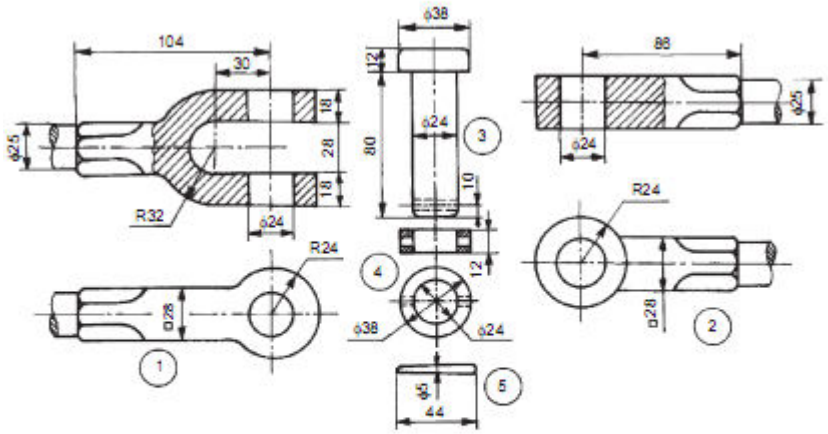
10. Assemble different parts of knuckle joint (Fig 2) and draw the following views for the assembled unit
    i) Sectional Front view ii) Side view.



Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Gland	Brass	1
3	Bush	Brass	1
4	Stud	MS	2
5	Nut, M12	MS	2

Fig 1



Parts list

S. No.	Name	Matl.	Qty.
1	Fork end	Forged steel	1
2	Eye end	Forged steel	1
3	Pin	Mild steel	1
4	Collar	Mild steel	1
5	Taper pin	Mild steel	1

Fig 2

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

AIRCRAFT ENGINEERING DRAWING (R15)

MODEL PAPER – III

1. A cone of diameter 60 mm and height 80 mm is cut by a section plane such that the plane passes through the mid-point of the axis and tangential to the base circle. Draw the development of the lateral surface of the bottom portion of the cone.

(OR)

2. A frustum of a square pyramid has its base 50 mm side, top 25 mm side and height 60 mm. It is resting with its base on HP, with two of its sides parallel to VP. Draw the projections of the frustum and show the development of its lateral surface.

3. Draw the three views of a hexagonal headed bolt of nominal diameter 25 mm and length 100mm; with a hexagonal nut and washer.

(OR)

4. Sketch the following forms of nuts, with proportions marked:
   (a) Flanged nut, (b) cap nut, (c) dome nut, (d) capstan nut, (e) wing nut and (f) ring nut.

5. Draw (a) sectional view from the front and (b) view from above, of the following riveted joints, to join plates of thickness 10 mm:
   (i) Double riveted chain lap joint,
   (ii) Single riveted, single strap butt joint,
   (iii) Single riveted, double strap butt joint

(OR)

6. Draw (a) half sectional view from the front, top half in section and (b) view from the side of a rigid flange coupling to connect two shafts, each of diameter 30 mm.

7. Show how the roughness is indicated on the component for the following situations.
   (a) Surface to be obtained by any production method,
   (b) Surface to be obtained without removal of material
   (c) Surface to be coated, and
   (d) Surface to be given a machining allowance.

(OR)

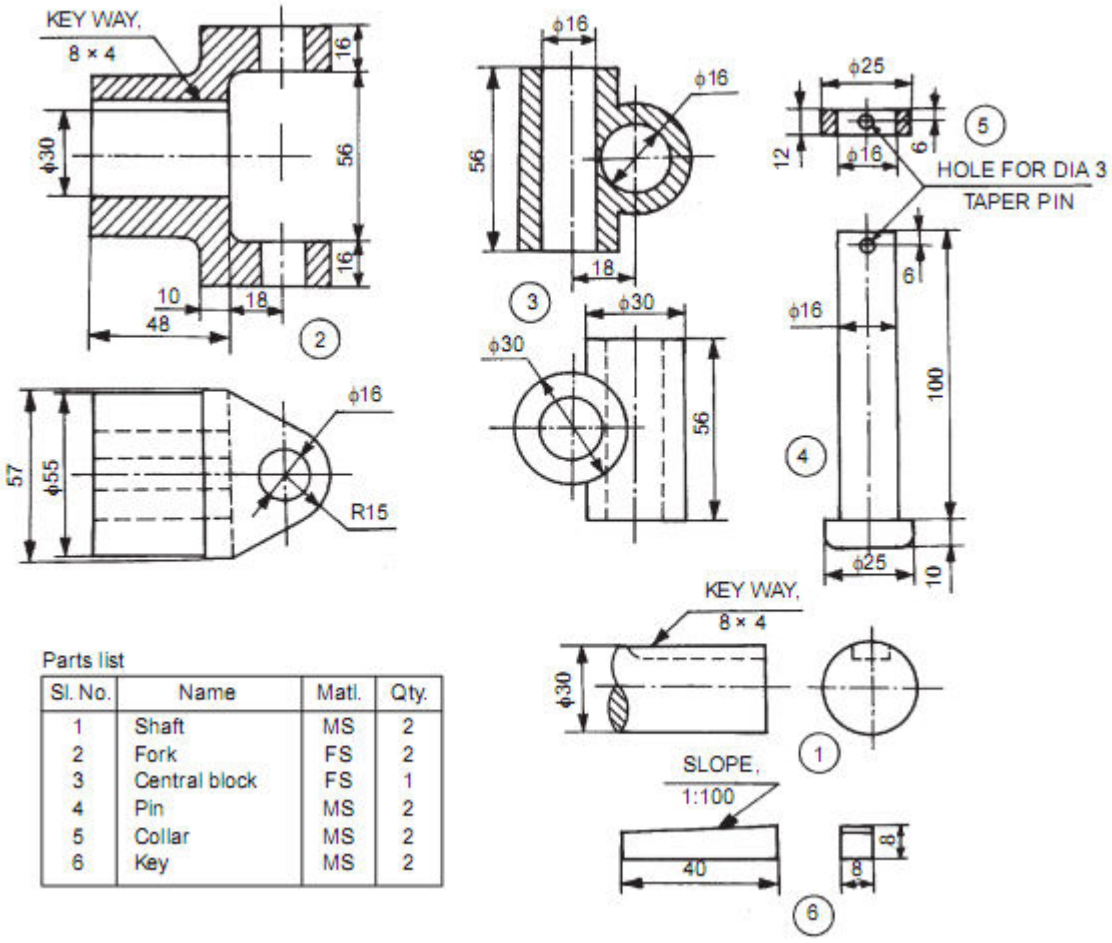
8. A 30mm diameter hole is made on a turret lathe to the limits, 30.035 and 30.00. The following two grades of shafts are used to fit in the hole:
   (a) Ø29.955mm and 29.925mm, and (b) Ø 30.055mm and 30.050mm.

Calculate the maximum tolerance, clearance and indicate the type of fit in each case by a sketch.

9. Assemble the parts of universal coupling and shown in Fig. 1 and draw, (i) sectional view from the front and (ii) view from the right.

(OR)

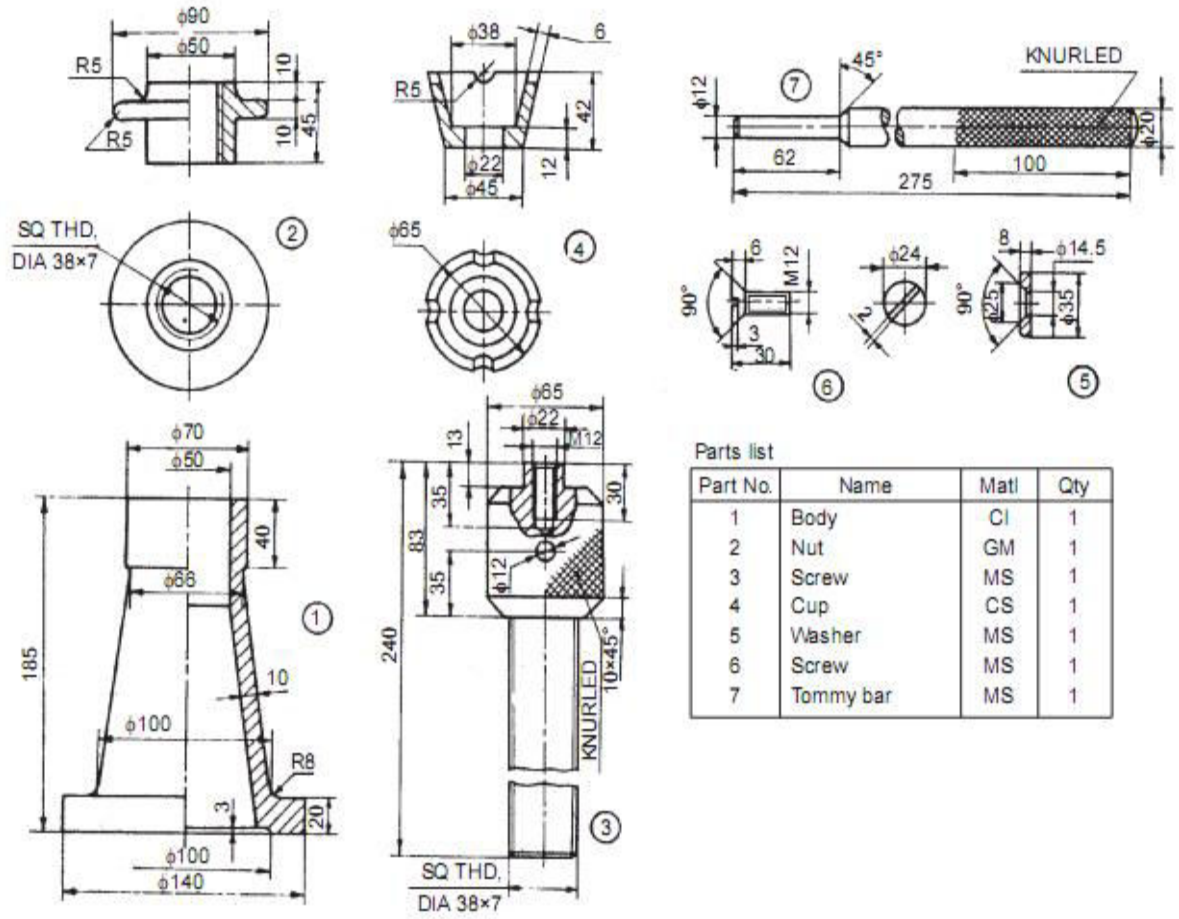
10. Assemble different parts of screw jack (Fig 2) and draw the following views for the assembled unit
    i) Half Sectional Front view ii) Top view.



