

Code No: R18A0303

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)

R18

II B.Tech I Semester Supplementary Examinations, June 2022

Thermodynamics

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

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

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Note: Steam Tables, Psychometric charts and Mollier charts are permitted.

- 1 (a) Explain Microscopic and Macroscopic approach with examples. [7M]
(b) A pump forces 1.2 m³/min of water horizontally from an open well to a closed tank where the pressure is 0.9 Mpa. Compute the work the pump must do upon the water in an hour just to force the water into the tank against the pressure. [7M]
- 2 (a) Distinguish between open system and closed system. [7M]
(b) A gas at a pressure of 138 kN/m² is having volume of 0.112 m³. It is compressed to 690 kN/m² according to the law $p v^{1.4} = \text{constant}$. Calculate the final volume of the gas. [7M]
- 3 (a) Discuss the significance of Gibbs and Helmholtz functions. [7M]
(b) Two blocks of metal, each having a mass of 10 kg and having a specific heat of 0.4 kJ/kg.K, are at a temperature of 40^oC. A reversible refrigerator receives heat from one block and rejects heat to the other. Calculate the work required to cause a temperature difference of 100^oC between the two blocks. [7M]
- 4 (a) Derive Maxwell Equations. [7M]
(b) A copper ball weighing 0.4536 kg and uniformly heated to 310.7 K is dropped in a cold bath where upon it cools down to 267 K. Calculate the entropy change of the ball for the process. [7M]
- 5 (a) What is critical state? Explain the terms critical pressure, critical volume and critical temperature of water? [7M]
(b) A steam pressure of holding capacity 4m³ contains a mixture of saturated water and saturated steam at 250^oC. The mass of the liquid present is 1 ton. Determine (i) Quality; (ii) Specific Volume; (iii) Specific Enthalpy; (iv) Specific Entropy and (v) Specific Internal Energy of steam. [7M]
- 6 (a) Write short notes on “Mollier diagram”. Why do isobars on the Mollier diagram diverge from one another. [7M]
(b) A pressure cooker holding 2 kg of steam at 5 bar and 90% dry is being cooled slowly. What quantity of heat has to be extracted so as to reduce the steam [7M]

quality down to 60%? Also calculate the pressure and temperature of the steam that remains in the pressure cooker after the heat rejection.

- 7 Write short notes on:
- (a) Dalton's Law [7M]
 - (b) Psychrometric properties [7M]
- 8 (a) Show that efficiency of an Otto cycle depends only on the compression ratio. [7M]
(b) A theoretical diesel engine operates at suction conditions of 1 bar and 300 K. At the end of compression stroke, the pressure rises to 24 bar. The maximum temperature limit of the cycle is 1473K. Determine (i) cut-off ratio; (ii) net work output of the cycle and (iii) thermal efficiency of the cycle. For air, assume specific heat at constant pressure and volume as 1.005 kJ/kg.K and 0.717 kJ/kg.K. [7M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June 2022

Engineering Mechanics

(ME)

Roll No									
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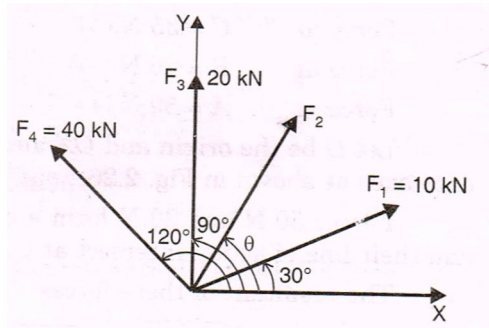
Time: 3 hours

Max. Marks: 70

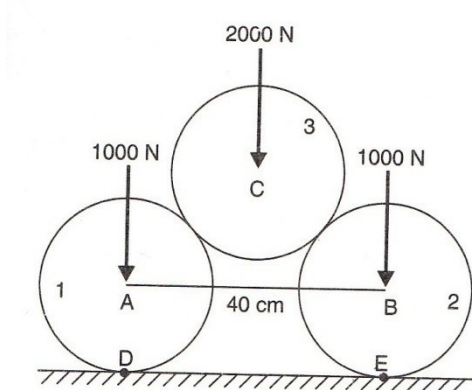
Answer Any Five Questions

All Questions carries equal marks.

- 1 The resultant of four force which are acting at point O as shown fig is along Y-axis [14M]
the magnitude of force F_1, F_3 and F_4 are 10kN, 20kN, and 40kN with x-axis are $30^\circ, 90^\circ$ and 120° respectively . Find the magnitude and direction of force F_2 if resultant is 72 kN.

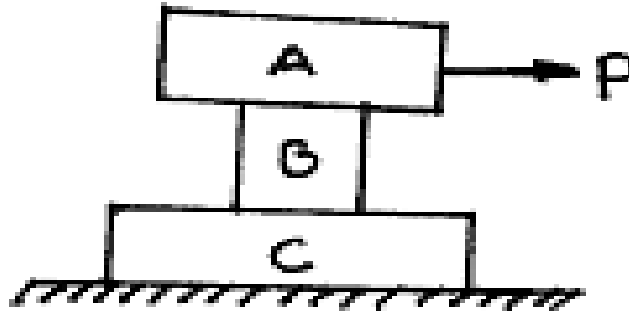


- 2 Two smooth circular cylinders each of weight $W=1000\text{N}$ and radius 15 cm, are connected at their centre by a strings AB of length = 40 cm rest upon a horizontal plane supporting them a third cylinder of weight = 2000N and radius 15 cm as shown in fig find the force T (Tension) in the string AB and the pressure produced on the floor at the points of contact D and E. [14M]

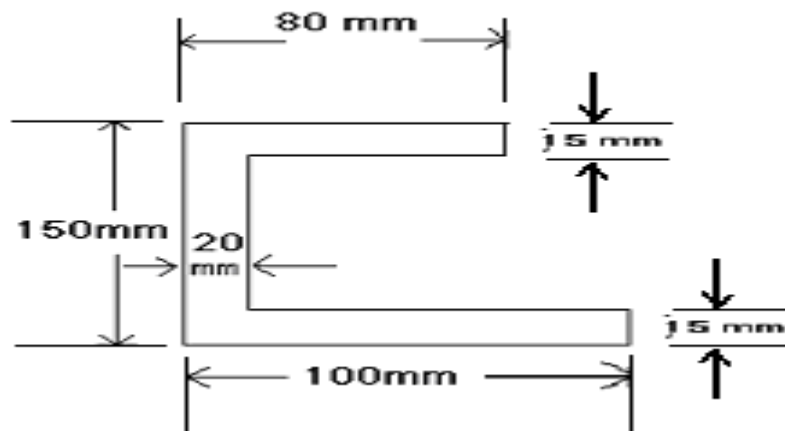


- 3 Find the least horizontal force 'P' to start motion of any part of the system of three [14M]

blocks resting upon one another as shown in figure. The weights of the blocks are $A = 3000\text{N}$, $B = 1000\text{N}$, $C = 2000\text{N}$. Between A and B $\mu = 0.3$, between B and C, $\mu = 0.2$ and between C and the ground $\mu = 0.1$.



- 4 Explain the step by step procedure used in method of joints process for a cantilever truss with a suitable example. [14M]
- 5 (a) Explain the difference between centroid and centre of gravity [7M]
 (b) State and explain Pappu's theorems I and II [7M]
- 6 Find the centroid of the plain laminas given below [14M]



- 7 (a) State and prove parallel axis theorem. [7M]
 (b) State and prove perpendicular axis theorem. [7M]
- 8 A projectile is fired from top of a tower 100m high with a velocity of 100m/sec. at 60° to horizontal. Find horizontal rang through base of the tower [14M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June 2022

Fluid Mechanics & Hydraulic Machines

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

- 1 a) The specific gravity of a liquid is 3.0, what are its specific weight, specific mass and specific volume? [7M]
b) A body weighing 45 kg with a flat surface area of 930 cm² slides down lubricated inclined plane making a 30° angle with the horizontal. For viscosity of 1 poise and body speed of 3 m/sec, determine the lubricant film thickness. [7M]
- 2 a) List all the fluid properties and explain why water rises in a small glass tube when inserted in water. [7M]
b) The space between two parallel plates kept 3mm apart is filled with an oil of dynamic viscosity 0.2 Pa-s. What is the shear stress on the lower fixed plate, if the upper one is moved with a velocity of 1.50m/sec? [7M]
- 3 a) Differentiate between laminar flow and turbulent flows, and rotational and irrotational flows. [7M]
b) Write short notes on: Stream line, Path line and Streak lines [7M]
- 4 a) Derive the Bernoulli's equation and Discuss its significance. [7M]
b) A 30 cm diameter pipe carries water under a head of 15 meters with a velocity of 4 m/s. If the axis of the pipe turns through 45°, Find the magnitude and direction of the resultant force at the bend. [7M]
- 5 a) What are the factors affecting the boundary layer thickness? [7M]
b) Derive Darcy-Weisbach equation for loss of head in a pipe [7M]
- 6 a) Derive the expression for computing discharge through an orifice meter [7M]
b) Define and explain the terms: [7M]
 - i) Hydraulic gradient line and
 - ii) Total energy line
- 7 a) Explain the classification of turbines? Explain the working of Francis turbine with a neat sketch. [7M]
b) A jet of water strikes with a velocity of 50 m/sec a flat fixed plate inclined at 30 degrees with the axis of the jet. The cross-sectional area of the plate is 100 cm². Find the force exerted by the jet on the plate and the [7M]

ratio in which the jet gets divided after striking.

- 8** What is indicator diagram for a reciprocating pump? Explain slip and coefficient of discharge of a reciprocating pump. **[14M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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II B.Tech I Semester Supplementary Examinations, June 2022

Kinematics of Machinery

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions
All Questions carries equal marks.

- 1 a) Define inversion of a mechanism? [2M]
b) Explain the inversions of a quadric cycle chain? [12M]
- 2 a) Define machine and mechanism. [4M]
b) Enumerate the inversions of single slider crank chain mechanism [10M]
- 3 a) What is the condition for correct steering? [4M]
b) Explain the Ackerman's steering gear mechanism. [10M]
- 4 a) What is a Double Hooke's joint? [4M]
b) Derive an expression for the ratio of shaft velocities in a Hooke's joint. [10M]
- 5 a) Define centrode and axode. [4M]
b) Derive the analytical method of determination of velocity and acceleration for a slider crank mechanism? [10M]
- 6 Draw the acceleration diagram of a slider crank mechanism [14M]
- 7 a) Write short notes on cams and followers. [4M]
b) Draw a cam to raise a valve through a distance of 50 mm in 1/3 of revolution with SHM, keep it fully raised through 1/12 of revolution and lower it with harmonic motion in 1/6 of revolution. The valve remains closed during the rest of the revolution. The diameter of the roller is 20 mm and the minimum radius of the cam is 25 mm. The axis of the valve rod passes through the axis of the cam shaft. [10M]
- 8 a) Explain helical, bevel and worm gears? [7M]
b) Derive an expression for the length of path of contact. [7M]

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II B.Tech I Semester Supplementary Examinations, June 2022

Machine Drawing

(ME)

Roll No										
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Time: 3 hours

Max Marks: 70

Note : This question paper contains two parts A and B

Answer any two questions from part A each carries 14 marks.

Part B is compulsory which carries 42 marks

Part-A (28 Marks)

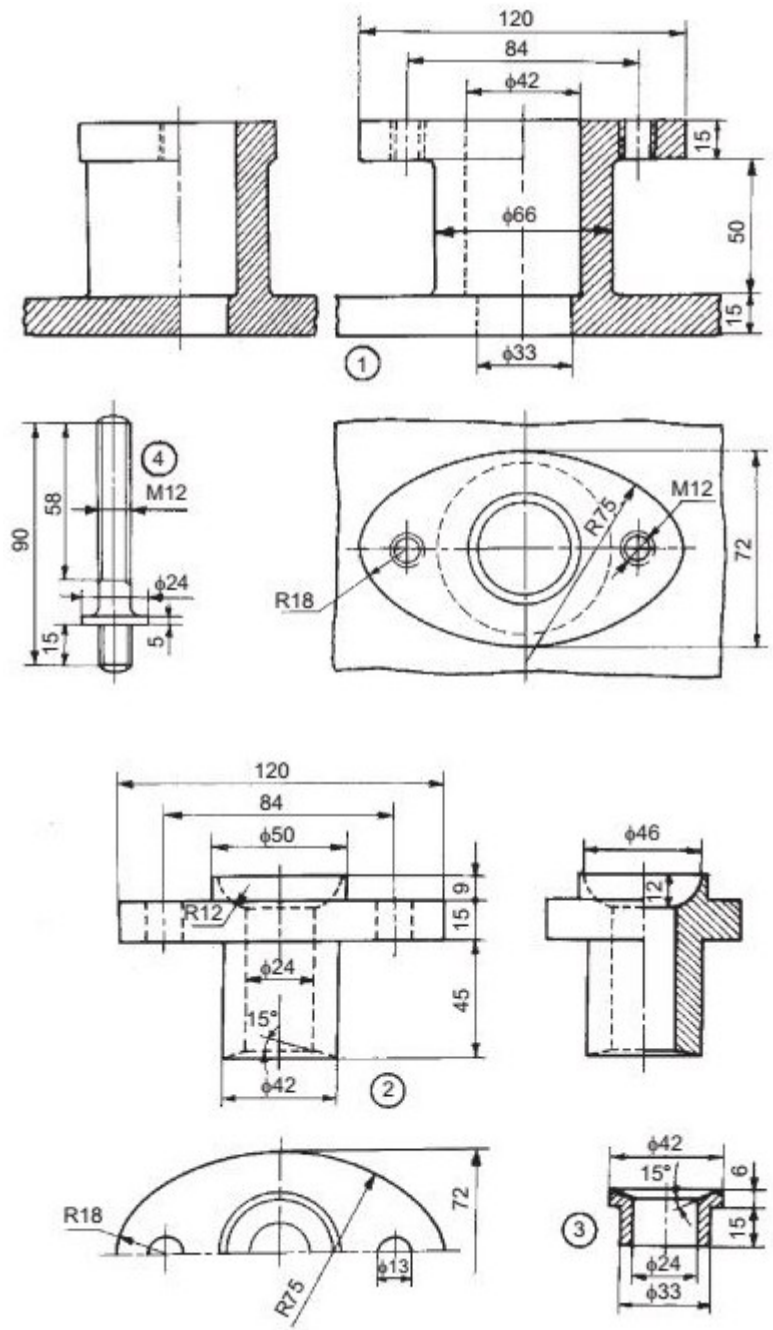
Answer **any two** of the following (2x14=28)

- 1 a) Give diagrammatic representation of important material representations. [6+8M]
b) Draw the front, top, side views of a hexagonal bolt of diameter 35mm
- 2 Draw the sectional front and top views of a double strap double riveted butt joint [14M]
to join plates of 10 mm thickness.
- 3 Draw the sectional front, top and side view of a knuckle joint to join two rods of [14M]
diameter 30mm each.