Parts list

Sl. No.	Name	Matl.	Qty.
1	Shaft	MS	2
2	Fork	FS	2
3	Central block	FS	1
4	Pin	MS	2
5	Collar	MS	2
6	Key	MS	2

Fig 1



Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Nut	GM	1
3	Screw	MS	1
4	Cup	CS	1
5	Washer	MS	1
6	Screw	MS	1
7	Tommy bar	MS	1

Fig 2

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

AIRCRAFT ENGINEERING DRAWING (R15)

MODEL PAPER IV

1. A pentagonal pyramid has its base on the HP. Base of the pyramid is 30mm in side, axis 50 mm long. The edge of the base nearer to VP is parallel to it. A vertical section plane, inclined at 45 to the VP, cuts the pyramid at a distance of 6 mm from the axis. Draw the top view, sectional front view and the auxiliary front view on an A VP parallel to the section plane.

(OR)

2. A cylinder of 40 mm diameter, 60 mm height and having its axis vertical is cut by a section plane, perpendicular to the VP, inclined at 45 to the HP and intersecting the axis 32 mm above the base. Draw its front view, sectional top view, sectional side view and the true shape of the section.

3. Answer any two of the following:
   a. Sketch the conventional representation of the following:
      i) Splined shaft ii) Cylindrical compression spring
   b. Show by sketches
      i) Parallel dimensioning ii) Chain dimensioning
   c. Sketch the following thread profiles where pitch is 3mm
      i) Buttress thread ii) ACME thread

(OR)

4. Answer any two of the following:
   a. Sketch the conventional representation of the following:
      i) steel ii) glass iii) wood iv) cement v) porcelain
   b. Show by sketches dimensioning of tapered features.
      i) External and ii) internal
   c. Sketch the internal and external ISO metric thread profile of nominal size 30X3mm, to a scale of 10:1.
5. Answer any two of the following:

a. Draw three views of a hexagonal headed bolt of nominal diameter 30mm and length 100mm; with a hexagonal nut and washer.
b. Draw two views of the following types of keys in position. Choose shaft diameter as 30mm and hub diameter as 60mm.
   i) Woodruff key ii) parallel sunk key

(OR)

6. Answer any two of the following:
   a. Draw three views of a hexagonal headed bolt of nominal diameter 30mm and length 10mm; with a square nut and a washer.
   b. Draw the sectional view from the front and view from the top of the double riveted double strap chain butt joint with diameter of the rivet as 16 mm.
   c. Draw the half sectional view from the front (left half in section) and view from the above of a solid journal bearing to support a shaft of diameter D and mark proportions on the views.
7. The dimensions of a shaft and a hole are given below:
   Shaft, Basic size = 60mm and given as 60 – 0.020
   Hole, Basic size = 60mm and given as 60 – 0.005
   Find out:
   (a) Tolerance of shaft (b) Tolerance of hole (c) Maximum allowance (d) Minimum allowance (e) Type of fit

(OR)

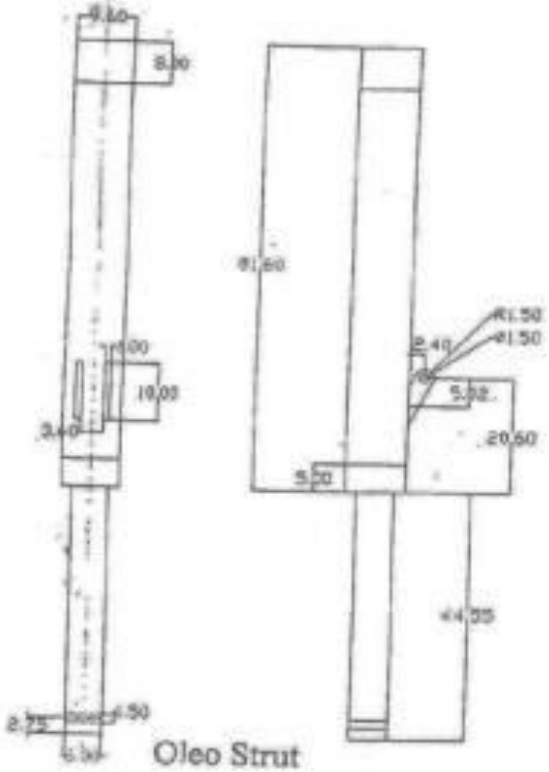
8. Calculate the maximum and minimum limits for both the shaft and hole in the following; using the tables for tolerances and name the type of fit obtained:

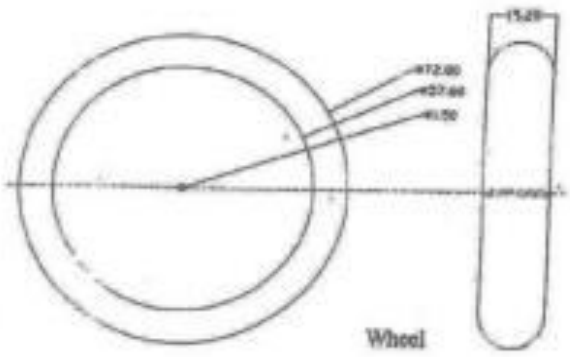
   (a)45H8/d7 (b)180H7/n6 (c)120H7/s6 (d)40G7/h6 (e)35 C11/h10

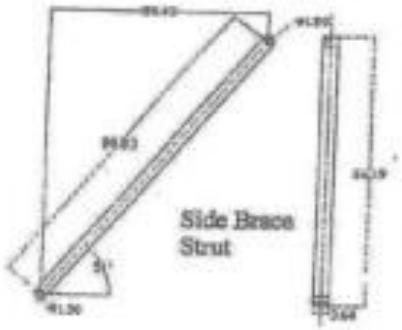
9. Details of double wheel landing gear are shown in the fig1. with dimensions in cm. Assemble all the parts and provide the following views of the assembled double wheel landing gear. View from the front and view from the right. Take suitable scale.

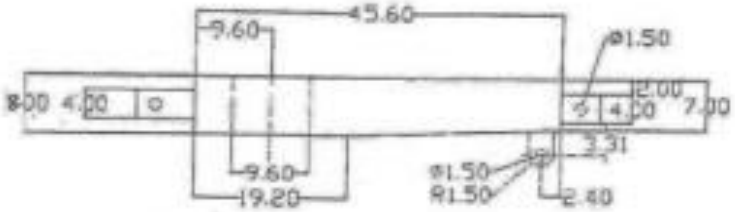
(OR)

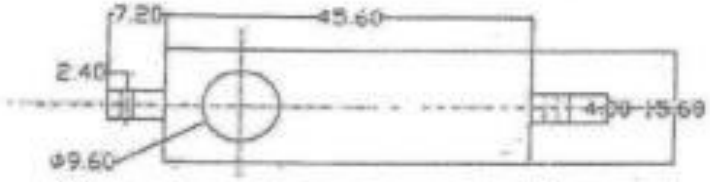
10. Assemble the parts of universal coupling and shown in Fig. 2 and draw, (i) sectional view from the front and (ii) view from the right.



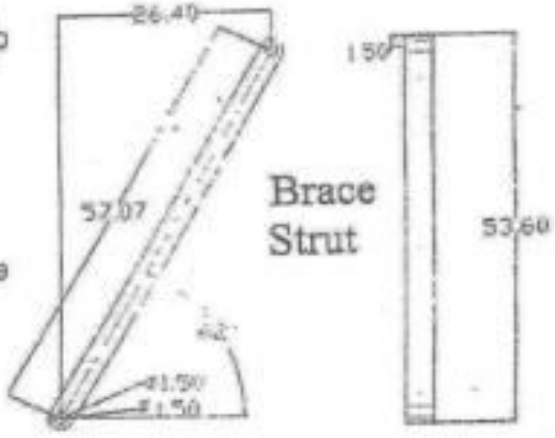








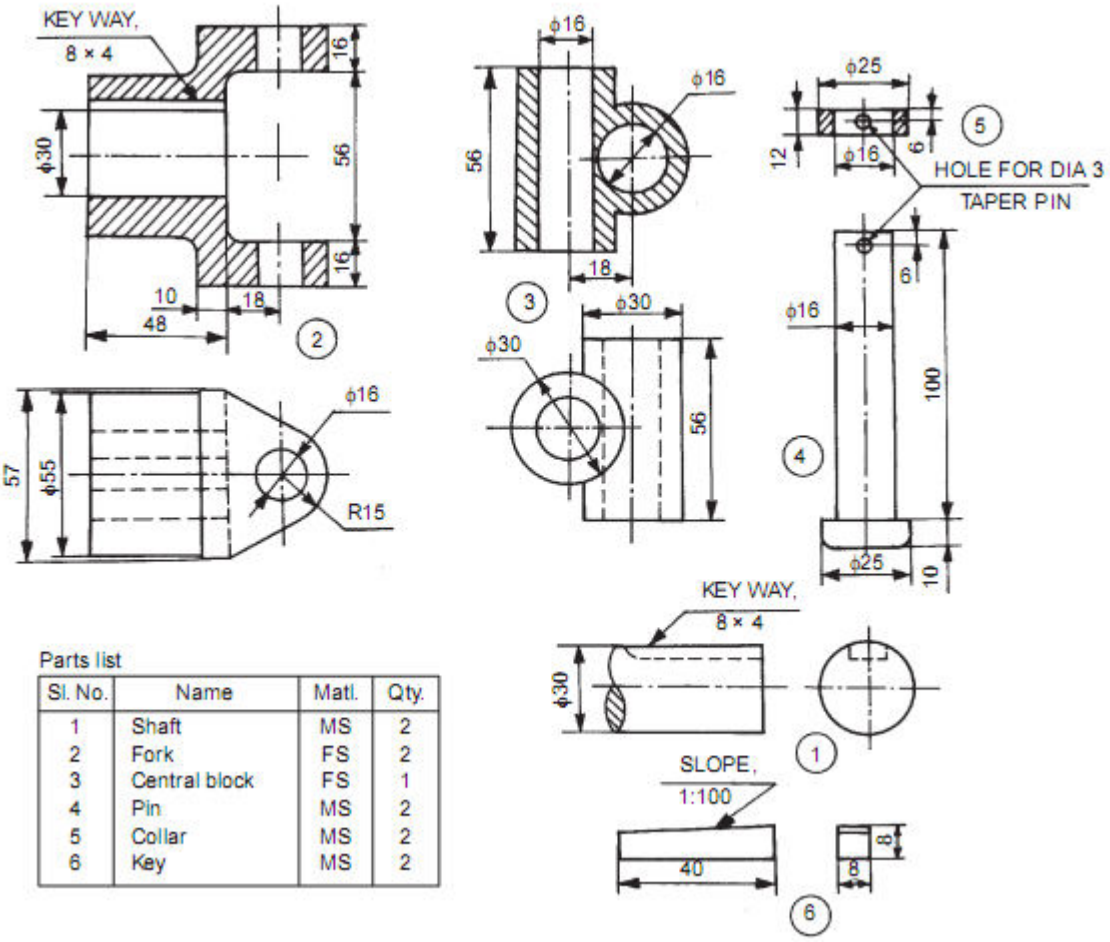
Supporting Frame



PART LIST

SI NO.	PART NAME	QTY
1	Supporting Frame	1
2	Oleo Strut	1
3	Side Brace Strut	1
4	Brace Strut	1
5	Axle	1
6	Wheel	1

Fig 1



Parts list

Sl. No.	Name	Matl.	Qty.
1	Shaft	MS	2
2	Fork	FS	2
3	Central block	FS	1
4	Pin	MS	2
5	Collar	MS	2
6	Key	MS	2

FIG 2

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

AIRCRAFT ENGINEERING DRAWING (R15)

MODEL PAPER V

1. Draw the sectional front view and top view of a double riveted zig-zag lap joint. Take the thickness of main plates=10 mm.

(OR)

2. Draw the sectional front view and top view of a double riveted double strap lap joint. Take the thickness
   of main plates=10 mm.
3. A hexagonal prism, having a base with a 30 mm side and a 70 mm axis, is resting on a face on the ground with axis parallel to the VP. It is cut by a an AVP which makes an angle of 45^{o} with the VP and passes through a point distant 25 mm on the axis from one of its ends. Draw its sectional front view and obtain true shape of the section.

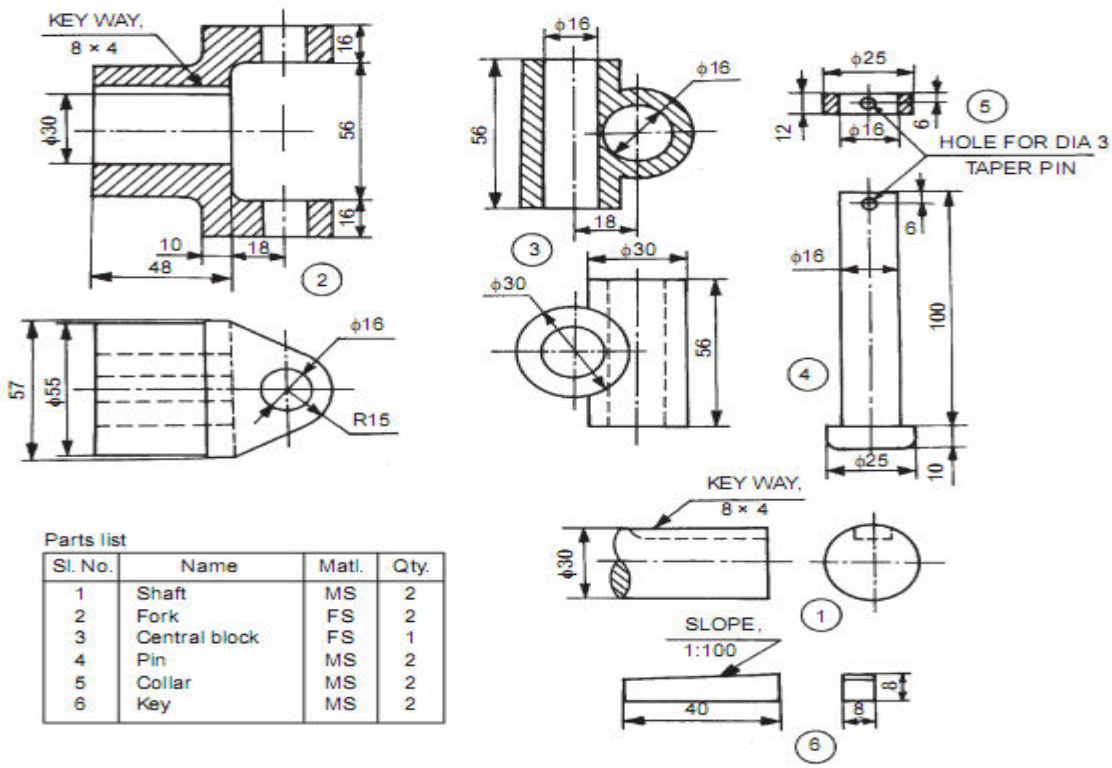
(OR)

4. A pentagonal pyramid, having a base with a 40 mm side and a 70 mm long axis, is resting on the HP on an edge of its base such that the axis is inclined 45^{o} to the HP and parallel to the VP. It is cut by a section plane such that HT and VT of the section plane are perpendicular to the xy line and passes through the edge on which the pyramid is resting. Draw the front view, top view and sectional side view.

5. Assemble the parts of universal coupling and shown in Fig. 1 and draw, (i) sectional view from the front and (ii) view from the right.