Part-B (42 Marks)

(1x42=42M)

- 4 Draw the following assembled views of the Stuffing box. [42M]
a) Half sectional Front view b) Top 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 : Stuffing Box

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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II B.Tech I Semester Supplementary Examinations, June 2022

Materials Engineering

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

- 1 a) Distinguish between covalent and ionic bonds in solids. Illustrate with examples [7M]
b) Explain in detail metallic bonding and its properties. [7M]
- 2 a. Differentiate between crystalline solids and amorphous solids? [7M]
b. Find the atomic packing factor of B.C.C, F.C.C and H.C.P. [7M]
- 3 a) Describe the effect of grain boundaries on the properties of metal / alloys? [7M]
b) Compare and contrast between intermediate phases and solid solutions? [7M]
- 4 a) Write the peritectoid reaction. Draw a labeled phase diagram showing this reaction. Also give examples. [7M]
b) What is Gibb's phase rule? Explain its importance. [7M]
- 5 Explain the importance, characteristics, applications of any two non-ferrous metals and alloys. [14M]
- 6 a) Discuss different types of annealing processes [7M]
b) Define hardenability of a material and list the factors affecting hardenability. [7M]
- 7 a) Sketch and explain various reinforcing patterns of fibers being used in composites. [7M]
b) What is a Composite material? How it is classified? Explain briefly. [7M]
- 8 a. Distinguish between addition polymerization and condensation polymerization? [7M]
b. Explain brief note with applications:
i) Thermoplastics ii) Thermosetting plastics [7M]

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II B.Tech I Semester Supplementary Examinations, November 2022

Thermodynamics

(ME)

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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 *A* State Zeroth's law of thermodynamics. [7M]
B Explain Irreversible Process and Irreversibility Process with examples. [7M]

OR

- 2 *A* Derive the expression for Steady Flow Energy Equation. [7M]
B Explain concept of PMM-1 [7M]

SECTION-II

- 3 *A* Derive the expression for efficiency of carnot cycle [7M]
B Find the COP and heat transfer rate in the condenser of a refrigerator which has a refrigeration capacity of 7.5 kW. The power input to the refrigerator is 1kW. [7M]

OR

- 4 *A* Explain Kelvin-Planck and Clausius Statements [7M]
B A reversible engine is supplied with heat from two constant temperature sources at 900 K and 600 K and rejects heat to a constant temperature sink at 300 K. The engine develops work equivalent to 90 kJ/s and rejects heat at the rate of 56 kJ/s. Estimate: 1. Heat supplied by each source, and 2. Thermal efficiency of the engine. [7M]

SECTION-III

- 5 *A* State and Prove Carnot's theorem. [7M]
B A heat pump working on the Carnot cycle takes in heat from a reservoir at 5°C and delivers heat to a reservoir at 60°C. The heat pump is driven by a reversible heat engine which takes in heat from a reservoir at 840°C and rejects heat to a reservoir at 60°C. The reversible heat engine also drives a machine that absorbs 30KW. If the pump extracts 17 kJ/s from the 5°C reservoir, determine (i) The rate of heat supply from the 840°C source, and (ii) The rate of heat rejection to the 60°C sink. [7M]

OR

- 6 *A* Write short notes on Mollier chart with neat sketch. [7M]
B A vessel of volume 0.04 m³ contains a mixture of saturated water and saturated steam at a temperature of 250°C. The mass of the liquid present is 9 kg. Find the pressure, the mass, the specific volume, the enthalpy, the entropy and the internal energy. [7M]

SECTION-IV

- 7 *A* The volumetric analysis of a gaseous mixture has the following composition: [7M]
Carbon dioxide-14%, Carbon monoxide-1%, Oxygen-5% and Nitrogen-80%.
Calculate the gas composition by mass
- B* State and prove Daltons law of partial pressures. [7M]
- OR
- 8 *A* Explain the following terms [2M]
i. Mole fraction [2M]
ii. Volume fraction [3M]
iii. Partial pressure
- B* Explain Avogadro's Laws of additive volumes [7M]
- SECTION-V**
- 9 *A* Derive an expression for Air standard Efficiency of Dual cycle? [7M]
- B* A gas turbine works on an air Brayton cycle. The initial condition of the air [7M]
is 25°C and 1 bar. The maximum pressure and temperature are limited to 3
bar and 650°C. Determine the following: (i) Cycle efficiency (ii) Heat
supplied and heat rejected per kg of air (iii) Work output per kg of air (iv)
Exhaust temperature. Draw P-V and T-S diagrams.
- OR
- 10 *A* Compare Otto, Diesel cycles operating at same compression ratio, same [7M]
maximum temperature and same maximum pressure.
- B* An SI engine operating on Otto cycle has its inlet parameters as 323 K and 1 [7M]
bar, while it develops a maximum pressure of 25 bar. Assuming Bore as
250mm, stroke as 375mm and clearance volume as 0.00263 m³, determine
(i) air standard efficiency and (ii) mean effective pressure of the cycle.

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II B.Tech I Semester Supplementary Examinations, November 2022

Engineering Mechanics

(ME)

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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

1 *A* Show that the algebraic sum of the resolved parts of a number of forces in a given direction is equal to the resolved part of their resultant in the same direction. [7M]

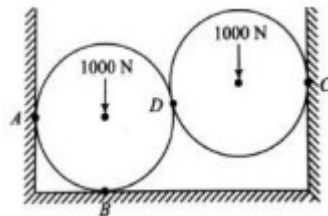
B Define Types of Forces in detail. [7M]

OR

2 *A* Define the following. [7M]

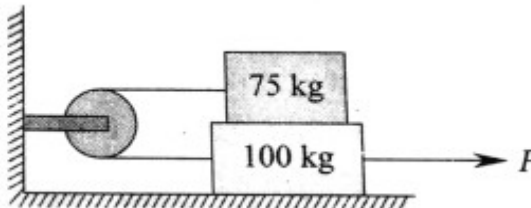
(i) Law of transmissibility (ii) Parallelogram law of forces

B Two spheres each of 1000N and of radius 25cm rest in a horizontal channel of width 90cm as shown in figure. Find the reaction at the point of contact A, B and C. [7M]

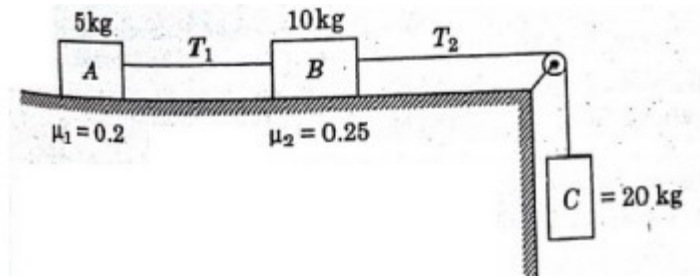


SECTION-II

3 *A* In figure, determine the horizontal force P applied to the lower block to just pull it to the right. The coefficient of friction between the blocks is 0.2 and that between the lower block and the plane is 0.25. Assume the pulley be frictionless. [7M]

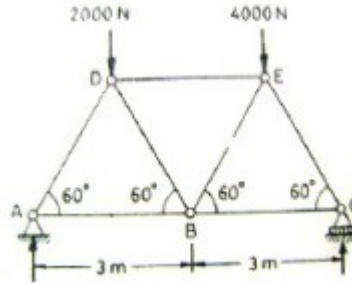


B Three blocks A, B and C are connected as shown in the Figure-5. Find acceleration of the masses and the tension T_1 and T_2 in the strings. Given $\mu_1=0.2$ and $\mu_2=0.25$. [7M]



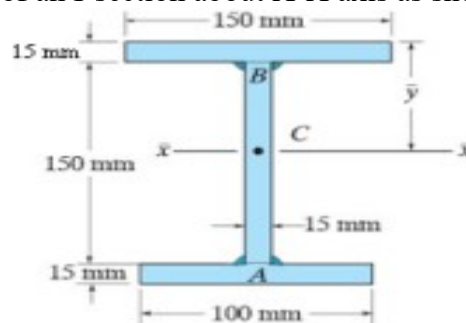
OR

- 4 Determine the axial forces induced in the members of a truss as shown in figure- [14M]



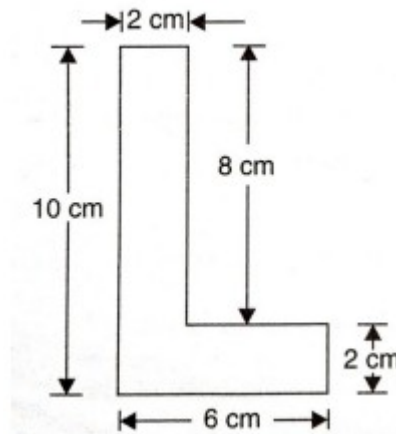
SECTION-III

- 5 Locate the centroid of an I-section about X-X axis as shown in the figure- [14M]



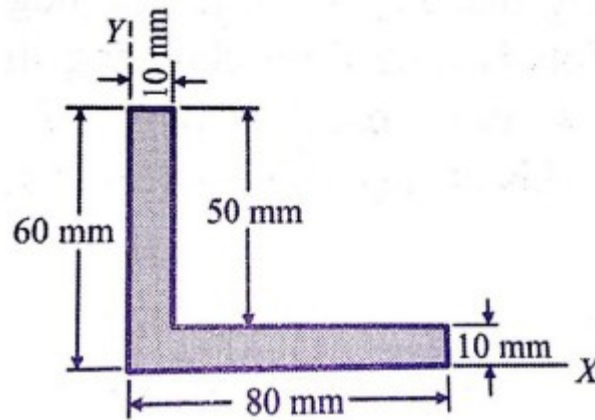
OR

- 6 Find the centre of gravity of the L section shown in figure [14M]



SECTION-IV

- 7 Find area moment of inertia of L section shown in Figure- about X axis. [14M]



OR

- 8 Determine moment of inertia of a cylinder shaft of 120 mm diameter and 1.75m height about the centre of gravity XX, YY, ZZ axes. (density, $\rho = 8000 \text{ kg/m}^3$). [14M]

SECTION-V

- 9 A stone is dropped into a well while splash is heard after 2.5 seconds. Then determine depth of water surface assuming the velocity of sound as 330 m/s. [14M]

OR

- 10 A motorist takes 10 seconds to cover a distance of 20m and 15 seconds to cover a distance of 40m. Find the uniform acceleration of the car and the velocity at the end of 15 seconds. [14M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNO

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II B.Tech I Semester Supplementary Examinations, November 2022

Fluid Mechanics & Hydraulic Machines

(ME)

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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 A differential manometer is connected to two pipes whose centers are at 3m difference in height. Higher level pipe is carrying liquid of specific gravity of 0.9 at a pressure of 1.8 bar and another pipe is carrying liquid at specific gravity of 1.5 at a pressure of 1 bar. The centre of pipe carrying low pressure liquid is 2m above the higher level of the mercury in the manometer. Find out the difference in mercury level in the manometer in cm. [14M]

OR

- 2 A An oil of viscosity 5 poise is used for lubrication between a shaft and sleeve. The diameter of shaft is 0.5 m and it rotates at 200 rpm. Calculate the power lost in the oil for a sleeve length of 100 mm. The thickness of the oil film is 1.0 mm [7M]
- B Explain how vacuum pressure can be measured with the help of a U-tube manometer [7M]

SECTION-II

- 3 A Explain the terms: (i) Path line (ii) Streak line (iii) Stream line and (iv) Stream tube. [7M]
- B State Bernoulli's equation? Write the assumptions for such a derivation? [7M]

OR

- 4 A Define and distinguish between: [7M]
- (i) uniform flow and non- uniform flow (ii) laminar and turbulent flow
- B A pipe of 300 mm diameter conveying $0.30\text{m}^3/\text{s}$ of water has a right angled bend in a horizontal plane. Find the resultant force exerted on the bend if the pressure at inlet and outlet of the bend are $24.525\text{N}/\text{cm}^2$ and $23.544\text{N}/\text{cm}^2$ [7M]

SECTION-III

- 5 A Describe the characteristics of laminar and turbulent boundary layers. [7M]
- B What is a Orifice Meter? Derive an expression for the discharge through a Orifice Meter [7M]

OR

- 6 A Derive the Darcy-Weisbach equation for friction head loss in a pipe. [7M]
- B Explain Reynold's experiment with a neat sketch. [7M]

SECTION-IV

- 7 What do you mean by gross head, net head and efficiency of turbine. Explain [14M]

the different types of efficiencies of a turbine.

OR

- 8** Explain what is meant by unit quantities in turbines. Derive expressions for unit speed, unit discharge and unit power of a turbine [14M]

SECTION-V

- 9** Explain the working principle of Centrifugal pump with a neat sketch [14M]

OR

- 10** Explain the working principle of Reciprocating pump with a neat sketch [14M]

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II B.Tech I Semester Supplementary Examinations, November 2022

Kinematics of Machinery

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

1 Write the inversions of four bar chain with neat diagrams [14M]

OR

2 A Explain briefly various types of constrained motions [7M]
B Explain briefly the second inversion of single slider crank mechanism [7M]

SECTION-II

3 A Explain main differences between Davis Steering gear, Ackermans steering mechanisms [7M]

B A Hooke's joint is used to connect two shafts. The driving shaft is rotating with a uniform speed of 600 rpm. The maximum speed of the driven shaft is 630 rpm. Find the minimum speed of the driven shaft. [7M]

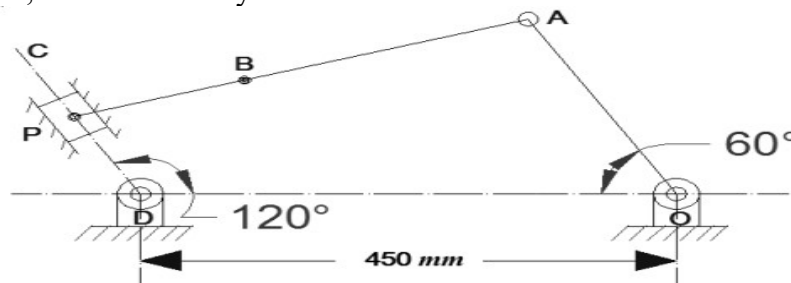
OR

4 A What condition is to be satisfied by the Davis steering gear-whenever the vehicle is taking a turn - for any radius of curvature of the path of the vehicle? Derive the expression of this condition. [7M]

B Two shafts are connected by a Hooke's joint. The angle between the shafts is 18° . What will be the angle turned by the driving shaft when the velocity ratio is maximum? [7M]

SECTION-III

5 In the slider-crank mechanism shown in Figure 1, the block P reciprocates along the fixed line CD. The crank OA rotates clockwise at a uniform speed of 150 rpm. The dimensions of the links (in mm) are: OA=AB = 250; AP = 400; For the given configuration, find the velocity and acceleration of the block P. [14M]



OR

- 6 In a four-bar mechanism ABCD, AD is the fixed link, AB is the driving link and CD is the driven link. Show that the angular velocity of CD is to that of AB as QA is to QD, where Q is the point of intersection of BC and AD produced if necessary. [14M]

SECTION-IV

- 7 Draw the profile of a cam to give the following motion to a flat-faced follower: [14M]
a) Follower to rise through 36 mm during 120° of cam rotation with uniform velocity
b) Follower to dwell for 50° of cam rotation
c) Follower to return to its initial position during 90° of cam rotation with SHM
d) Follower to dwell for the remaining period of cam rotation
The minimum radius of cam is 50 mm. Also find the minimum width of the Follower from the cam profile diagram

OR

- 8 The follower of a tangent cam is operated through a roller of 50 mm diameter, and its line of stroke intersects the axis of the cam. Minimum radius of the cam is 40 mm, nose radius is 12 mm, and the lift is 25 mm. If the speed of rotation of the cam is 800 rpm, find the velocity and acceleration of the follower at the instant when the cam is 25° from the full-lift position. [14M]

SECTION-V

- 9 Define the 'Law of Gearing'. Derive the expression for the same [14M]

OR

- 10 The number of teeth on the gear and the pinion of two spur gears in mesh are 30 and 18 respectively. Both the gears have a module of 6 mm and a pressure angle of 20° . If the pinion rotates at 400 rpm, what will be the sliding velocity at the moment the tip of the tooth of pinion has contact with the gear flank? Take addendum equal to one module. Also, find the maximum velocity of sliding [14M]

Code No: R18A0306

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, November 2022

Machine Drawing

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 28 marks and Answer any two questions.