(OR)

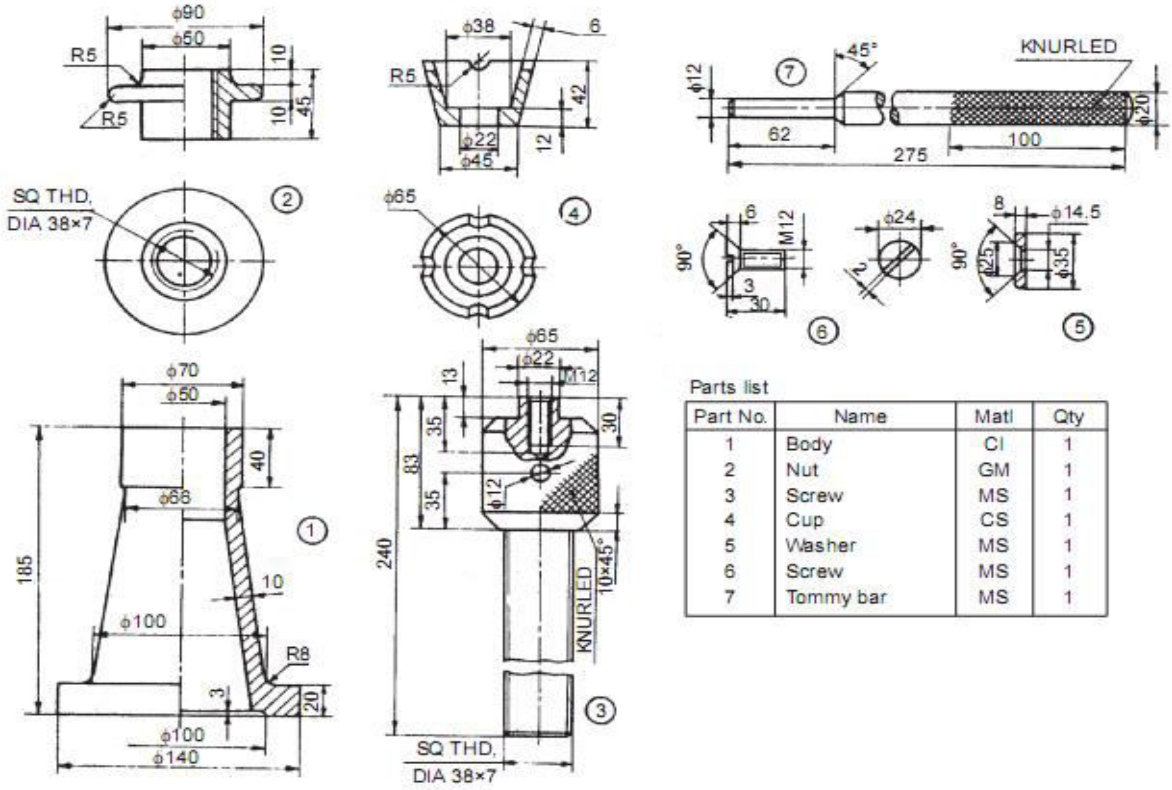
6. Assemble different parts of screw jack (Fig 2) and draw the following views for the assembled unit
   Half Sectional Front view ii) Top view.



Parts list

Sl. No.	Name	Matl.	Qty.
1	Shaft	MS	2
2	Fork	FS	2
3	Central block	FS	1
4	Pin	MS	2
5	Collar	MS	2
6	Key	MS	2

Figure 1



Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Nut	GM	1
3	Screw	MS	1
4	Cup	CS	1
5	Washer	MS	1
6	Screw	MS	1
7	Tommy bar	MS	1

Figure 2

7. Answer any two of the following:

   a) Sketch the conventional representation of the following:
   i) Splined shaft ii) Cylindrical compression spring
   b) Show by sketches
   i) Parallel dimensioning ii)Chain dimensioning
   c) Sketch the following thread profiles where pitch is 3mm
   i) Buttress thread ii)ACME thread

(OR)

8. Answer any two of the following:

   a. Sketch the conventional representation of the following:

      i) steel ii) glass iii) wood iv) cement v) porcelain

   b. Show by sketches dimensioning of tapered features.

   c. i) External and ii) internal

   d. Sketch the internal and external ISO metric thread profile of nominal size 30X3mm, to a scale of 10:1.

9. A journal bearing consists of a bronze bush of diameter 100 mm fitted into a housing and a steel shaft of 50 mm diameter, running in the bush, with oil as lubricant. Determine the working dimensions of (a) bore of the housing, (b) bush and (c) shaft. Calculate the maximum and minimum interference or clearance.

(OR)

10. What are the roughness values that can be normally obtained by (a) fine turning, (b) machine reaming,
    (c)milling, (d) precision grinding and (e) chrome plating

13/5/17 .F.N

R15

Code No: R15A0364

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester supplementary Examinations, May 2017

Thermodynamics

(AE)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART - A (25 Marks)

1. (a) Explain the law on which thermometers function. [2M]
   (b) Define the term Continuum. When is the Continuum concept valid? [3M]
   (c) Discuss about the Clausius inequality. [2M]
   (d) Define reversible process and state the conditions for reversibility? [3M]
   (e) Define the terms: triple point and critical point of water. [2M]
   (f) What is the relationship between the universal gas constant and characteristic gas constant? [3M]
   (g) State Gibbs theorem for internal energy of gas mixtures?. [2M]
   (h) Define Dalton's law of partial pressures. [3M]
   (i) Describe Stirling cycle using p-v and T-S diagrams [2M]
   (j) Represent Otto cycle on p-v and T-S planes. [3M]

PART - B (50 Marks)

SECTION - I

2.a) Differentiate between the macroscopic and the microscopic approaches in thermodynamics. (6M)

(b) Explain "quasi-static process" with a relevant example. (4M)

OR

3 a) State Zeroth law of thermodynamics. What is its significance? (4M)

b) A turbine operates under steady flow conditions, receiving steam at the following state: Pressure 1.2 MPa, temperature 188°C, enthalpy 2785 kJ/kg, velocity 33.3 m/s and elevation 3 m. The steam leaves the turbine at the following state: Pressure 20 kPa, enthalpy 2512 kJ/kg, velocity 100 m/s, and elevation 0 m. Heat is lost to the surroundings at the rate of 0.29 kJ/s. If the rate of steam flow through the turbine is 0.42 kg/s, what is the power output of the turbine in kW? (6M)

SECTION – II

4. (a) Explain Kelvin-Planck and Clausius statements using schematic diagrams. (4M)

(b) State and prove Clausius theorem. (6M)

OR

5. (a) Explain the operation of a cyclic refrigerator plant with the help of a block diagram? [5+5]

(b) A cyclic heat engine operates between a source temperature of 800^0C and a sink temperature of 30^0C. What is the least rate of heat rejection per kW net output of the engine?

SECTION – III

6 Air is compressed from 75 kPa, 50°C to 0.35 MPa and is then expanded. The process of compression is reversible adiabatic and the expansion is at constant pressure to the original volume. The mass flow rate of air is 0.45 kg/so Draw the process on P-v diagram and T-s diagram. Calculate the Work transfer and heat transfer for the complete path.

OR

7(a) Draw the T-S diagram for water and show the different regimes. (5M)

(b) Explain Dalton's Law (5M)

SECTION – IV

8. a) Sketch the Psychrometric chart and explain. (10M)

OR

9. a) Show that for an ideal gas, the slope of the constant volume line is more than that of the constant pressure line on the T-S diagram? [4+6]

b) A certain gas has C_p=1.968 and C_v=1.507kJ/kg.K. Find its molecular weight and the gas constant. A constant volume chamber of 0.35 m^3 capacity contains 2 kg of this gas at 10^0C. Heat is transferred to the gas until the temperature is 110^0C. Find the work done, the changes internal energy, enthalpy and entropy.

SECTION – V

10. In an air standard Diesel cycle, the compression ratio is 14. Compression begins at 0.1MPa, 35°C. The heat added is 1.75 MJ/kg. Find :

i) the maximum temperature of the cycle
ii) the work done per kg of air
iii) the cycle efficiency

OR

11. a) Derive an expression for thermal efficiency of Otto Cycle.

b) Describe the dual cycle using PV and TS diagrams. In what way it differs from Otto Cycle and Diesel Cycle?

* * * * * * * * * *

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

THERMODYNAMICS (R15)

MODEL PAPER – I

PART A **Max Marks: 25**

iii. All questions in this section are compulsory
iv. Answer in four to six sentences.

11. Define a system and how many systems are there ? **(2M)**
12. Define a thermodynamic property ? **(2M)**
13. What is meant by PMM2 ? **(2M)**
14. Define TON of refrigeration ? **(2M)**
15. State the law of conservation of energy ? **(2M)**
16. Differentiate between reversible process and irreversible process ? **(3M)**
17. Define Claussius inequality and prove it ? **(3M)**
18. Compare the otto, diesel, and dual cycle efficiencies ? **(3M)**
19. Explain the significance of Vanderwalls equation and its limitations ? **(3M)**
20. What do you understand by low-grade energy and high-grade energy ? **(3M)**

PART B **Max Marks: 50**

iii. Answer only one question among the two questions in choice.
iv. Each question answer (irrespective of the bits) carries 10M.

11) A steam turbine receives steam at 20 bar and superheated by 80 C. The exhaust pressure is 0.10 bar and expansion takes place isentropically. Calculate

a) Heat supplied, assuming that the feed pump supplies water to the boiler at 20 bar,
b) Heat rejected,
c) Turbine work,
d) Net work,
e) Thermal efficiency, and
f) Theoretical steam consumption.

OR

12a)Describe diesel gas power cycle with the help of P-V and T-S diagrams. Derive an expression for its air standard efficiency

b)A diesel engine has a clearance volume of 220 **cm3** and a bore and stroke of 15 cm and 20cm respectively. The inlet conditions are 100 KN/**m2** and 20 C. The maximum temperature of the engine is 1400 C. Calculate

i. Ideal thermal efficiency of cycle and
ii. m.e.p

13a)What is critical point ? What process is possible below the critical point ?

b)Steam initially at 1.5 Mpa, 300 C expands reversibly and adiabatically in a steam turbine to 40 C. Determine the ideal work output of the turbine per kg of steam.

OR

14a)Explain "internal energy", "heat and work"

b)To a closed system 100 KJ of work is supplied. If the initial volume is 0.5 **m3** and pressure of a system changes as P=(8-4V), where P is in bar and V is in **m3**, determine the final volume and pressure of the system.

15a)Prove that at adiabatic saturation t**db = twb** = t*

b) A mixture of ideal air and water vapour at a dbt of 22 C and a total pressure of 730 mmHg abs. has a temperature of adiabatic saturation of 15 C. Calculate
i. The specific humidity in gms per kg of dry air
ii. The partial pressure of water vapour
iii. The relative humidity, and
iv. Enthalpy of the mixture per kg of dry air.

OR

16) 0.2 **m3** of air at 3 bar and 120 C is contained in a system. A reversible adiabatic expansion takes place till the pressure falls to 1.5 bar. The gas is then heated at constant pressure till enthalpy increases by 75 kJ. Calculate the work done and the index of expansion, if the above processes are replaced by a single reversible polytropic process giving the same work between the same initial and final states.

17a) What is a PMM2 ?

b)A heat pump operates between two identical bodies of specific heat C and T**1**. The operation of the pump cools down one of the bodies to T**2.** Show that for the operation of pump the minimum work input is given by

$W_{min} = C [T1/T2 + T2 - 2T1]$

OR

18a)Show that energy of an isolated system remains unchanged ?

b)A system comprises a stone of mass 20 kg and a drum containing 1000 kg of water. Initially the stone is 50 m above the water and the stone and water are at the same temperature. The stone is then made to fall into water. Determine change in internal energy, kinetic energy, potential energy heat transfer, and work transfer for the changes of state given below ?

i. The stone is to just enter water.
ii. The stone just comes to rest in drum, and
iii. The heat transferred to surroundings is such that water and stone remain in the same temperature. Assume g = 9.81 m**/s2**

19) One kg of air at 27 C is heated reversibly at constant pressure until the volume is doubled and then heated reversibly at constant volume until the pressure is doubled. For a total path find work, heat transfer and changed in entropy.

OR

20) Draw T-S diagram of water and show dew point temperature, dry bulb temperature and critical temperature.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

THERMODYNAMICS (R15)

MODEL PAPER – II

PART A **Max Marks: 25**

iii. All questions in this section are compulsory
iv. Answer in four to six sentences.

11. Define state ? **(2M)**
12. What are the different types of heat ? **(2M)**
13. What do you mean by availability ? **(2M)**
14. State Zeroth law of thermodynamics ? **(2M)**
15. Prove Cp-Cv=R ? **(2M)**
16. What is a quasistatic ? **(3M)**
17. Define entropy and show that it is a property of the system ? **(3M)**
18. What do you understand by mean effective pressure ? **(3M)**
19. Distinguish between thermal and thermodynamic equilibrium ? **(3M)**
20. Define the following terms **(3M)**
    i. Partial pressure
    ii. Mole fraction
    iii. Mass fraction

PART B **Max Marks: 50**

iii. Answer only one question among the two questions in choice.
iv. Each question answer (irrespective of the bits) carries 10M.

Q11

a) State the limitations of the first law of thermodynamics.
b) A reversible heat engine operates between 875K and 310K and deliver a reversible refrigerator operating between 310K and 255K. the engine receives 2000KJ of heat and the net work output from the arrangement equals to 350KJ. Calculate the cooling effect of refrigerator.

OR

Q12 Steam at 0.8 Mpa, 250 C and flowing at the rate of 1 kg/s passes into a pipe carrying wet steam at 0.8 Mpa, 0.9 dry. After adiabatic mixing the flow rate is 2.5 kg/s. determine the condition of steam after mixing. The mixture is now expanded in a frictionless nozzle isentropically to a pressure of 0.4 Mpa. Determine the velocity of the steam leaving the nozzle. Neglect the velocity of steam in the pipe line..

13Q

Steam at a pressure of 15 bar and 250 C is delivered to the throttle of an engine. The steam expands to 2 bar when release occurs. The steam exhaust takes place at 1.1 bar. A performance test gave the result of the specific steam consumption of 12 kg/kwh and a mechanical efficiency of 80%. Determine

a) Ideal work or the modified Rankine engine work per kg
b) Efficiency of the modified Rankine engine or ideal thermal efficiency
c) Indicated and brake work per kg
d) Brake thermal efficiency
e) Relative efficiency on the basis of indicated work and brake work.

OR

14Q (a) Derive energy equation for a closed system undergoing

i. Isochoric process
ii. Isothermal process
iii. Polytropic process between state 1 to state 2.

b) When a closed system executes a certain non flow process the work and heat interactions per degree rise in temperature at each temperature attained are given by dW/dT=(4-0.08T)KJ/KdQ/dt=1.00KJ/K. calculate for the increase (or) decrease in the internal energy of the sytem if it is to operate between the temperature limits of 200 C and 500 C.

Q15 A rigid vessel of volume 0.86 m^3 contains 1 kg of steam at a pressure of 2 bar. Evaluate the specific volume , temperature ,dryness fraction, internal energy, enthalpy and entropy of steam.

OR

16Q (a) What is heat pump? How does it differ from refrigerator? Explain the COP of both the cases.

(b) A cyclic heat engine operates between a source temperature of 800°C and a sink temperature of 30°C. What is the least rate of heat rejection per kW net output of the engine?

Q17. (a) Draw the phase equilibrium diagram for a pure substance on T-s plot with relevant constant property lines

(b) A vessel of 0.04 m^2 Contains a mixture of saturated water and saturated steam at a temperature of 250°C. The Mass liquid present is 9kg . Find pressure, the mass, the specific volume, the enthalpy and entropy and the internal energy

OR

18 (a) What do you understand by triple point? Give the pressure and temperature of water at its triple point.

(b) Find the enthalpy and entropy of steam when the pressure is 2 MPa and the specific volume is 0.09 m^3/kg.

Q19. (a) Describe diesel gas power cycle with the help of P-V and T-S diagrams. Derive the expressions for its air standard efficiency and mean effective pressure.
(b) A diesel engine has a clearance volume of 220 cm3 and a bore and stroke of 15 cm and 20 cm respectively. The inlet conditions are 100 kN/m2 and 20°C. The maximum temperature of the engine is 1400°C. Calculate,
(i) Ideal thermal efficiency of cycle
(ii) Mean effective pressure.

OR

Q20(a) Discuss the advantages and disadvantages of vapour absorption refrigeration system over the vapour compression system.
(b) A Bell-Coleman refrigeration cycle works between 1 bar and 6 bar. Find the C.O.P of the system and its tonnage when the air flow rate is 1 kg/s. The ambient temperature is 27°C and refrigerator temperature is 0°C.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

THERMODYNAMICS (R15)

MODEL PAPER – III

PART A **Max Marks: 25**

i. All questions in this section are compulsory
ii. Answer in four to six sentences.

1. Define work from thermodynamic point of view ? **(2M)**
2. Define PMM1 ? **(2M)**
3. What are the causes of irreversibility ? **(2M)**
4. What is meant by equilibrium ? **(2M)**
5. Define enthalpy ? **(2M)**
6. Explain why development of Carnot engine is practically not possible ? **(3M)**
7. State the application of steady flow energy equation ? **(3M)**
8. Distinguish between microscopic and macroscopic approach of thermodynamics ? **(3M)**
9. Explain about systems ? **(3M)**
10. What are the assumptions made for air standard cycles ? **(3M)**

PART B **Max Marks: 50**

iii. Answer only one question among the two questions in choice.
iv. Each question answer (irrespective of the bits) carries 10M.

11 (a) Distinguish between the terms change of state, path and process.
(b) Show that energy is a property of a system. And explain with suitable figures.

OR

Q 12) The air speed of a turbo jet engine in flight is 270 m/s. Ambient air temperature is 15°C. Gas temperature at outlet of nozzle is 600°C. Corresponding enthalpy values for air and gas are respectively 26 and 912 kJ/kg. Fuel air ratio is 0.0190. Chemical energy of the fuel is 44.5 MJ/kg. Owing to incomplete combustion 5% of the chemical energy is not released in the reaction. Heat loss from the engine is 21 kJ/kg of air. Calculate the velocity of the exhaust jet

Q13) A reversible heat engine operates between two reservoirs at temperatures of 600°C and 40°C. The engine drives a reversible refrigerator which operates between reservoirs at temperatures of 40°C and 20°C. The heat engine is 2000 kJ and the network output of the combined engine refrigerator plant is 360 kJ.