Part B Consists of one question which carries of 42 marks

Part- A (28 Marks)

Answer any two of the following (14*2=28)

- Q. No. 1. Draw a proportionate diagram of Double rivetted double strap chain type butt joint two connect plate of 20 mm size
- Q. No. 2. Draw the two views of oldham’s coupling for shaft of 50 mm diameter
- Q. No. 3. Draw the two views of universal coupling for shaft of 50 mm diameter

Part-B (42 Marks)

- Q. No.4 Assemble all the parts and draw the following assembled views (1*42=42M)
 - a) Sectional front view
 - b) Top view.

The drawing shows a gland and bush assembly. Part 1 is the gland, part 2 is the bush, part 3 is the stud, part 4 is the nut, and part 5 is the M12 nut. Dimensions are provided for each part and the assembly. The parts list table is as follows:

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

Code No: R18A0305

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, November 2022

Materials Engineering

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 *A* Explain all Bravais lattice with neat diagrams [7M]
B Explain Bonding in solids [7M]

OR

- 2 *A* Calculate the atomic Packing factor for FCC [7M]
B Explain the reasons to study the crystal structure of metals [7M]

SECTION-II

- 3 *A* Explain crystal defects with neat sketches. [7M]
B Apply Gibbs phase rule to identify degrees of freedom for various regions in Pure Metal binary alloy & Eutectic alloy cooling curve [7M]

OR

- 4 *A* Define alloy. Explain the Hume Rothery rules for maximum solid solubility. [7M]
B Explain Solidification of pure metal [7M]

SECTION-III

- 5 *A* Explain the various types of cast irons. [7M]
B Distinguish between Annealing and Normalizing. [7M]

OR

- 6 *A* Draw Iron-Carbon phase diagram and explain its various phases. [7M]
B Explain any two surface hardening techniques [7M]

SECTION-IV

- 7 *A* Define composites what are the advantages of composites material over engineering alloy [7M]
B Write short note on Silicate ceramics. [7M]

OR

- 8 *A* Write the Applications of composites in electrical and mechanical sectors. [7M]
B Write short note on Functional properties and applications of ceramic materials [7M]

SECTION-V

- 9 *A* Explain Mechanisms of polymerization. [7M]
B Write short notes on Photonic polymers. [7M]

OR

- 10 *A* Define polymer and explain how polymer are Classified. [7M]
B Write short note on Conductive polymers [7M]

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, October 2020**Thermodynamics****(ME)**

Roll No									
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Time: 2 hours**Max. Marks: 70**

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

Note: Steam tables, Mollier charts and Psychometric charts are permitted.

- What is displacement work? Show that work is a path function, and not a property.
 - To a closed system 150 kJ of work is supplied. If the initial volume is 0.6 m^3 and pressure of the system changes as $P = 8-4V$, where P is in bar and V is in m^3 , determine the final volume and pressure of the system.
- What is constant volume gas thermometer? Why it is preferred to a constant pressure gas thermometer?
 - A new absolute temperature scale is proposed. On this scale the ice point of water is 150° S and the steam point is 300° S . Determine the temperature in $^\circ \text{ C}$ that correspond to 100° S and 400° S , respectively. What is the ratio of the size of $^\circ \text{ S}$ to the kelvin?
- Give the differential form of SFEE. Under what conditions the SFEE does reduce to Euler's equation.
 - A reciprocating air compressor takes in $2 \text{ m}^3/\text{min}$ at 0.11 Mpa , 20° C which it delivers at 1.5 Mpa , 111° C to an air cooler where the air is cooled at constant pressure to 25° C . the power absorbed by the compressor is 4.15 kW . Determine the heat transfer in (a) the compressor, and (b) the cooler. State your assumptions.
- Show that efficiency of reversible engine operating between two given constant temperatures is the maximum.
 - A refrigeration plant for a food store operates as a reversed Carnot heat engine cycle. The store is to be maintained at a temperature of -5° C and the heat transfer from the store to the cycle is at the rate of 5 kW . If heat is transferred from the cycle to the atmosphere at a temperature of 25° C , calculate the power required to drive the plant.
- What is pure substance? Draw the phase equilibrium diagram for a pure substance on T-S plot with relevant constant property line.
 - What is quality of steam? What are the different methods of measurement of quality?
- What is an adiabatic process? What are the relations among $p, v \wedge T$ of an ideal gas in a polytropic process?
 - Air in a closed stationary system expands in a reversible adiabatic process from 0.5 MPa , 15° C to 0.2 MPa . Find the final temperature, and per kg of air, the change in enthalpy, the heat transferred, and the work done.
- State Dalton's law of partial pressures. How is the partial pressure in a gas mixture related to the mole fraction?
 - A constant volume chamber of 0.3 m^3 capacity contains 1 kg of air at 5° C . Heat is transferred to the air until the temperature is 100° C . Find the work done, the heat transferred, and the changes in internal energy, enthalpy and entropy.
- How is a reversed Carnot cycle used for refrigeration? Explain the process.
 - An engine working on the Otto cycle is supplied with air at 0.1 MPa , 35° C . The compression ratio is 8. Heat supplied is 2100 kJ/kg . Calculate the maximum pressure, temperature of the cycle and the cycle efficiency.

Code No: R18A0302

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, October 2020

Engineering Mechanics

(ME)

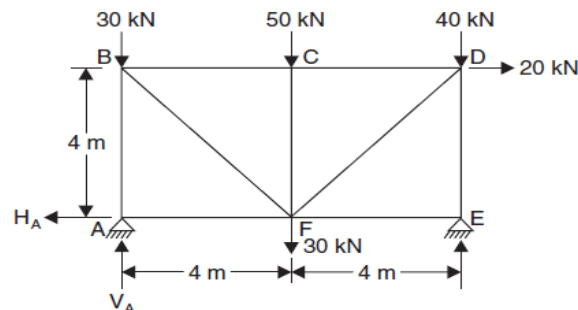
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Time: 2 hours

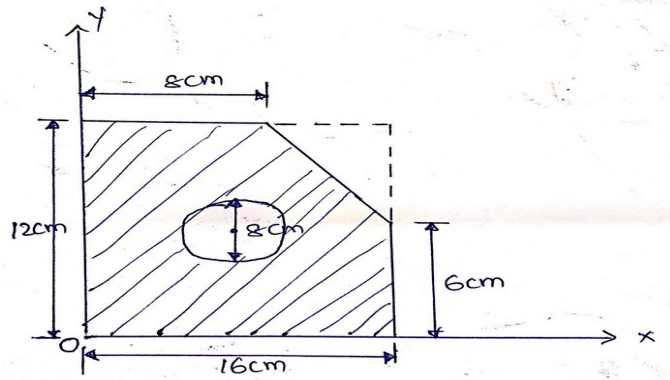
Max. Marks: 70

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

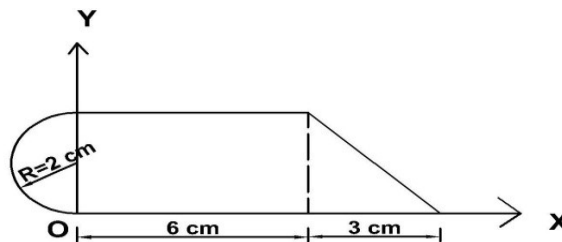
- Find the magnitude and direction of resultant force, for the system of forces 18N, 12N, 20N and 35N acting at 60° , 90° , 150° , 180° respectively along the horizontal.
 - What do you mean by coplanar concurrent force system? Explain with suitable example.
- Find the magnitude of two forces such that, if they act at right angles, their resultant is 5N whilst when they act at an angle of 60° , their resultant is $\sqrt{37}$ N.
 - Find the magnitude of the two forces, such that if they act at right angles, their resultant is 25 N. But if they act at 60° , their resultant is 30 N.
- Determine the forces in the members of truss shown in Fig.



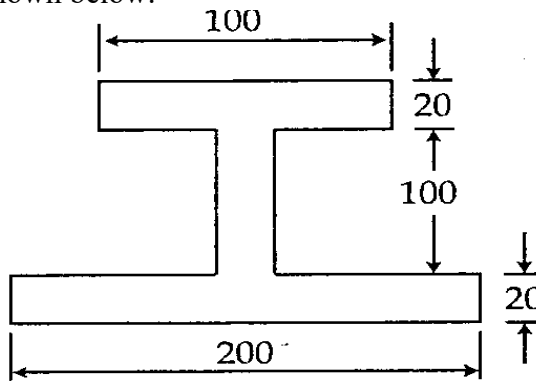
- A block weighing 500 N just starts moving down a rough inclined plane when it is subjected to 200 N force acting up the inclined plane and it is at the point of moving up the plane when pulled up by a force of 300 N parallel to the plane. Find the inclination of the plane and the coefficient of friction between the inclined plane and the block.
 - Explain the terms: coefficient of friction, angle of friction and cone of friction.
- Locate the centroid of a right angled triangle with base b and height h from the first principles.
 - Determine the Co-ordinates X_C and Y_C of the centre of an 8 cm diameter circular hole cut in a thin plate, so that this point will be the centroid of the shaded area shown in Figure.



- 6 a) Differentiate the centroid and centre of gravity with example.
 b) Determine the coordinates of Centroid of the area as shown in Fig. with respect to the axes shown.



- 7 a) What do you mean by polar moment of inertia?
 b) Determine moment of inertia about the base and about the horizontal centroidal axis for the figure shown below.



- 8 a) A man weighing 'W' Newton entered a lift which moves with an acceleration of 'a' m/s². Find the force exerted by the man on the floor of lift when
 i) lift is moving upwards, ii) lift is moving downwards.
 b) Explain D'Alembert's principle

Code No: R18A0304

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, October 2020

Fluid Mechanics & Hydraulic Machines

(ME)

Roll No									
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Time: 2 hours

Max. Marks: 70

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

- 1 a) List all fluid properties and derive Newton's law of viscosity.
b) Find the height through which water rises by capillary action in a glass tube of 2mm bore if the surface tension at the prevailing temperature is 0.075 N/m.
- 2 a) Derive the equation for capillarity depression when a small glass tube is inserted in mercury.
b) A piston of 7.95 cm diameter and 30 cm long works in a cylinder of 8.0 cm diameter. The annular space of the piston is filled with an oil of viscosity 2 poise. If an axial load of 10N is applied to the piston, calculate the speed of movement of the piston.
- 3 a) Derive the expression for continuity equation.
b) A Water pipe changes in diameter from 400mm at section A to 800mm at section B which is 7 m above. The pressures at A and B are 100 KPa and 75 KPa respectively. The discharge is 400 litres/Sec. Find the direction of flow.
- 4 a) What are the different types of flow ? State and Explain Bernoulli's equation.
b) Differentiate between laminar flow and turbulent flows, and rotational and irrotational flows.
- 5 a) A pipe line 300 m long has a slope of 1 in 100 and tapers from 1.2m diameter at the high end to 0.6m at the low end. The discharge through the pipe is 5.4 m³/minute. If the pressure at the high end is 70 kpa, find the pressure at the low end. Neglect the losses
b) Discuss displacement thickness, energy thickness and momentum thickness
- 6 a) What is a boundary layer ? Differentiate between a laminar and turbulent boundary layer.
b) Explain how a boundary layer separates from boundary. What are the conditions under which separation takes place ?
- 7 a) A jet of oil of specific gravity strikes a fixed curved symmetrical plate at its center and leaves at the outlet tips. The diameter of the jet is 62 mm and the velocity of the jet is 45 m/sec. If the jet is deflected by 100 degrees, calculate the force exerted on the curved plate.
b) How do you estimate the impact of a jet striking a moving normal plate in the direction of the jet.
- 8 a) What is indicator diagram for a reciprocating pump? Explain slip and coefficient of discharge of a reciprocating pump.
b) A fluid is to be lifted against a head of 120m . The pumps that run at a speed of 1200 rpm with rated capacity of 300 liters per second are available. How many pumps are required to pump the water if specific speed is 700.

Code No: R18A0307

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, October 2020

Kinematics of Machinery

(ME)

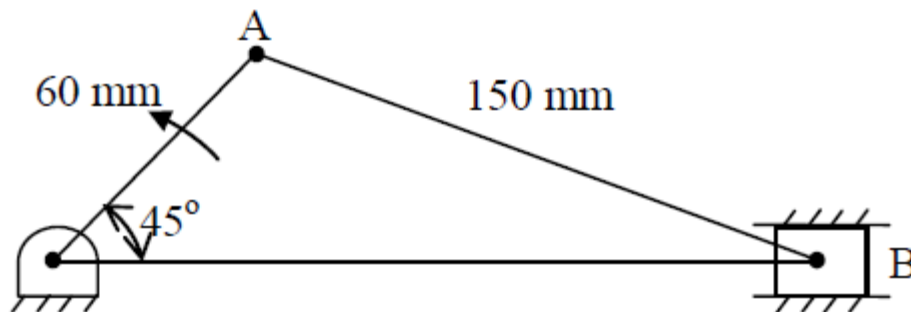
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Time: 2 hours

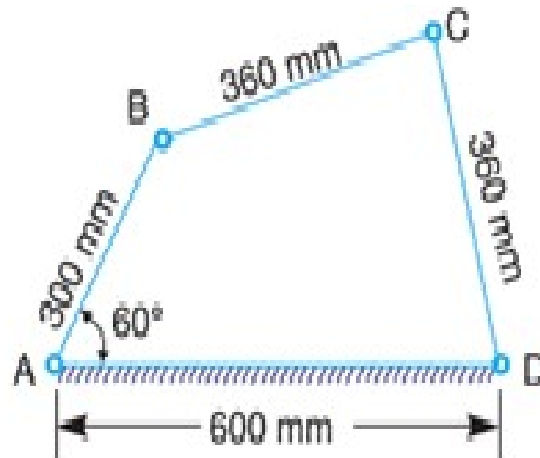
Max. Marks: 70

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

- 1 Define Kinematic Pair? Classify Kinematic Pairs with suitable examples?
- 2 (a) Define Machine and Mechanism ?
(b) Describe Four bar mechanism and its inversions ?
- 3 Derive an expression for the ratio of angular velocities of the shafts of a Hooke's joint and draw the polar velocity diagram depicting the salient features on it.
- 4 What is a pantograph? Show that it can produce paths exactly similar to the ones traced out by a point on a link on an enlarged or a reduced scale.
- 5 In a crank and slotted lever mechanism crank rotates of 300 rpm in a counter clockwise direction. Find (Note. use any of the methods)
(i) Angular velocity of connecting rod and
(ii) Velocity of slider.