(i) Evaluate the heat transfer to the refrigerant and the net heat transfer to the reservoir at 40°C.
(ii) Reconsider (a) Given that the efficiency of the heat engine and the COP of the refrigerator are each 40% of their maximum possible values

OR

14 (a) What do you understand by triple point? Give the pressure and temperature of water at its triple point.

(b) Find the enthalpy and entropy of steam when the pressure is 2 MPa and the specific volume is 0.09 m^3/kg.

Q15.(a) Discuss the advantages and disadvantages of vapour absorption refrigeration system over the vapour compression system.
(b) A Bell-Coleman refrigeration cycle works between 1 bar and 6 bar. Find the C.O.P of the system and its tonnage when the air flow rate is 1 kg/s. The ambient temperature is 27°C and refrigerator temperature is 0°C.

OR

16(a) Describe diesel gas power cycle with the help of P-V and T-S diagrams. Derive the expressions for its air standard efficiency and mean effective pressure.
(b) A diesel engine has a clearance volume of 220 cm3 and a bore and stroke of 15 cm and 20 cm respectively. The inlet conditions are 100 kN/m2 and 20°C. The maximum temperature of the engine is 1400°C. Calculate,
(i) Ideal thermal efficiency of cycle
(ii) Mean effective pressure.

17. (a) What is heat pump? How does it differ from refrigerator? Explain the COP of both the cases.
(b) A cyclic heat engine operates between a source temperature of 800°C and a sink temperature of 30°C. What is the least rate of heat rejection per kW net output of the engine?

OR

18 (a) Draw the phase equilibrium diagram for a pure substance on T-s plot with relevant constant property lines

(b) A vessel of 0.04 m^2 Contains a mixture of saturated water and saturated steam at a temperature of 250°C. The Mass liquid present is 9kg . Find pressure, the mass, the specific volume, the enthalpy and entropy and the internal energy.

Q19 a) show that the Claussius statement and Kelvin Planck statement are same
b)To aclosed systems 100 kJ of work is supplied. If the initial volume is 0.5 m^3 and pressure of a system changes as P = (8-4 V), where P is in bar and V is in m^3, determine the final volume and pressure of the system.

OR

20) Steam at 0.8 MPa, 250 °C and owing at the rate of 1 kg/s passes into a pipe carrying wet steam at 0.8 MPa, 0.9 dry. After adiabatic mixing the flow rate is 2.5 kg/s. Determine the condition of steam after mixing. The mixture is now expanded in a frictionless nozzle isentropically to a pressure of 0.4 MPa. Determine the velocity of the steam leaving the nozzle. Neglect the velocity of steam in the pipe line.

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(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

THERMODYNAMICS (R15)

MODEL PAPER – IV

PART A **Max Marks: 25**

i. **All questions in this section are compulsory**
ii. **Answer in four to six sentences.**

1) What do you understand by path function and point function?(2)
2) What are exact and inexact differentials?(2)
3) What is a PMM I and PMM II?(3)
4) Explain the terms 'source' and 'sink'?(2)
5) What is the critical state?(2)
6) What are the applications of Mollier chart?(2)
7) Define Avogadro's law and Daltons law of partial pressures.(3)
8) Write the applications of psychometric chart. (3)
9) Why dual cycle is called mixed cycle?(3)
10) Write the advantages and disadvantages of Bell-Coleman cycle.(3)

PART B **Max Marks: 50**

11 A stationary mass of gas is compressed without friction from an initial state of 0.35 m^3 and 0.11 MPa to a final state of 0.25 m^3 at constant pressure. There is a transfer of 48.67 kJ of heat from the gas during the process. How much does the internal energy of the gas change?

OR

12 A system composed of 2 kg of the above fluid expands in a frictionless piston and cylinder machine from an initial state of 1 MPa, 100 °C to a final temperature of 30 °C. If there is no heat transfer, then find the network for the process

13 A reversible heat engine operates between two reservoirs at temperature of 600 °C and 40°C. The engine drives a reversible refrigerator which operates between reservoirs at temperatures of 40°C and 20°C. The heat engine is 2000 kJ and the network output of the combined engine refrigerator plant is 360 kJ. Then,

(i)Evaluate the heat transfer to the refrigerant and the net heat transfer to the reservoir at 40°C.

OR

14 Reconsider (i) given that the efficiency of the heat engine and the COP of the refrigerator are each 40% of their maximum possible values.

15 A rigid vessel of volume 0.86m3 contains 1 kg of steam at a pressure of 2 bar. Evaluate the specific volume, temperature, dryness fraction, internal energy, enthalpy and entropy of system

OR

16 State and explain i) Dalton's law of partial pressures
ii) Avogadro's Law

17. 5 kg of steam with a dryness fraction of 0.9 expands adiabatically to the Law PV1.13constant. from a pressure of 8 bar to 1.5 bar determine i)final dryness fraction ii)heat transferred iii)work done

OR

18 Air at 16^{o}C and 1.2 bar occupies a volume of 0.03m^{3}.the air is heated at constant voulume until the pressure is 4.3 bar and then cooled at constant pressure back to the original temperature.calculate i) The net heat flow to or from the air and

ii) the net entropy change.

19 The compression ratio in an air standard Otto cycle is 7.5.at the beginning of compression process the pressure is 120kN/m2 and the temperature is 300k.The heat added to the air per cycle is 1650kJ/kg of air. calculate a)the pressure and the temperatures at the end of each process of the cycle b)the thermal efficiency c)the MEP of the cycle and d)power out per kg of air.

OR

20 In an ideal refrigeration cycle the temperature of of the condensing vapor is -40oC and the temperature during evaporation is – 15oC Calculate a) The COP of the cycle

b) The power required to produce one ton of refrigeration and Mass flow rate of the refrigeration for each ton of refrigeration consider the working fluids F 12 and ammonia

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

THERMODYNAMICS (R15)

MODEL PAPER – V

PART A **Max Marks: 25**

i. All questions in this section are compulsory

ii. Answer in four to six sentences.

1) Explain what do you understand by thermodynamic equilibrium?(3)
2) State Zeroth law of thermodynamics(3)
3) Why PMM I and PMM II are impossible to operate? (2)
4) What is the thermal energy reservoir?(2)
5) Explain the terms critical pressure, critical temperature and critical volume of water.(3)
6) State and explain Daltons' law of partial pressures and Avogadro's law of additive volumes.(3)
7) Define mole fraction, mass fraction.(2)
8) Define DBT, WBT, RH.(3)
9) What is dual cycle?(2)
10) What is mean effective pressure?(2)

Part – B

11) A cyclic heat engine operates between a source temperature of 800°C and a sink temperature of 30°C. What is the least rate of heat rejection per kW net output of the engine?

OR

12) A vessel of 0.04 m^3 contains a mixture of saturated water and saturated steam at a temperature of 250°C. The mass liquid present is 9 kg. Find the pressure, the mass, the specific volume, the enthalpy and entropy and the internal energy.

13) a) State Kelvin-Plank statements and Clausius statement
b) Prove that all reversible engines operating between the same two heat reservoirs have the same efficiency

OR

14) Two reversible heat engines operate on carnot cycle. They work in series between a maximum and minimum temperature of 550 C and 20 C. If the engines have equal thermal efficiencies and the first rejects 450 KJ to the second, calculate
i) The temperature at which heat is supplied to the second engine
ii) The work done by each engine

15) 10 kg of feed water is heated in a boiler at a constant pressure of 1.5 MN/m2 from 40 C. Calculate the enthalpy required and change of entropy when water is converted into following qualities of steam in each case i) Wet steam at x=0.95 and ii) Super heated steam at 300 ^{0}C

OR

16) Define dryness fraction of steam. Describe methods of finding dryness fraction of steam

17) a) Define saturated air, wet bulb temperature, specific humidity and relative humidity.
b) State and explain i) Dalton's law of partial pressure ii) Avagadro's law

OR

18) What is the use of psychometric chart, compressibility charts and Mollier chart

19) Describe diesel gas power cycle with the help of P-V and T-S diagrams. Derive an expression for its air standard efficiency

OR

20) Explain with neat sketch the working of Vapour compression refrigeration cycle

Code No: R15A0067

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester supplementary Examinations, May 2017

Technology Management

(AE)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART - A (25 Marks)

1. (a) R&D and competitive advantage [2M]
   (b) Techniques for creative problem solving [3M]
   (c) Project selection formulae [2M]
   (d) Need for cost effectiveness [3M]
   (e) Product architecture and design [2M]
   (f) Project termination [3M]
   (g) Role of technological forecasting in decision making [2M]
   (h) Forecasting techniques [3M]
   (i) Price of technology transfer [2M]
   (j) Recent trends in technology transfer [3M]

PART - B (50 Marks)

SECTION - I

2. Explain the selection and implementation of R&D strategy in business?

OR

3. What are the factors contributing successful technological innovation?

SECTION – II

4. How would you forecast the R&D expenses?

OR

5. "Every R&D project and product development project is exposed to risks related to budget and duration" Explain?

SECTION – III

6. Explain the role of Market research in developing new products with suitable example?

OR

7. Explain the various tools/techniques used in efficient product development

SECTION – IV

8. "Anticipating technological change is an important management function" discuss with suitable example?

OR

9. Explain the process of technological forecasting in the organisation

SECTION – V

10. What is negotiation? Explain the strategies used in negotiation for price of MOT.

OR

11. What is transfer of technology? Explain the modes of technology transfer

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

TECHNOLOGY MANAGEMENT (R15)

MODEL PAPER – I
MAXIMUM MARKS: 75

PART A **Max Marks: 25**

1. What are the two levels involved in technological innovation?
2. How do technological innovations generate income to an organization?
3. What are the approaches available to product designers for estimating the unit cost?
4. What are Pro forma statements? Explain how pro forma statements are made based on percentage of sales method.
5. What are the stages involved in R & D process?
6. Briefly explain the important issues involved in project termination.
7. Define technological forecasting
8. Briefly explain trend analysis as a forecasting technique
9. Explain reverse-engineering channel of technology flow.
10. Explain briefly licensing route of technology transfer.

Part B

Answer all questions

11. (a) What is the conceptual approach to technological innovation? What are the two levels involved in technological innovation?
    (b) At the firm level, **e**xplain the stages of problem solving in the process of technological innovation.

Or

12. Explain different stages in the process of technological innovation.
13. Explain different cost possibilities which should be investigated in case R & D projects?

Or

14. What is the principle involved in DCF methods of project evaluation? Explain the weak points DCF methods.
15. What are the objectives of R & D?

Or

16. Explain the stages involved in new product development.
17. Define technological forecasting. Explain the forecasting model as an input-output system with the help of a neat diagram

Or

18. Explain the five-step process of technological forecasting.

19. What are different types of channels available for technology flow?

Or

20. Discuss the principal routes of enterprise-to-enterprise technology transfer.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

TECHNOLOGY MANAGEMENT (R15)

MODEL PAPER – II

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

1. What do you understand by elements of strategy for R & D? What are the levels of strategy for R & D?
2. What are the categories of new products that can be identified in new product development?
3. List the project evaluation techniques used under certainty and uncertainty.
4. Write short notes on DCF methods of project evaluation.
5. Explain the meaning of critical path of the program in a network (CPM)
6. Briefly explain the four types of development projects commonly considered in an organization.
7. What is Delphi technique? Explain briefly.
8. Explain the problems associated with forecasting based on expert opinion.
9. Briefly explain the channels of technology transfer.
10. What is turnkey-project route of technology transfer? Briefly explain.

Part B

Answer all questions

11. What are the factors contributing to successful technological innovation?

or

12. Briefly explain the focus areas that the technology portfolio.
13. State the reasons that make risk inherent in R & D projects. Distinguish between project risk and business risk associated with R & D projects.

Or

14. What is the principle involved in Discounted Cash Flow method of project evaluation. Explain the NPV method along with merits and demerits.
15. Explain the activities to be taken up in different stages of project management

or

16. What are the sequences covering the project planning. Explain briefly.
17. State and explain the important forecasting techniques.

Or

18. What are the essential steps that constitute the morphological method.

19. What are the broad categories of payments for technology transfer? Explain briefly.

Or

20. What are the general guidelines for setting up a transfer team in an organization?

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

TECHNOLOGY MANAGEMENT (R15)

MODEL PAPER – III

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

1. What are attributes of creativity in new product development?
2. Explain the factors that drive the changes at technology level in the process of technology development
3. What are the merits and demerits of IRR method of project evaluation?
4. State four examples of potential negative events of risk that can occur in specific projects.
5. Differentiate between short term and long term projects while planning the portfolio
6. Explain breakthrough projects with examples.
7. How is technology monitoring method used as a forecasting technique?
8. What is dynamic modeling forecasting technique? List the tools available under this type of modeling.
9. Explain the concept of general channels of technology flow/transfer.
10. What is equipment-supplier route of technology transfer? Briefly explain.

Part B

Answer all questions

11. What are the key factors to be considered when allocating funds to R & D? Briefly explain.

Or

12. What are the approaches that can be used for allocating funds to R & D?
13. How are the methods used for evaluating R & D projects categorized? Explain the pay-back method along with the merits and demerits.

Or

14. Explain Internal Rate of Return method. How is it superior when compared to NPV and PI methods?
15. Explain Internal Rate of Return method. How is it superior when compared to NPV and PI methods?

Or

16. What are effectiveness ratios that indicate the usefulness of the R & D program to the organization?
17. What are the series indicators in forecasting? Explain the general categories.

Or

18. Discuss the organizational requirement for technological forecasting.
19. Explain the variations that necessitate price negotiation.

Or

20. What are technology transfer agreements? State the obligations of the licensor and licensee in the agreements.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

TECHNOLOGY MANAGEMENT (R15)

MODEL PAPER – IV

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

1. State different attributes of creativity in new product development?
2. What are the factors that drive the changes at technology level in the context of technology development
3. What are the project evaluation techniques used under uncertainty. Explain any one of them briefly
4. What is principle of DCF methods of project evaluation.
5. Explain the stages involved in R & D process.
6. State the important issues involved in project termination and briefly explain..
7. How is technology monitoring method used as a forecasting technique?
8. What is dynamic modeling forecasting technique? List the tools available under this type of modeling.
9. State the concept of reverse-engineering channel of technology flow.
10. What is the purpose of licensing route of technology transfer.

Part B

Answer all questions

11. Explain the conceptual approach to technological innovation? What are the two levels involved in technological innovation?

Or

12. Briefly explain the focus areas that the technology portfolio.
13. What are the methods used for evaluating R & D projects categorized? Explain the pay-back method along with the merits and demerits.

or

14. Explain the NPV method along with merits and demerits.
15. What is the principle of Internal Rate of Return method. Compare with NPV and PI methods.

Or

16. Define are effectiveness ratios that indicate the usefulness of the R & D program to the organization? Explain their relevance clearly.
17. State and explain the series indicators in forecasting.

Or

18. Discuss the organizational requirement for technological forecasting
19. List the broad categories of payments for technology transfer explaining each one of them briefly.

Or

20. State and explain the general guidelines for setting up a transfer team in an organization?

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC AUTONOMOUS)

II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING

TECHNOLOGY MANAGEMENT (R15)

MODEL PAPER – V

MAXIMUM MARKS: 75

PART A **Max Marks: 25**

1. Explain the levels involved in technological innovation?
2. Explain the process of income generation by technological innovations.
3. Explain briefly the approaches available to product designers for estimating the unit cost?
4. State the purpose of pro forma statements and how they are made based on percentage of sales method.
5. What is the purpose of critical path of the program in a network (CPM)
6. State the four types of development projects commonly considered in an organization. Explain them briefly
7. Explain the process followed in delphi technique?
8. Explain the problems associated with forecasting based on expert opinion.
9. State the concept of general channels of technology flow/transfer and briefly explain.
10. Explain the equipment-supplier route of technology transfer.

Part B

Answer all questions

11. What are the stages of problem solving in the process of technological innovation. Explain.

Or

12. State and explain the focus areas that the technology portfolio.
13. State various cost possibilities which should be investigated in case R & D projects?

Or

14. Explain the principle involved in DCF methods of project evaluation? What are the weak points DCF methods?
15. State the activities to be taken up in different stages of project management and explain each stage

or

16. State the sequences covering the project planning. Explain briefly.
17. Explain the forecasting model as an input-output system with the help of a neat diagram

Or

18. State and explain the five-step process of technological forecasting.
19. State the variations that necessitate price negotiation. Explain them briefly.

Or

20. Explain the purpose of technology transfer agreements? State the outline of the obligations of the licensor and licensee in the agreements.

Code No: R15A2101

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester supplementary Examinations, May 2017

Aircraft Production Technology

(AE)

Roll No										

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART - A (25 Marks)

1. (a) What is the purpose of riser? [2M]
   (b) Explain the basic principles of arc welding. [3M]
   (c) Name different types of lathes. Explain their uses. [2M]
   (d) Distinguish between shaving and burnishing [3M]
   (e) Name the materials used to make tools for the machines. [2M]
   (f) Write sheet metal characteristics. [3M]
   (g) Explain, how the EDM process is capable to make complex shapes? [2M]
   (h) Write some of the special tools used for aircraft assembly/ maintenance. [3M]
   (i) Name few jigs and fixtures used in aircraft industry. [2M]
   (j) Explain chemical theory of corrosion. [3M]

PART - B (50 Marks)

SECTION - I

2.a) Give step by step procedure for investment casting and centrifugal casting.
b) How are risers and spruces placed in sand molds? Explain with sketches.