- 6 In a pin jointed four bar mechanism as shown in fig $AB=300\text{mm}$, $BC=CD=360\text{mm}$ and $AD=600\text{mm}$. The angle BAD is 60° . The crank AB rotates uniformly at 100 rpm, Locate all instantaneous centers and find the angular velocity of the link BC .



- 7 A cam rotating in a clock wise direction is used to move reciprocating roller follower with simple harmonic motion in a radial path, as given below
- i. Out stroke with maximum displacement of 30 mm during 120° of cam rotation
 - ii. Dwell for 60° of cam rotation, return stroke with 80° , and the remaining is dwell
 - iii. The line stroke is offset by 10mm Draw the cam profile ?
- 8 (a) Derive expression for Path of contact, Arc of contact and contact ratio of spur gears
- (b) State the law of gearing ?

Code No: R18A0306

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, October 2020

Machine Drawing

(ME)

Roll No										
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Time: 2 hours

Max. Marks: 70

Part-A

Answer any one of the following

Q. No.1 Sketch the conventional representation of the following materials:

(i) Steel (ii) Wood (iii) Glass (iv) Cement

Q. No.2 Draw whitworth standard thread and Buttress thread with a pitch of 20mm.

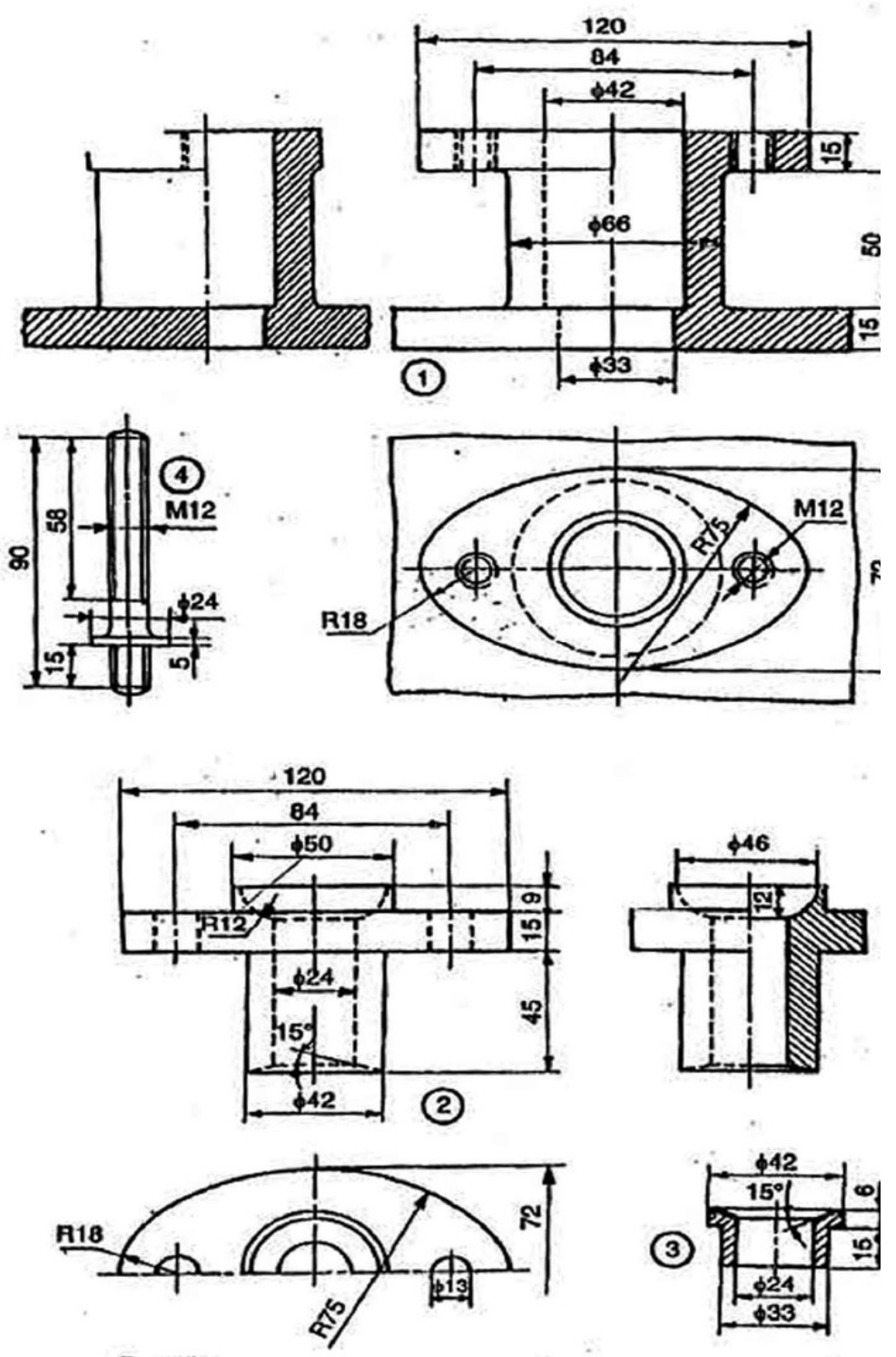
Part- B

Q. No.3 Part drawings of a Stuffing Box are shown in Figure-1. Draw

(i) Half sectional front view

(ii) Full plan

(iii) Left 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

Stuffing box

Figure 1

Code No: R18A0305

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, October 2020

Materials Engineering

(ME)

Roll No									
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Time: 2 hours

Max. Marks: 70

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

- 1(a) Calculate atomic packing factor for FCC and BCC unit cell.
- (b) What are Miller indices? Explain their importance.
- 2 Explain Covalent, metallic and van der Waals Bond.
- 3(a) Describe with sketches the mechanism of slip and twinning.
- (b) Define solid solution. Sketch cooling curve for a solid solution. Explain different types of solid solutions.
- 4 Explain the principal steps involved in the process of powder metallurgy components.
- 5 Explain the properties of any four types of Cast Iron.
- 6(a) Write Short notes on Tungsten carbide & Boron nitrides.
- (b) Compare annealing and normalizing heat treatments adopted for steels.
- 7 Write short notes on
 - i) MMC
 - ii) CMC
- 8 What is the polymerization? Explain in detail.

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, November 2019**Thermodynamics****(ME)**

Roll No									
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Time: 3 hours**Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

Note: Steam tables, Mollier chart, Psychrometric chart are permitted.

SECTION-I

- Explain in detail the macroscopic and microscopic study of thermodynamics.
 - A gas having a volume of 0.05 m^3 and pressure of 6.9 bar expands reversibly in a cylinder behind a piston according to law $pV = \text{constant}$ until the volume is 0.08 m^3 . Calculate the work done by the gas. Also sketch the process on a p-v diagram. [7 M+7 M]

OR

- Define thermometric property and how does a constant volume gas thermometer work?
 - A new absolute temperature scale is proposed. On this scale the ice point of water is 150° S and the steam point is 300° S . Determine the temperatures in $^{\circ} \text{C}$ that correspond to 100° S and 400° S , respectively. What is the ratio of the size of $^{\circ} \text{ S}$ to the of $^{\circ} \text{ S}$ to the kelvin? [7 M+7 M]

SECTION-II

- Show that energy is a property of a system.
 - 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? [7 M+7 M]

OR

- What is a Carnot cycle? What are the four processes which constitute the cycle?
 - A reversible power cycle operates between a reservoir at temperature T and a lower temperature reservoir at 200 K. At steady state, the cycle develops 40 kW of power while rejecting 1000 kJ/min of energy by heat transfer to the cold reservoir [7 M+7 M]

SECTION-III

- A mass of wet steam at temperature 165°C is expanded at constant quality 0.8 to pressure 3 bar. It is then heated at constant pressure to a degree of superheat of 66.5°C . Find the enthalpy and entropy changes during expansion and during heating. Draw the T-s and h-s diagrams. [14 M]

OR

- Write down the Vander Waal's equation of state. How does it differ from the ideal gas equation of state?
 - A gas of 4 kg is contained with in a piston cylinder machine. The gas undergoes a process for which $pV^{1.5} = \text{constant}$. The initial pressure is 3 bar and the initial volume is 0.1 m^3 , and the final volume is 0.2 m^3 . The specific internal energy of the gas decreases by 4.6 kJ/kg. There are no significant changes in KE and PE. Determine the net heat transfer for the process. [7 M+7 M]

SECTION-IV

7. a). Define dew point temperature. When do the DBT, WBT and DPT becomes equal?
b). Explain the steps involved in the construction of psychrometric chart at 2 bar pressure and explain the process of adiabatic saturation. [7 M+7 M]

OR

8. a). State Dalton's law of partial pressures. How is the partial pressure in a gas mixture related to the mole fraction?
b). A sling psychrometer reads 40° C DBT and 36° C WBT. Find the humidity ratio, relative humidity, Dew point temperature, specific volume and enthalpy of air. [7 M+7 M]

SECTION-V

9. a). Show that the efficiency of the Otto cycle depends only on the compression ratio.
b). An engine is to operate on Otto cycle with the following data: Maximum temperature 1400 K, exhaust temperature 700 K. State of air at the beginning of compression 0.1 MPa, 300 K. Estimate the compression ratio, the maximum pressure, efficiency, and rate of work output for 1 kg/min of air. [7 M+7 M]

OR

10. a). Explain the effects of pressure ratio the net output and efficiency of a Brayton cycle.
b). A simple ideal Brayton cycle uses air as working fluid and has a pressure ratio of 12. If the air temperature at the entrance of the compressor and turbine are at 300 K and 1300 K respectively. Determine thermal efficiency and air temperature at the compressor exit. Assume constant specific heats at room temperatures. [7 M+7 M]

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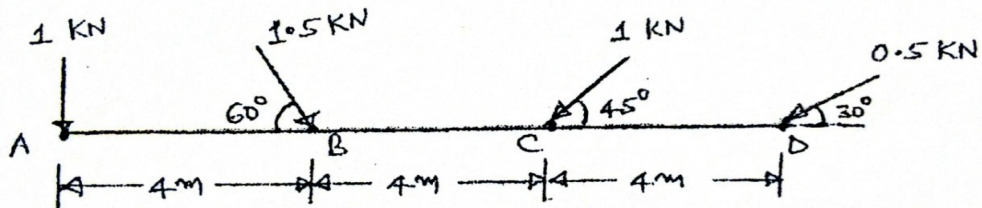
Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

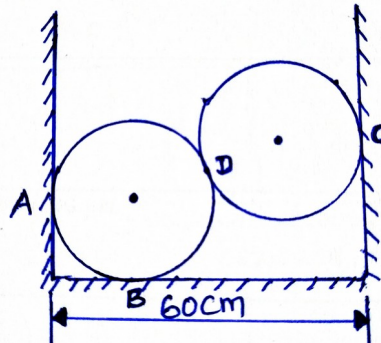
SECTION-I

- 1 a) State and prove Varignon's theorem [10M]
 b) A horizontal member AD of length 12 m is acted upon by set forces as shown in figure. Determine the magnitude, direction and position of the resultant from A. [4M]

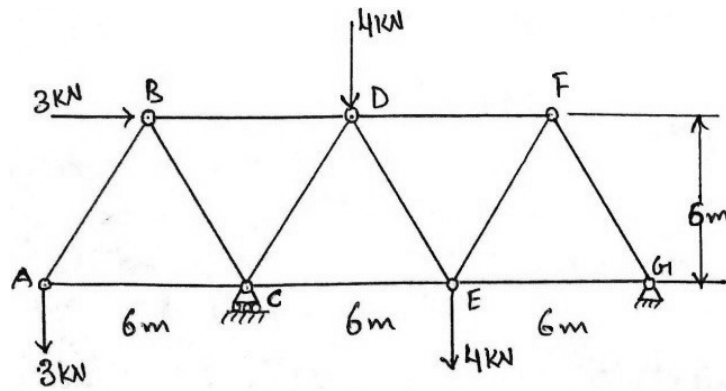


OR

- 2 a) What is equilibrium and equilibrant? [2M]
 b) Two spheres each of weight 200 N and radius 20 cm rest in a horizontal channel of width 60 cm as shown in Figure. Find the reactions at the points of contact A, B and C. [12M]

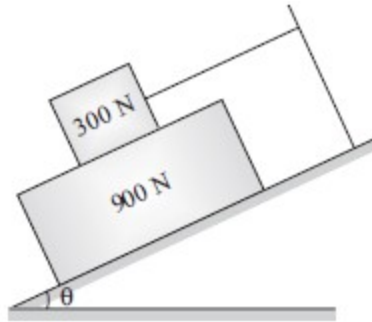
**SECTION-II**

- 3 Determine the forces in all the members of the truss as shown in below Figure. [14M]
 Also indicate the magnitude and nature of forces on the diagram.



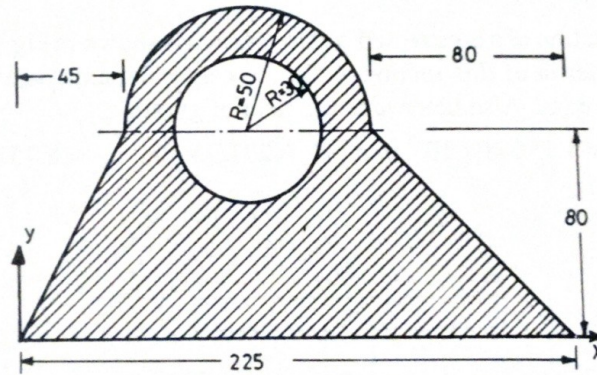
OR

- 4 a) What is limiting Friction? And state the laws of Friction.. [6M]
 b) What should be the value of θ in Fig. which will make the motion of 900 N block down the plane to impend? The coefficient of friction for all contact surfaces is $1/3$. [8M]



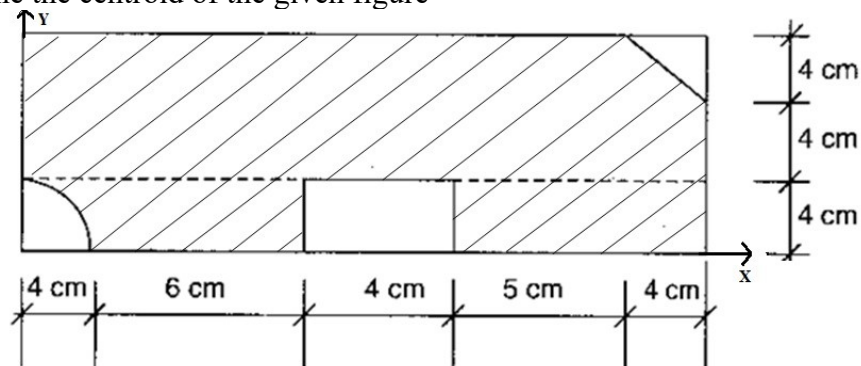
SECTION-III

- 5 a) Determine the centroidal coordinates of quarter-circle with radius 'R'. [6M]
 b) Determine the centroid of the shaded area shown in figure given below. [8M]



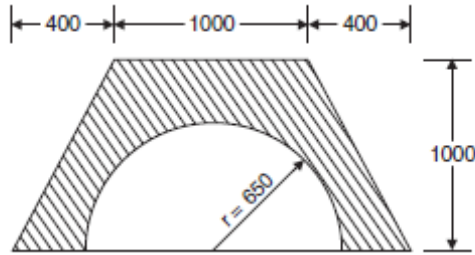
OR

- 6 Determine the centroid of the given figure [14M]



SECTION-IV

- 7 The cross-section of a plain concrete culvert is as shown in Fig. Determine the moment of inertia about the horizontal centroidal axes. [14M]



OR

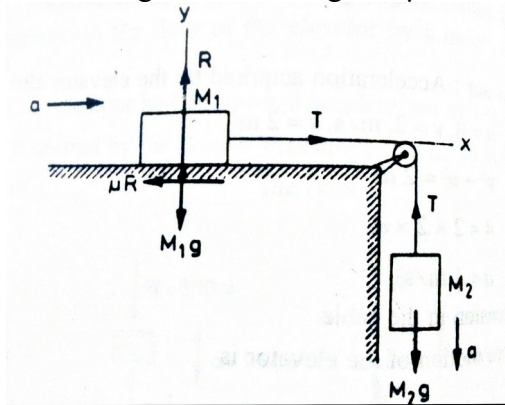
- 8 The homogeneous body of total mass m consist of a cylinder with hemispherical ends. Calculate the moment of inertia of the body about the z -axis in terms of R and m . [14M]

SECTION-V

- 9 a) A motorist takes 10 seconds to cover a distance of 20 m and 15 seconds to cover a distance of 40 m. Determine the uniform acceleration of the car and the velocity at the end of 15 seconds. [7M]
 b) Motion of a particle is given by the equation $x = t^3 - 3t^2 - 9t + 12$. Determine the time, position and acceleration of the particle when its velocity becomes zero. [7M]

OR

- 10 Two blocks of masses M_1 and M_2 are connected by a flexible but inextensible string as shown in figure. Assuming the coefficient of friction between block M_1 and the horizontal surface to be μ find the acceleration of the masses and tension in the string. Assume $M_1 = 10$ kg and $M_2 = 5$ kg and $\mu = 0.25$. [14M]



Code No: R18A0304

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, November 2019

Fluid Mechanics & Hydraulic Machines

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 a) What is the importance of a manometer. Brief the types of manometers. [8M]
b) What are the different types fluids? Explain each type. [6M]

OR

- 2 a) Define the basic law relating to the pressure in a static fluid. What is gauge Pressure and atmospheric pressure? [7M]
b) A U-tube manometer is used to measure the pressure of oil of specific gravity 0.85 flowing in a pipe line. Its left end is connected to the pipe and the right limb is open to the atmosphere. The centre of the pipe is open to the atmosphere. The centre of the pipe is 100mm below the level of mercury (specific gravity=13.6) in the right limb. If the difference of mercury level in the two limbs is 160mm, determine the absolute pressure of the oil in the pipe [7M]

SECTION-II

- 3 a) What is a boundary layer? Why does it increase with distance from the upstream edge? [8M]
b) Define energy thickness. Derive an expression for the energy thickness [6M]

OR

- 4 State Bernoulli's theorem. Derive it from Euler's equation of motion. What are the assumptions involved in? [14M]

SECTION-III

- 5 Derive the Darcy - Weisbach equation for friction head loss in a pipe . [14M]
OR
6 The rate of flow of water through a horizontal pipe is 0.25 m³/s. The diameter of the pipe which is 200 mm is suddenly enlarged to 400 mm. The pressure intensity in the smaller pipe is 11.772 N/cm². Determine: i) loss of head due to sudden enlargement, ii) pressure intensity in the large pipe, iii) power lost due to enlargement [14M]

SECTION-IV

- 7 Derive an expression for the force of jet striking tangentially at the tip of a curved vane which is moving in the direction of jet. Also derive the expression for work done. [14M]

OR

- 8 a) Draw a neat diagram of Kaplan turbine and explain its working. State important equations. [7M]

b) Explain in detail, how you find the efficiency of draft tube. [7M]

SECTION-V

9 a) Define cavitation and discuss the effects of cavitation [8M]

b) List the advantages and limitations of reciprocating pumps over rotodynamic pumps. [6M]

OR

10 a) Discuss the concept of multistage pumps in detail. [7M]

b) A centrifugal pump has three stages discharging 120 lit/s, working against a head of 45 m, running at 1400 rpm. Calculate the specific speed of the pump. [7M]

Code No: R18A0307

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, November 2019

Kinematics of Machinery

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

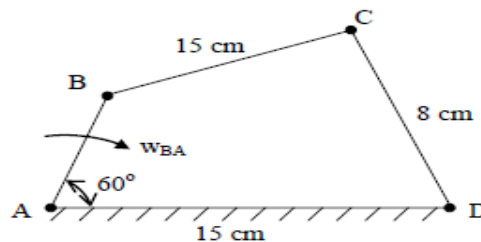
- 1 (a) Define Degrees of Freedom of link? Give kutz bach equation [4M]
(b) Describe four bar chain and any two inversions of it? [10M]
- 2 OR
- (a) Define kinematic link, pair, kinematic pair and mechanism [4M]
(b) Describe Double slider crank chain mechanism and its inversions [10M]

SECTION-II

- 3 (a) Sketch and describe Ackermann steering gear. What are its advantages over Davis type? [7M]
(b) Explain Harts mechanism [7M]
- OR
- 4 (a) In a Davis steering gear, the length of the car between axles is 2.6m and the steering pivots are 1.45m apart. Determine the inclination of the track arms to the longitudinal axis of the car it moves in a straight path. [7M]
(b) Sketch a polar velocity diagram of a Hooke's joint and mark its salient features [7M]

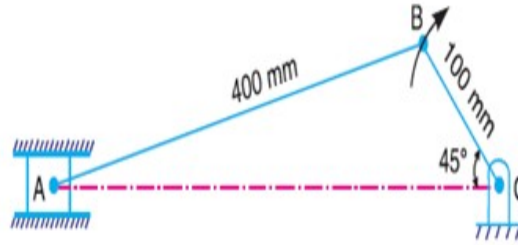
SECTION-III

- 5 In a four bar chain ABCD link AD is fixed and in 15 cm long. The crank AB is 4 cm long rotates at 180 rpm (clock wise) while link CD rotates about D is 8 cm long BC = AD and angle BAD = 60°. Find angular velocity of link CD. [14M]



r

- 6 Locate all Instantaneous centers of the slider crank mechanism as shown in fig. [14M]
The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with angular velocity of 10 rad/s, find:
1. Velocity of slider 2. Angular velocity of connecting rod ?



SECTION-IV

- 7 A cam rotating in a clock wise direction is used to move reciprocating roller follower of diameter 20 mm with simple harmonic motion in a radial path, as given below [14M]
- i. Out stroke with maximum displacement of 25 mm during 120° of cam rotation
 - ii. Dwell for 60° of cam rotation, return stroke with 90°, and the remaining is dwell

OR

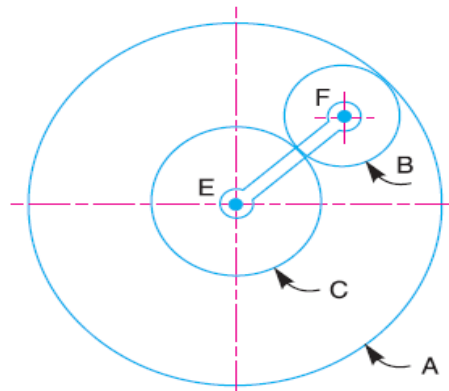
- 8 A cam drives a flat reciprocating follower in the following manner: [14M]
 During first 120° rotation of cam, follower moves outwards through a distance of 30 mm with uniform acceleration and follower dwells during next 30° of cam rotation. During next 120° of cam rotation with uniform deceleration, remaining is dwell. Base circle radius is 40 mm. Draw the cam profile

SECTION-V

- 9 (a) Explain the terms (i) Module, (ii) Addendum (iii) Dedendum (iv) pitch circle diameter [4M]
- (b) A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and contact ratio? [10M]

OR

- 10 An epicyclic gear consists of three gears A, B and C as shown in Fig. The gear A has 72 internal teeth and gear C has 32 external teeth. The gear B meshes with both A and C and is carried an arm EF which rotates about the center of A at 18 rpm. If the gear A is fixed, determine the speed of gears B and C [14M]



Code No: R18A0306

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, November 2019

Machine Drawing

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 2 parts. Answer any two questions from Part-A, which carries of 28 Marks and Part-B consists of one question which is

Answer any Two of the following (14*2=28)

- Q. No.1 Sketch the conventional representation of the following materials. [14M]
(i) Bronze (ii) cast iron (iii) plywood
- Q. No.2 Draw sectional front view and top view of the triple riveted butt joint with double strap (zig-zag type) with dia of rivet as 15mm. [14M]
- Q. No.3 Draw the half sectional elevation and plan of Split Muff Coupling with D=25mm. [14M]
- Part- B (42 Marks)**
- Q. No.4 Details of the screw jack are shown in figure 1, assemble all the parts provide the following views of the assembled screw jack. Half sectional front view (right half in section), top view and view from the right. Also provide the part list. [42M]

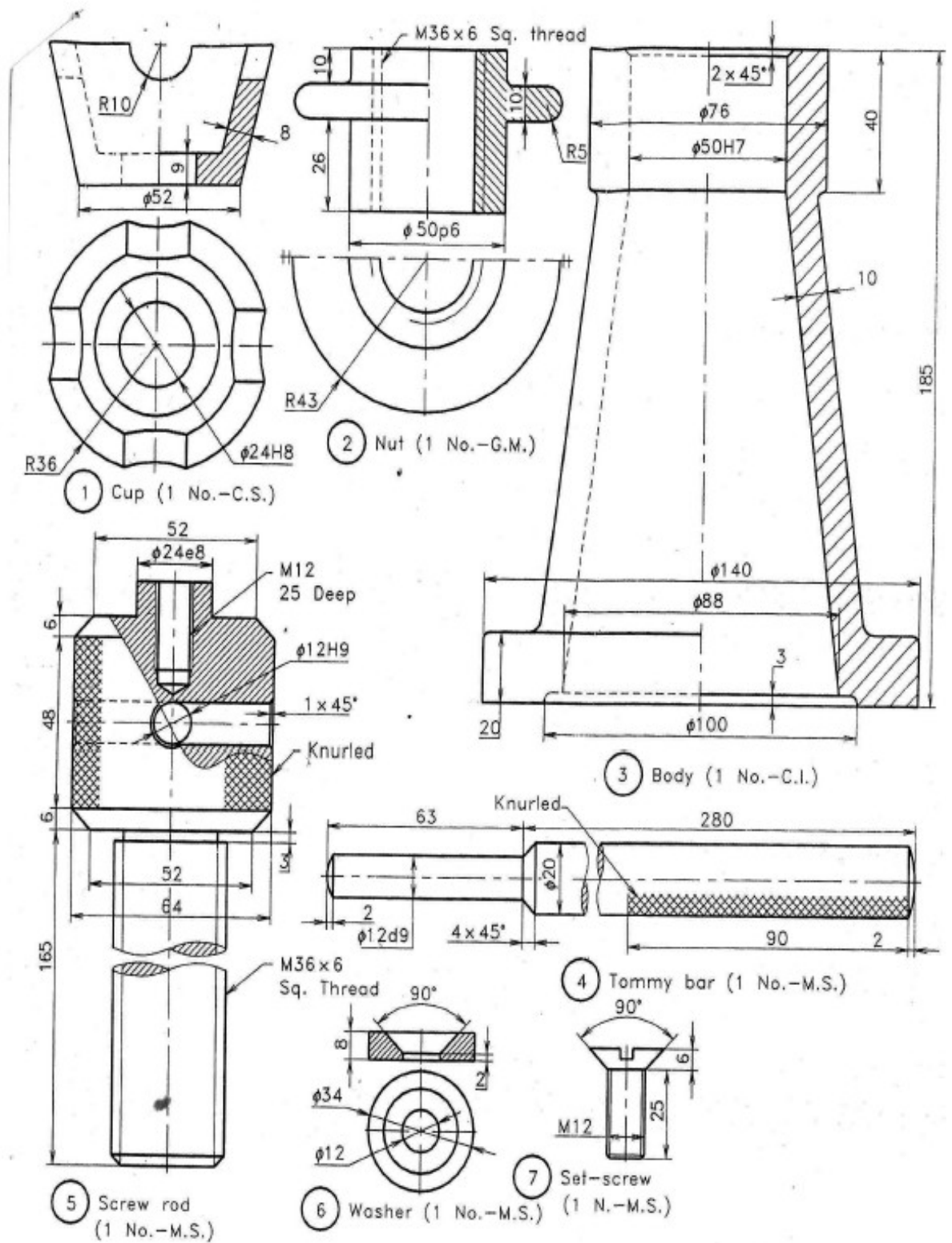


Figure 1

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, November 2019

Materials Engineering

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 Prove that FCC is closely packed than BCC by calculating atomic packing factor for both [14M]

OR

- 2(a) Discuss Ionic, Covalent and Metallic Bond. [7M]
 2(b) Discuss how the properties strength, Ductility and Electrical Conductivity are affected by these bonding. [7M]

SECTION-II

- 3(a) Differentiate Substitutional and Interstitial solid solutions with examples [7M]
 3(b) Define Eutectic, Peritectic and Eutectoid reactions [7M]

OR

- 4(a) State Hume-Rothery rules that govern the formation of solid solutions [7M]
 4 (b) What is twinning deformation? Explain the difference between slip and twinning mechanisms using sketch [7M]