OR

3. a)Explain Gas- Tungsten-Arc welding and its capabilities.
b) Explain about spot welding

SECTION – II

4. a) Explain the similarities and differences in the design guidelines for turning and boring.
b) What determines the selection of the number of teeth on a milling cutter? Explain.

OR

5. a) Explain about soldering techniques
b) Explain super plastic forming and diffusion bonding. Where these processes are used?

SECTION – III

6. a) Explain plasma-arc machining and its capabilities.
b) Explain advantages and disadvantages of LASER beam machining compared to conventional machining.

OR

7. a) Draw the schematic of the abrasive-jet machining and explain in detail.
   b) Does the electrical discharge machining affect the fatigue strength of metal? Explain.

SECTION – IV

8. a) Explain the methods of paint application and types of paints used in aircraft industry.
   b) Write types of corrosion. How to identify and prevent corrosion from the aircraft?

OR

9. a) Explain anodizing, hot dipping and diffusion coating.
   b) Explain the method of Ion- Plating. What are the advantages of this method?

SECTION – V

10. a) Explain the principles of operation of ultrasonic NDT technique. In which materials it is most suited?
    b) Explain different types of riveted joints used in aircraft manufacturing. Draw the sketches and give advantages of each.

OR

11. a) Explain Dye Reentrant NDT method. Why this method is widely used for in-situ aircraft components?
    b) A very extensive tooling concept is used in aircraft industry. Explain the reason and methods of aircraft tool control.

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MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING
AIRCRAFT PRODUCTION TECHNOLOGY (R15)
MODEL PAPER – I
MAXIMUM MARKS: 75

PART A **Max Marks: 25**

1. Enumerate the various steps involved in investment casting.
2. Explain about various patterns used in casting
3. Explain about the advantages and disadvantages of CNC.
4. Explain the principle involved in soldering and its advantages
5. Explain in brief the ECM principle.
6. Explain about the laser technique used in machining
7. Explain few points on quenching.
8. Explain in brief the various annealing process
9. Explain with neat sketch about the triple riveted lap joint.
10. Explain about project related tools

PART - B

Answer any five **5x10=50**

11. Explain the steps and procedure involved in shell molding. Also discuss the advantages and disadvantages of shell molding.

(or)

12. (a) Explain about the types of cylinders and hoses used in gas welding with a tabular column for each and required figures.
    (b) Explain the process involved and types of flames in gas welding.

13. Explain about any one type of drilling m/c in detail. And discuss about the twist drill nomenclature

(or)

14. Explain in detail about the various types of sheet metal operations with one example for each.

15. Explain the AJM machining process; electrode used its advantages and disadvantages.

(or)

16. Explain the EDM machining process its advantages and disadvantages.

17. (a) Explain the requirement and advantage of heat treatment & surface finishing.
    (b) Discuss the process of anodizing of titanium alloys

(or)

18. Explain the terms with neat sketches
    a. Organic coating b. Honing c. Polishing & Buffing

19. Explain about the process of liquid penetrate testing and it types with neat sketches and required equations.

(or)

20. Explain about the types and uses of jigs and fixtures employed in aircraft assembly.

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING
AIRCRAFT PRODUCTION TECHNOLOGY (R15)
MODEL PAPER – II
MAXIMUM MARKS: 75

PART A **Max Marks: 25**

1. Enumerate the various steps involved in diffusion bonding.
2. Explain about the various cores used in casting
3. Explain about the advantages and disadvantages of casting.
4. Explain the mechanisms involved in shaper machine
5. Explain in brief the EDM principle.
6. Explain in brief about plasma arc machining
7. Explain few points on tempering.
8. Explain about thermal spray coating
9. Explain with neat sketch about the triple riveted butt joint.
10. Explain about thermography

PART - B

Answer any five **5x10=50**

11. Explain the steps and procedure involved in die casting. Also discuss the advantages and disadvantages of die casting.

(or)

12. Explain the types and process involved in resistance welding with neat sketches.

13. Explain about any one type of milling machine and the procedure of milling (up & down) in detail.

(or)

14. Explain the terms with neat sketch
    a. Bending b. Super plastic forming
    c. deep drawing d. Louvering [2 ,3, 2, 3]

15. Explain the laser machining process; electrode used its advantages and disadvantages.

(or)

16. Explain the ECM machining process its advantages and disadvantages.

17. a) Explain the requirement and advantage of heat treatment & surface finishing.
    (b) Discuss the process of heat treatment of aluminum alloys

(or)

18. Draw and explain about iron carbon diagram its compositions and variations in percentage effects.

19. Explain the various types of project related tools used in aircraft assembly.

(or)

20. Explain about the process of magnetic particle testing and it types with neat sketches and required equations.

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING
AIRCRAFT PRODUCTION TECHNOLOGY (R15)
MODEL PAPER – III
MAXIMUM MARKS: 75

PART A **Max Marks: 25**

1) Write the basic steps in the casting process. (2M)
2) Write the various sands used in casting (2M)
3) Explain about single pint cutting tool nomenclature (3M)
4) Explain about drill bit cutting tool nomenclature (3M)
5) Compare the similarities and differences of ECM and EDM (3M)
6) Explain why EBM process is preformed usually in vacuum chamber (2M)
7) List the alloying materials of aluminum (2M)
8) Explain the principle of heat treatment (2M)
9) How many types of riveted joints? What are they? (3M)
10) What are the advantages in NDT (3M)

PART-B

Answer any five **5x10=50**

11) Explain the principle of Electronic Beam welding with neat sketch.

(OR)

12) Explain about gas welding in details with neat sketch.

13) Explain about quick return mechanism in shaper machine

(OR)

14) Explain about radial milling machine with neat sketch

15) Explain about USM in detail with the help of neat sketch

(OR)

16) Explain why the mechanical properties of work piece materials are not significant in most of the NTMM

17) Discuss the alloying elements which improves strength of pure titanium

(OR)

18) Discuss the process of anodizing of aluminum alloys

19) Explain different mechanical clamping system used in fixtures

(OR)

20) How is metal inspected by ultrasonic testing and x-rays

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING
AIRCRAFT PRODUCTION TECHNOLOGY (R15)
MODEL PAPER – IV
MAXIMUM MARKS: 75

PART A **Max Marks: 25**

1) Discuss: Expandable mold casting, permanent molding casting and semi–permanent mold casting. (3M)
2) Write the advantages and limitations of metal as the pattern material (3M)
3) Discuss the various pattern allowances. (3M)
4) Explain about up down milling process (2M)
5) Write about punching operation (2M)
6) Explain why the mechanical properties of work piece materials are not significant in most of the NTMM (3M)
7) What is the effect of EDM on mechanical properties of work materials (2M)
8) Write short notes on harden ability of steel (2M)
9) How many types of riveted joints? What are they? (3M)
10) What are the advantages in NDT (2M)

PART.B

Answer any five **5x10=50**

11) Explain the soldering and brazing techniques

(OR)

12) Explain about die-casing in detail with neat sketch

13) Describe "Metal Spinning" write its product applications, differentiate between cold and hot Metal spinning.

(OR)

14) Explain the roll and importance of CNC machine in the field of aircraft industry

15) Explain about EDM in detail with the help of neat sketch

(OR)

16) Explain about EBM & PAM in detail with the help of neat sketch

17) Explain how aluminum alloys classified when used for aircraft application

(OR)

18). Explain the initial stresses and the stress alleviation procedures in manufacturing

19) How is metal inspected by ultrasonic testing and x-rays

(OR)

20) Explain the various types of rivets that are used in an aircraft industry justify your answer with Respect to the loads and atmospheric affects over an aircraft.

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II B.TECH I SEMESTER – AERONAUTICAL ENGINEERING
AIRCRAFT PRODUCTION TECHNOLOGY (R15)
MODEL PAPER – V
MAXIMUM MARKS: 75

PART A **Max Marks: 25**

1) Write short notes on quenching. (2M)
2) What is jigs and fixture (2M)
3) What is the effect of EDM on mechanical properties of work materials (3M)
4) Explain the principle of LBM and PAM (3M)
5) Write about blanking operation (2M)
6) Give the advantages of sheet metal working process (2M)
7) Define the "deep drawing process" (2M)
8) Write about the following types of sands: facing sand, backing sand, system sand, and parting sand. (3M)
9) What are the limitations of pressure die casting method? (3M)
10) Write the advantages and drawbacks of the "Welding Process" (3M)

PART-B

Answer any five **5x10=50**

11) Explain in detail about Centrifugal casting with neat sketch.

(OR)

12) Explain about Investment casting in detail with neat sketch

13) What are the various methods of bending, describe each with neat sketch

(OR)

14) Compare "Metal spinning" with deep drawing

15) Explain about ECM in detail with the help of neat sketch

(OR)

16) List the principle advantages of
A) Arc welding over gas welding
B) Gas welding over arc welding

17) A) why the cleaning of a joint is important before welding?
B) Explain about welding techniques

(OR)

18) Explain about sand casting in detail

19) Explain the tooling docks/tooling bars method in jig alignments

(OR)

20) what are advantages of using jigs and fixture in aircraft manufacturing