SECTION-III

- 5(a) State composition, specific properties and applications of Grey Cast Iron. [7M]
 5(b) Enlist the properties of pure aluminium and mention the composition, properties and application of any aluminium [7M]

OR

- 6 (a) Define annealing and normalising. [7M]
 (b) How they differ in affecting the properties? [7M]

SECTION-IV

- 7(a) Discuss the mechanical behaviour of ceramic materials. [7M]
 (b) Write short notes on i) Particle – reinforced materials. ii) Fiber reinforced materials. [7M]

OR

- 8 What are composites? Explain different types of fibers used in composites. [14M]

SECTION-V

- 9 What are the Mechanisms of polymerization. [14M]

OR

- 10 Write short notes of (a) Liquid crystal polymers (b) Conductive polymers. [14M]

Code No: R18A0303

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)

R18

II B.Tech I Semester Regular/Supplementary Examinations, February 2021
Thermodynamics

(ME)

Roll No									
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Time: 2 hours 30 min

Max. Marks: 70

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

- 1 a. Define thermodynamics and discuss different approaches to study of thermodynamics? [7M]
- b. Write short notes on the following: Thermodynamic properties, state, path, process, closed system, isolated system, open system, extensive and intensive properties. [7M]
- 2 a. Sketch and explain the working of constant volume thermometer. [7M]
- b. Calculate the actual pressure of air in the tank if the pressure of compressed air measured by manometer is 30 cm of mercury and atmospheric pressure is 101 kPa. (Take $g = 9.78 \text{ m/s}^2$) [7M]
- 3 A gas at 65 kPa, 200°C is heated in a closed, rigid vessel till it reaches to 400°C. Determine the amount of heat required for 0.5 kg of this gas if internal energy at 200°C and 400°C are 26.6 kJ/kg and 37.8 kJ/kg respectively. [14M]
- 4 a. Derive the steady flow energy equation. [7M]
- b. Explain the following :
(a) Free expansion (b) Polytropic process, (c) Hyperbolic process
Also obtain expressions for work in each case. [7M]
- 5 a. Determine enthalpy, specific volume, entropy for mixture of 10% quality at 0.15 MPa. [7M]
- b. Give a neat sketch of “separating and throttling calorimeter” for dryness fraction measurement. [7M]
- 6 a. Derive the equation of State [7M]
- b. Explain Vanderwal’s equation. [7M]
- 7 a. Discuss the working of summer air-conditioning system. Describe working of winter air-conditioning system. [7M]
- b. Write short notes on relative humidity, specific humidity, dry bulb temperature, dew point temperature, wet bulb temperature. [7M]
- 8 Derive the expression for efficiency of Diesel cycle with help of PV & TS diagrams

Code No: R18A0302

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)

R18

II B.Tech I Semester Regular/Supplementary Examinations, February 2021
Engineering Mechanics

(ME)

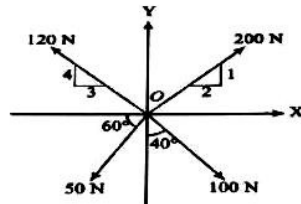
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Time: 2 hours 30 min

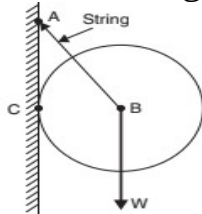
Max. Marks: 70

Answer Any Five Questions
All Questions carries equal marks.

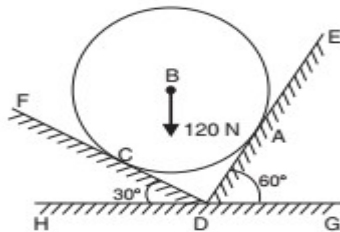
- 1 a) Classify Engineering Mechanics. [2M]
b) A system of four forces acting on a body is shown in figure. Determine the resultant force and its direction. [12M]



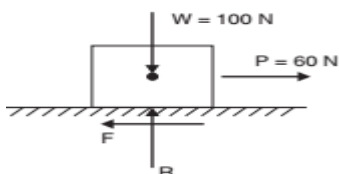
- 2 a) Draw the free body diagram of ball of weight W supported by a string AB and resting against a smooth vertical wall at C as shown in Fig. [4M]



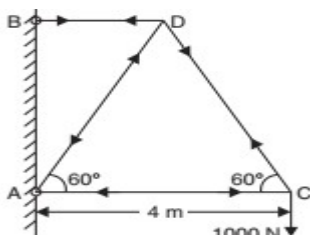
- b) A ball of weight 120 N rests in a right-angled groove, as shown in Fig. (a). The sides of the groove are inclined to an angle of 30° and 60° to the horizontal. If all the surfaces are smooth, then determine the reactions R_A and R_C at the points of contact.



- 3 a) State law of friction. [5M]
a) A body of weight 100 Newtons is placed on a rough horizontal plane. Determine the co-efficient of friction if a horizontal force of 60 Newtons just causes the body to slide over the horizontal plane. [9M]

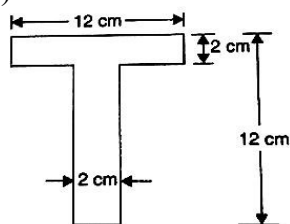


- 4 Determine the forces in all the members of a cantilever truss shown in Fig. [14M]

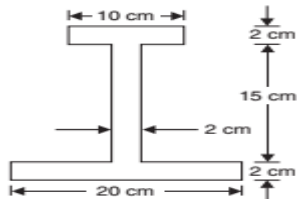


- 5 a) Define centroid and centre of gravity. [2M]

- b) For the T-section shown in figure, locate the centroid [12M]



- 6 Find the centroid of the I-section shown in Fig. [14M]



- 7 a) State the Pappus-Guldinus second theorem. [4M]

- b) Determine the moment of inertia of a rectangle about centroidal axes of base b height d [10M]

- 8 Two weights 800 N and 200 N are connected by a thread and move along a rough horizontal plane under the action of a force 400 N applied to the first weight of 800 N as shown in Fig.(c). The coefficient of friction between the sliding surfaces of the weights and the plane is 0.3. Determine the acceleration of the weights and the tension in the thread using D' Alembert's principle. [14M]

Code No: R18A0304

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular/Supplementary Examinations, February 2021

Fluid Mechanics & Hydraulic Machines

(ME)

Roll No									
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Time: 2 hours 30 min

Max. Marks: 70

Answer Any Five Questions
All Questions carries equal marks.

- 1 a) State Newton's law of viscosity. Distinguish between Newtonian and Non-Newtonian fluids. [7M]
b) What is meant by vapour pressure? Explain its importance in liquid flow systems. [7M]
- 2 a) Explain atmospheric, gauge and vacuum pressure with the help of a neat sketch. [7M]
b) U-tube manometer containing mercury was used to find the negative pressure in the pipe, containing water. The right limb was open to the atmosphere. Find the vacuum pressure in the pipe, if the difference of mercury level in the two limbs was 100mm and height of water in the left limb from the centre of the pipe was found to be 40mm below. [7M]
- 3 The water is flowing through a taper pipe of length 100m having diameters 600mm at the upper end and 300mm at the lower end, at the rate of 50lit/sec. the pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher level is 19.62 N/cm^2 . [14M]
- 4 A pipeline carrying oil of specific gravity 0.87, changes in diameter from 200 mm diameter at a position A to 500mm diameter at a position B which is 4metres at a higher level. If the pressures at A and B are 9.81 N/cm^2 and 5.886 N/cm^2 respectively and the discharge is 200 litres/s determine the loss of head and direction of flow. [14M]
- 5 a) Describe Reynolds experiment with a legible sketch. What are the outcomes of Reynolds experiment? [8M]
b) Two tanks are connected by a 300 mm diameter 1000 m long pipe. Find the rate of flow if the difference of water level in the tank is 10 m. Take $4f = 0.04$ and ignore minor losses. [6M]
- 6 a) Derive Darcy-Weisbach equation for loss of head in a pipe. [7M]
b) Water is flowing through a horizontal pipe line 1500m long and 200mm in diameter. Pressures at the two ends of the pipe line are respectively 12 kPa and 2kPa. If $f = 0.015$, determine the discharge through the pipe in litres per minute. Consider only frictional loss. [7M]
- 7 a) Explain and derive the expressions for: [7M]
(i) Unit speed. and
(ii) Unit discharge of a hydraulic turbine.
b) A Francis turbine working under a head of 8m at a speed of 200 r.p.m, [7M]

develops 70kW when the rate of flow of water is $1.6m^3/s$. The runner diameter is 1m. If the head on this turbine is increased to 18m, determine its new speed, discharge and power.

- 8** What is reciprocating pump? Describe the principle and working of a reciprocating pump with a neat sketch. Also derive the expression for discharge and work done. **[14M]**

Code No: R18A0307

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular/Supplementary Examinations, February 2021

Kinematics of Machinery

(ME)

Roll No										
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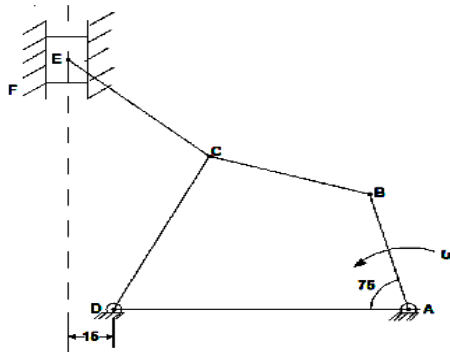
Time: 2 hours 30 min

Max. Marks: 70

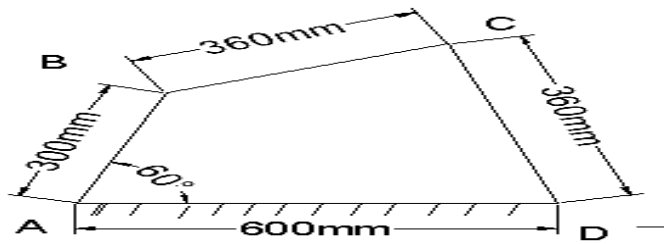
Answer Any Five Questions

All Questions carries equal marks.

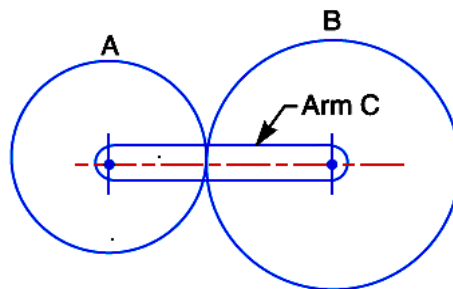
- 1 Sketch and describe the working of two different types of quick return mechanisms. Give examples of their applications. Derive an expression for the ratio of times taken in forward and return stroke for one of these mechanisms. [14M]
- 2.a) Explain the term kinematic link. Give the classification of kinematic link. [7M]
- b) What is the significance of degrees of freedom of a kinematic chain when it functions as a mechanism? Give examples [7M]
- 3 A double universal joint is used to connect two shafts in the same plane. The intermediate shaft is inclined at an angle of 20° to the driving shaft as well as the driven shaft. Find the maximum and minimum speed of the intermediate shaft and the driven shaft if the driving shaft has a constant speed of 500 r.p.m. In a Double Universal joint, what happens if the intermediate shaft is inadvertently placed in such a manner that its forks lie in planes perpendicular to each other? [14M]
- 4.a) Draw a neat sketch of the Robert's mechanism, and explain its working. How do you find the location of the (tracing) point P which produces the approximate straight line motion [7M]
- b) Derive the condition for correct steering of an automobile? [7M]
5. In the mechanism shown in Figure below, the dimensions of various links (in mm) are: $AB = 30$; $BC = 45$; $CD = 40$; $AD = 65$; $CE = 40$; $\angle DAB = 75^\circ$; The crank AB rotates at 600 rpm counter-clockwise. Determine the velocity of the slider. (The dimensions in the figure are in mm). [14M]



- 6 In a pin jointed four bar mechanism as shown in figure, $AB=300$ mm, $BC=CD=360$ mm and $AD=600$ mm. The angle $BAD=60^\circ$. The crank AB rotates uniformly at 100 r.p.m. Locate all instantaneous centre and find angular velocity of the link BC . [14M]



- 7 A cam drives knife edge follower in the following manner : [14M]
 During first 120° rotation of the cam, follower moves outwards through a distance of 20 mm with simple harmonic motion. The follower dwells during next 30° of cam rotation. During next 120° of cam rotation, the follower moves inwards with simple harmonic motion. The follower dwells for the next 90° of cam rotation. The minimum radius of the cam is 25 mm. Draw the profile of the cam.
- 8 In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 [14M]
 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B?



Roll No									
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Time: 2 hours 30 min

Max. Marks: 70

All Questions carries equal marks. **Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 30 marks. Answer any two in Part A.

Part B consists of one section which carries 40 marks

Part- A (30 Marks)**Answer any two of the following (15*2=30)**

- Q. No. 1. Draw the three view of a hexagonal bolt of nominal diameter 30mm and length 100mm with hexagonal nut and washer.
- Q. No. 2. Draw sectional front view and top view of a single riveted double cover butt joint for a plate of thickness 15mm.
- Q. No. 3. Draw sectional front view, top view and side view of socket and spigot joint to join two rods of 30mm diameter each.

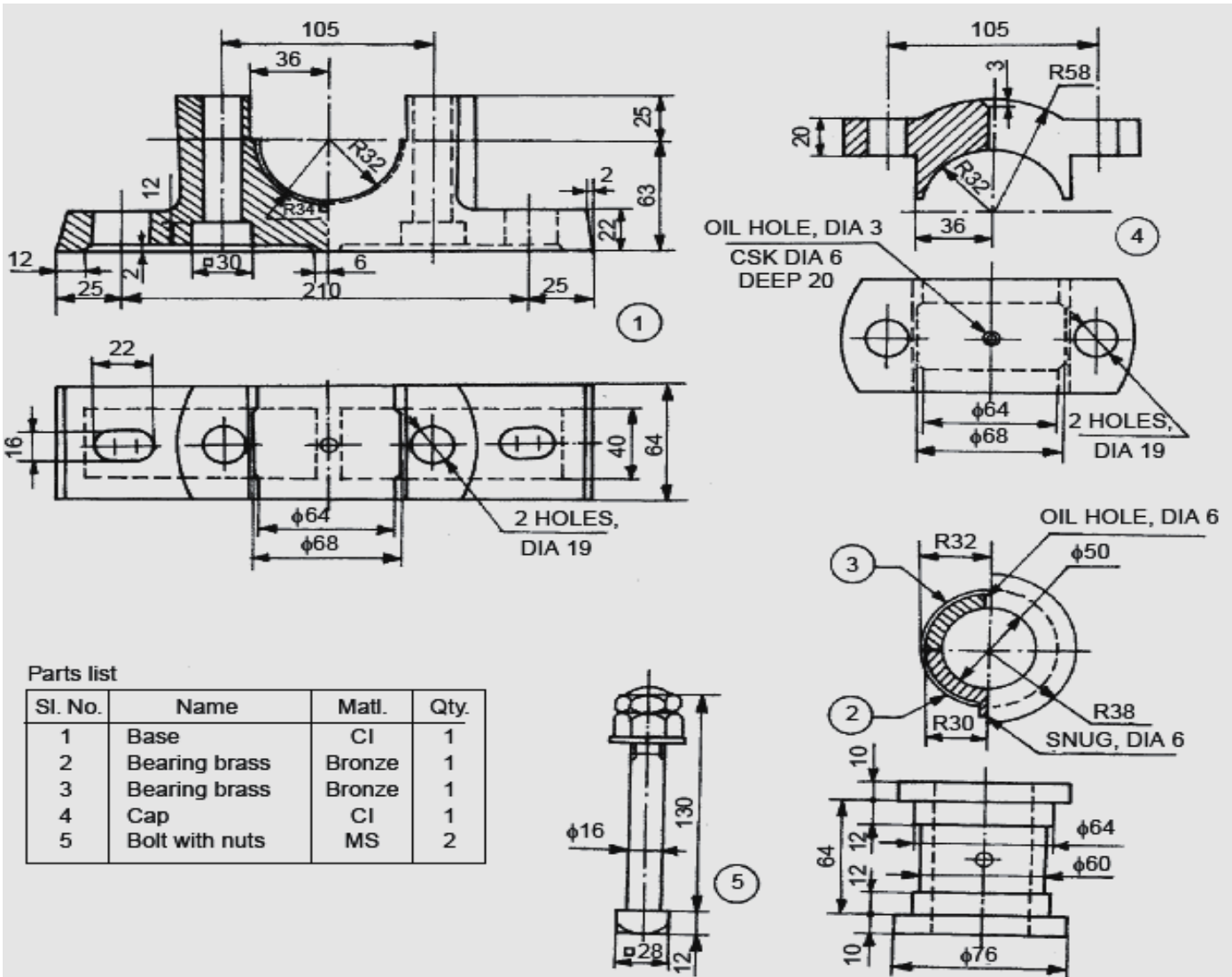
Part-B (40 Marks)

(1*40=40M)

Q.No. 4 The details of a Plummer block are given blow. Draw the following assembled views.

- half sectional front view
- Top view
- Side view

(All dimensions are in mm)

**Parts list**

Sl. No.	Name	Matl.	Qty.
1	Base	CI	1
2	Bearing brass	Bronze	1
3	Bearing brass	Bronze	1
4	Cap	CI	1
5	Bolt with nuts	MS	2

Code No: R18A0305

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular/Supplementary Examinations, February 2021

Materials Engineering

(ME)

Roll No										
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Time: 2 hours 30 min

Max. Marks: 70

Answer Any Five Questions
All Questions carries equal marks.

- 1a) Discuss in detail about metallic bond in solids. [7M]
b) Draw a neat sketch of HCP crystal structure and calculate the effective number of atoms. [7M]
- 2a) Define Unit cell. Determine APF for BCC crystal structure. [7M]
b) Discuss Van der Waals bond with an example. [7M]
- 3a) Explain different point defects in crystals. [7M]
b) Discuss about different types of surface defects in crystals. [7M]
- 4a) Discuss Hume-Rothery Rules of solid solubility. [7M]
b) What are the advantages of powder metallurgy? [7M]
- 5a) List and explain three reactions present in Fe-Fe₃C equilibrium diagram [7M]
b) What is high carbon steel? Explain with micro structure and specific applications. [7M]
- 6a) What is annealing? Discuss the structure transformation during annealing [7M]
b) Discuss the classification of cast iron and draw its micro structure. [7M]
- 7 List the important engineering ceramic materials and discuss its general applications of ceramic materials in various engineering fields. [14M]
- 8 What do you understand by polymerization? With the help of suitable example compare the process of addition polymerization and condensation polymerization, [14M]

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, April 2023

Thermodynamics

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 *A* What do you understand by macroscopic and microscopic view points? [7M]
B Explain a Quasi-static process with an example, what is its characteristic feature [7M]

OR

- 2 *A* What is a thermodynamic system? Classify and Explain different types of thermodynamic systems? [7M]
B Explain the terms state, path, process and cyclic process. [7M]

SECTION-II

- 3 *A* Define thermal energy reservoir, source and sink. [4M]
B Two Carnot engines A and B are connected in series between two thermal reservoirs maintained at 1500 K and 150 K respectively. Engine A receives 1700 kJ of heat from the high-temperature reservoir and rejects heat to the Carnot engine B. Engine B takes in heat rejected by engine A and rejects heat to the low-temperature reservoir. If engines A and B have equal thermal efficiencies determine (a) The heat rejected by engine B (b) temperature at which heat is rejected by engine A (c) The work done during the process by engines A and B respectively. [10M]

OR

- 4 *A* State and prove the Clausius' theorem. [7M]
B What is PMM2? Why it is impossible? [7M]

SECTION-III

- 5 *A* What do you understand by triple point? Give the pressure and temperature of water at its triple point. [7M]
B In a steam boiler, hot gases from a fire transfer heat to water which vaporizes at constant temperature. In a certain case, the gases are cooled from 1100 °C to 550 °C while the water evaporates at 220 °C. The specific heat of the gases is 1.005kJ/kgK, and the latent heat of water at 200 °C is 1858.5kJ/kg. All the heat transferred from the gases goes to the water. How much does the total entropy of the combined system of gas and water increase as a result of the irreversible heat transfer? Obtain the result on the basis of 1 kg of water evaporated. [7M]

OR

- 6 *A* Explain the terms Internal Energy, Enthalpy, and Specific Heats of Ideal [7M]

Gases.

- B** A mass of wet steam at temperature 165 °C is expanded at constant quality 0.8 to pressure 3 bar. It is then heated at constant pressure to a degree of superheat 65°C. Find the enthalpy and entropy changes during expansion and during heating. Draw the T- s and h-s diagrams. [7M]

SECTION-IV

- 7 **A** Define Psychrometric Properties [7M]
i. Wet Bulb Temperature
ii. Thermodynamic Wet Bulb Temperature
iii. Dew point Temperature
- B** Define the term “dryness fraction” of steam. Describe the terms “wet steam, dry saturated steam and superheated steam”. [7M]

OR

- 8 **A** Explain Mole Fraction and Mass fraction [7M]
B Derive the equation of state. [7M]

SECTION-V

- 9 **A** An SI engine operating on Otto cycle has its inlet parameters as 323 K and 1 bar, while it develops a maximum pressure of 25 bar. Assuming Bore as 250mm, stroke as 375mm and clearance volume as 0.00263 m³, determine (i) air standard efficiency and (ii) mean effective pressure of the cycle. [7M]
- B** Derive an expression for Air standard Efficiency of Dual cycle? [7M]

OR

- 10 **A** A gas turbine works on an air Brayton cycle. The initial condition of the air is 25°C and 1 bar. The maximum pressure and temperature are limited to 3 bar and 650°C. Determine the following: (i) Cycle efficiency (ii) Heat supplied and heat rejected per kg of air (iii) Work output per kg of air (iv) Exhaust temperature. Draw P-V and T-S diagrams. [7M]
- B** Derive an expression for Air standard Efficiency of Diesel cycle? [7M]

Code No: R18A0302

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, April 2023

Engineering Mechanics

(ME)

Roll No										
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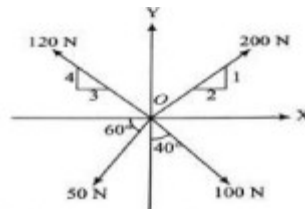
Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 A A system of four forces acting on a body is shown in figure. Determine the resultant force and its direction. [7M]

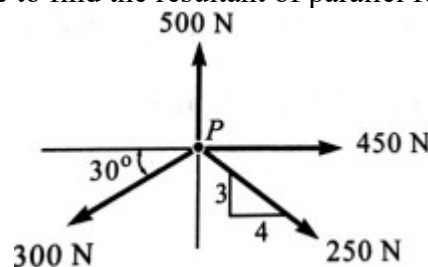


- B Explain how you will reduce the system of coplanar, non-concurrent forces to a force and a couple. [7M]

OR

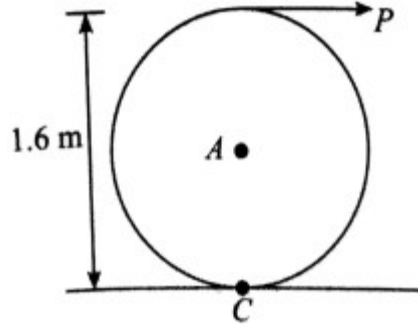
- 2 A A pull of 60 N inclined at 25° to the horizontal plane, is required just to move a body placed on a rough horizontal plane. But the push required to move the body is 75N. If the push is inclined at 25° to the horizontal, find the weight of the body and coefficient of friction. [7M]

- B Explain the procedure to find the resultant of parallel forces. [7M]



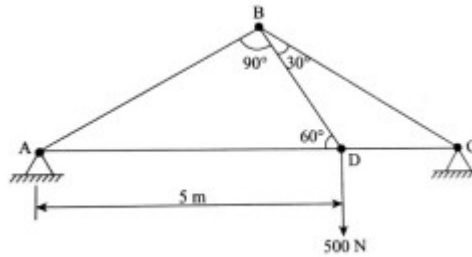
SECTION-II

- 3 A solid cylinder weighing 1300N is acted upon by a force 'P' horizontally as shown in figure. Determine the maximum value of 'P' for which there will be rolling without slipping. (coefficient of friction, $\mu=0.2$). [14M]



OR

- 4 A truss is loaded as shown in figure. Find the forces in members AB, BD and BC. [14M]

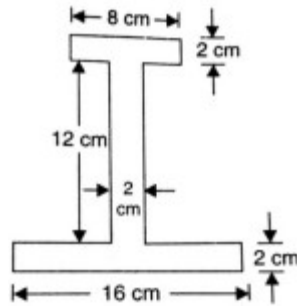


SECTION-III

- 5 Find the centroid of the T section shown in figure. [14M]

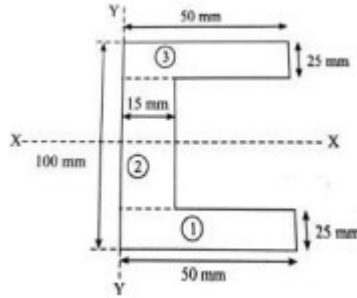
OR

- 6 Find the centroid of the I section shown in figure? [14M]



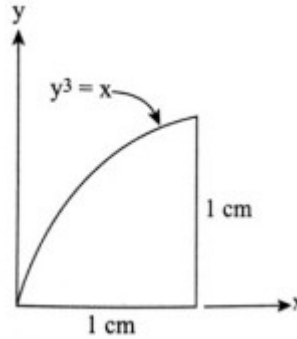
SECTION-IV

- 7 Determine moment of inertia of given section about centroidal XX axis. [14M]



OR

- 8 Determine the product of inertia I_{xy} of the area under the curve. [14M]



SECTION-V

- 9 A bullet of 25 g mass is fired with a speed of 400 m/s. What is its kinetic energy? If the bullet can penetrate 20 cm in a block of wood, what is the average resistance of the wood? If the bullet were fired into a similar block of 10 cm thick wood, what would be the exit speed? [14M]

OR

- 10 A particle undergoing central force motion has a tangential velocity of 20m/s while at a distance of 300m from the central point. Using the fact that the areal velocity of the particle must be constant, find its tangential velocity when it is 400m away from central point. [14M]

Code No: R18A0304

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, April 2023

Fluid Mechanics & Hydraulic Machines

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

1 Explain the Pascal's law. Prove that pressure acting on wedge submerged in fluid is equal in all directions. [14M]

OR

2 A Explain how vacuum pressure can be measured with the help of a U-tube manometer. [7M]

B In a mercury differential manometer the mercury deflection is 20 cm. Find the difference of pressure in 'kPa' if the liquid flowing in the pipe is oil of sp. gr. 0.8. [7M]

SECTION-II

3 A Explain the terms:
(i) Path line [2M]
(ii) Streak line [2M]
(iii) Stream line and [2M]
(iv) Stream tube. [2M]

B Derive Bernoulli's equation from Euler's equation [6M]

OR

4 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 diameter pipe is 3 m/s. Find the discharge in this pipe. Also, determine the velocity in 20 cm pipe if the average velocity in 30 cm diameter pipe is 2m/sec. [14M]

SECTION-III

5 A What is a Venturimeter ? Derive an expression for the discharge through a Venturimeter [7M]

B What are the different losses in flow through the circular pipes. [7M]

OR

6 A What are the different methods of preventing the separation of boundary layers? [7M]

B Describe the characteristics of laminar and turbulent boundary layers. [7M]

SECTION-IV

7 Differentiate between [5M]

i) Impulse and Reaction turbine [5M]

ii) Radial and Axial flow Turbines [4M]

iii) Inward and Outward Radial flow turbines

OR

- 8** A Kaplan turbine works under a head of 60m at a speed of 145rpm utilizing $175\text{m}^3/\text{s}$ of water. Diameter of runner and hub are 5.60m & 3.20m. Turbine develops 82500 kW. Find i) flow ratio ii) speed ratio iii) overall efficiency iv) specific speed. **[14M]**

SECTION-V

- 9** *A* Explain the performance characteristic curves of Centrifugal pump **[7M]**
B Write a note on Net positive suction head for centrifugal pumps **[7M]**

OR

- 10** What are different types of pumps and explain any one pump with neat sketch **[14M]**

Code No: R18A0307

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)

R18

II B.Tech I Semester Supplementary Examinations, April 2023

Kinematics of Machinery

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

1 What do you mean by inversion of a mechanism? Explain with neat sketches all the inversions of a quadric cyclic chain. [14M]

OR

2 With a neat sketch explain the inversion of double-slider crank mechanism which is used in elliptical trammel. [14M]

SECTION-II

3 Describe the Watt's parallel mechanism for straight line motion and derive the condition under which the straight line is traced. [14M]

OR

4 The driving shaft of a Hooke's joint runs at a uniform speed of 240 r.p.m. and the angle α between the shafts is 20° . The driven shaft with attached masses has a mass of 55 kg at a radius of gyration of 150 mm. 1. If a steady torque of 200 N-m resists rotation of the driven shaft, find the torque required at the driving shaft, when $\theta = 45^\circ$. 2. At what value of ' α ' will the total fluctuation of speed of the driven shaft be limited to 24 r.p.m? [14M]

SECTION-III

5 In a pin jointed four bar mechanism ABCD, the lengths of various links are as follows: AB = 25 mm; BC = 87.5 mm; CD = 50 mm and AD = 80 mm. The link AD is fixed and angle BAD = 135° . If the velocity of B is 1.8 m/s in the clockwise direction, find 1. Velocity and acceleration of the midpoint of BC, and 2. Angular velocity and angular acceleration of link CB and CD. [14M]

OR

6 The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine: 1. Linear velocity and acceleration of the connecting rod, and 2. angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position. [14M]

SECTION-IV

7 A cam is to give the following motion to a knife-edged follower : [14M]
1. Outstroke during 60° of cam rotation; 2. Dwell for the next 30° of cam rotation; 3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 210° of cam rotation.

The stroke of the follower is 40 mm and the minimum radius of the cam is

50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when the axis of the follower passes through the axis of the cam shaft.

OR

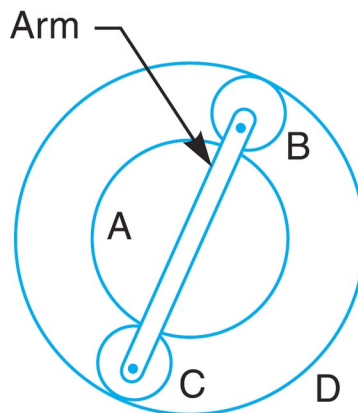
- 8 A cam drives a flat reciprocating follower in the following manner : [14M]
 During first 120° rotation of the cam, follower moves outwards through a distance of 20 mm with simple harmonic motion. The follower dwells during next 30° of cam rotation. During next 120° of cam rotation, the follower moves inwards with simple harmonic motion. The follower dwells for the next 90° of cam rotation. The minimum radius of the cam is 25 mm. Draw the profile of the cam.

SECTION-V

- 9 Two involute gears of 20° pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5 mm and the pitch line speed is 1.2 m/s, assuming addendum as standard and equal to one module, find: **1.** The angle turned through by pinion when one pair of teeth is in mesh; and **2.** The maximum velocity of sliding. [14M]

OR

- 10 An epicyclic train of gears is arranged as shown in Fig. How many revolutions does the arm, to which the pinions B and C are attached, make: **1.** When A makes one revolution clockwise and D makes half a revolution anticlockwise, and **2.** When A makes one revolution clockwise and D is stationary? The number of teeth on the gears A and D are 40 and 90 respectively. [14M]



Code No: R18A0306

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, April 2023

Machine Drawing

(ME)

Roll No										
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

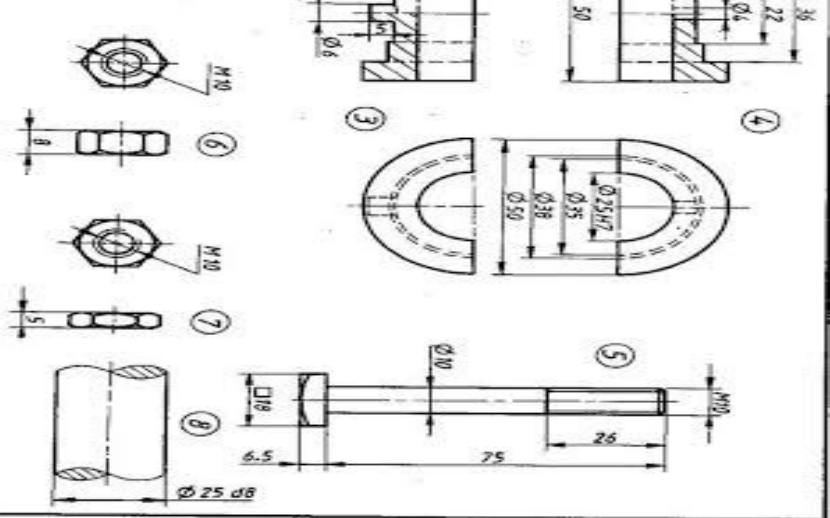
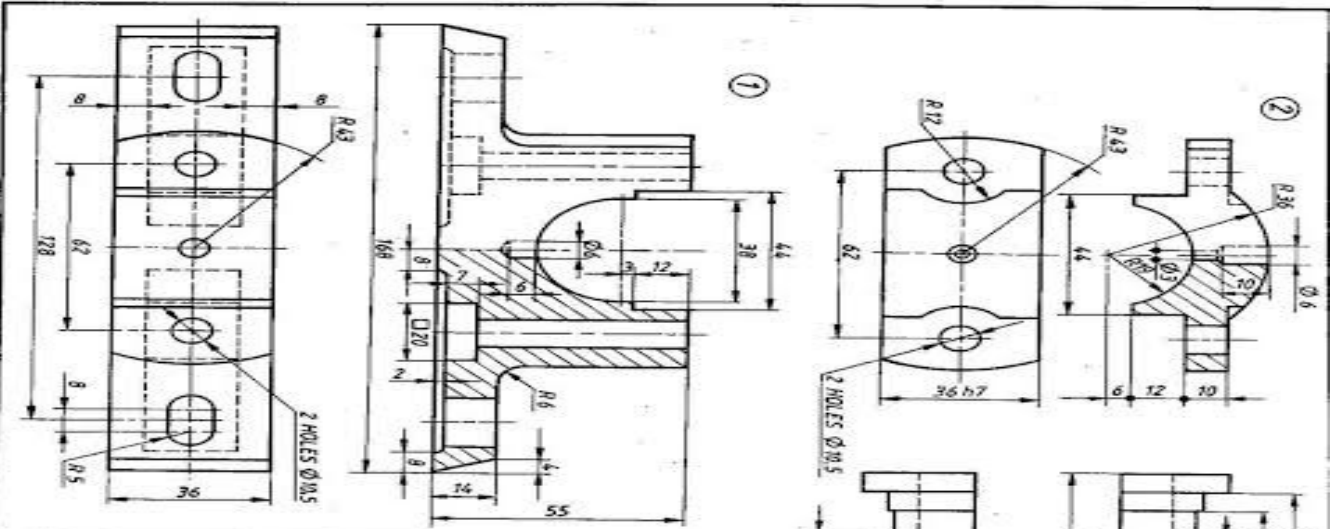
Part- A (28 Marks)

Answer any two of the following (14*2=28)

- Q. No. 1. Sketch the following : a) BSW thread b) Buttren thread c) Internal threads
d) Compression spring
- Q. No. 2. Draw the sectional front view and side view of a cotter joint with sleeve used to connect two rods of 40 mm diameter each.
- Q. No. 3. Draw (a) sectional view from the front and (b) view from above, of single riveted, double strap butt joint of thickness 15 mm:

Part-B (42 Marks)

- Q. No.4 The part drawings of plummer block are shown in Fig. Assemble the parts and draw,
(i) Sectional view from the front and (ii) view from above. (1*42=42M)



ITEM NO	DRAWING NO	DESCRIPTION	MATERIAL	NO QTY
1		SHAF	Fe 410 W	1
2		LOCK NUT M10	Fe 410 W	2
3		NUT M10	Fe 410 W	2
4		BOLT M10	Fe 410 W	2
5		BEARING TOP HALF	BRASS	1
6		BEARING BOTTON HALF	BRASS	1
7		CAP	CAST IRON	1
8		BOOY	CAST IRON	1

REVISION NO	UNLESS OTHERWISE STATED	REVISION	DATE
1	DIMENSIONS IN MM	DRAWN	
2	CHANGES 1 x 1/2"	CHECKED	
3	APPROVED	MADE	

ABC & COMPANY BANGALORE	STANDARD	APPROVED
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SCALE: 1:1
DETAILS OF PLUMMER BLOCK
 SHEET 1 OF 1

Code No: R18A0305

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, April 2023

Materials Engineering

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 Derive the relation between lattice parameter and atomic radius; Atomic packing factor, coordination number, average number of atoms for BCC, and FCC crystal structures [14M]

OR

- 2 A Explain the metallic bond with examples [7M]
B Identify the miller indices in cubic unit cell for (100) (111) (121) (110) [7M]

SECTION-II

- 3 A Apply Lever rule to identify relative amount of phases existing in (i) 0.4% C hypo eutectoid steel (ii) 0.8% C Eutectoid steel (iii) 1.2% C Hyper Eutectoid steel. [7M]

- B Explain frenkel defect and schottky defect. [7M]

OR

- 4 A Write the differences between edge dislocation and screw dislocation. [7M]

- B Explain the steps in powder metallurgy. [7M]

SECTION-III

- 5 A Draw Iron-Carbon phase diagram and explain its invariant reactions. [7M]

- B Differentiate between hardening and hardenability. [7M]

OR

- 6 A Explain the Classification of steels along with Microstructures. [7M]

- B Write short note on [7M]

i) High Resistivity alloys

ii) Super hard materials

SECTION-IV

- 7 A Write short notes on Advanced Ceramic Materials. [7M]

- B Differentiate between Particle Reinforced and Dispersion Composites? [7M]

OR

- 8 A Define composite and explain how composites are Classified. [7M]

- B Write short note on Functional properties and applications of ceramic materials. [7M]

SECTION-V

- 9 A Write the differences between Thermoplastics and Thermosets. [7M]

- B Write short notes on [7M]

i) Conductive polymers

ii) Photonic polymers.

OR

- 10** *A* Explain Mechanisms of polymerization.
 B Write short notes on Liquid crystal polymers

[7M]

[7M]

Code No: R18A0303

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Thermodynamics

(ME)

Roll No									

Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 (a) Energy is a point function. Explain and prove. [7M]
(b) Prove that heat and work are path functions. [7M]

OR

- 2 (a) Explain what is PMM-I? [7M]
(b) A mass of gas is compressed in a quasi-static process from 80 kPa, 0.1 m³ to 0.4MPa, 0.03 m³. Assuming that pressure and volume are related by PV = constant. Find the work done by the gas system. [7M]

SECTION-II

- 3 (a) What is a carnot cycle? What are the four Processes which constitute the cycle? [7M]
(b) What do you understand by the entropy, principle and show that entropy is a property of a system? [7M]

OR

- 4 (a) Is it possible for a heat engine to operate without rejecting any waste heat to a low temperature reservoir? Explain. [7M]
(b) Prove the equivalence of Kelvin Planck and Clausius Statement. [7M]

SECTION-III

- 5 (a) Explain the significance of Vander walls equation and its limitations [7M]
(b) A tank of volume 1.3 m³ is filled with argon at 6 bar and 260°C. If the gas within the tank changes its state isentropically when it flows from the tank until the pressure drops to the atmospheric pressure of 1 bar, determine the mass of the gas that has left the tank during the process. [7M]

OR

- 6 (a) Draw the phase equilibrium diagram for a pure substance on T-S plot with relevant constant property lines. [7M]
(b) What is the critical state? Explain the terms critical pressure, critical temperature and critical volume of water? [7M]

SECTION-IV

- 7 Define Mass and Mole fraction, derive a relation between them. [14M]

OR

- 8 Write note on the following:
(a) Avogadro's Law [5M]
(b) Adiabatic Saturation [5M]
(c) Psychometric chart [4M]

SECTION-V

- 9** A dual combustion cycle operates with a volumetric compression ratio is 12, and with a cut-off ratio 1.615. The maximum pressure is given by $P_{\max} = 54 P_1$ where P_1 is the pressure before compression. Assuming indices of compression and expansion of 1.35, show that the m.e.p. of the cycle $P_m = 10 P_1$ Hence evaluate
[14M]
(a) Temperatures at cardinal points with $T_1 = 335$ K, and
(b) Cycle efficiency.

OR

- 10** (a) Explain the air standard Otto cycle with the help P-V and T-S diagrams. [7M]
(b) In an Otto cycle, the upper and lower limits for absolute temperatures are respectively T_3 and T_1 . Show that for maximum work, the ratio of compression should have the value $r = (T_3 / T_1)^{1.25}$ Take $\gamma = 1.4$ [7M]

Code No: R18A0306

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Machine Drawing

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

Part-A (28 Marks)

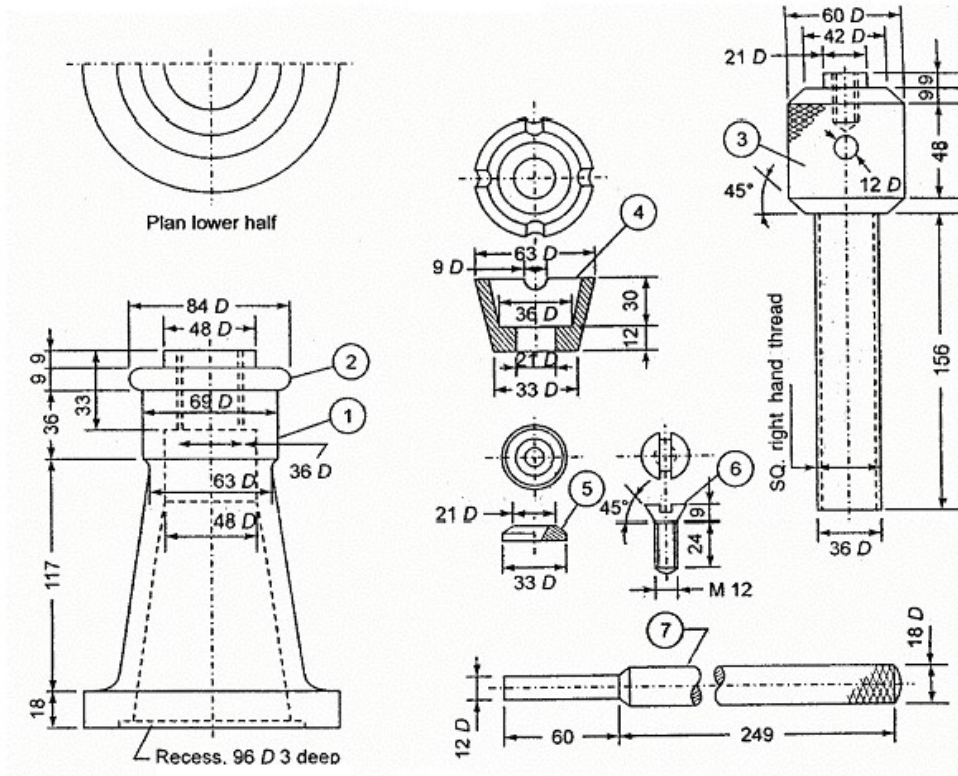
Answer any two of the following (2x14=28)

- 1 a) Sketch the following [8+6M]
 - i) Any three types of conventions ii) Feather key iii) Woodruff key
 - b) Draw left hand and right hand threads of nominal size M20
- 2 Draw neatly, a sectional front view and top view of a double riveted chain lap joint for two 10 mm thick plates. Show all the dimensions in your drawing [14M]
- 3 Draw gib and cotter joint suitable for joining 40 mm square rods. [14M]

Part-B (42 Marks)

(1x42=42M)

- 4 Draw the following assembled views of the Screw Jack. [42M]
 - a) Half sectional Front view b) Top view



Part list

S. no.	Name of part	Material	No. off
1.	Casting	C.I.	1
2.	Nut	G.M.	1
3.	Screw	M.S.	1
4.	Cup	Cast steel	1
5.	Washer	M.S.	1
6.	Screw	M.S.	1
7.	Tommy bar	M.S.	1

Fig. 1 Screw-jack.

Code No: R18A0302

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Engineering Mechanics

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

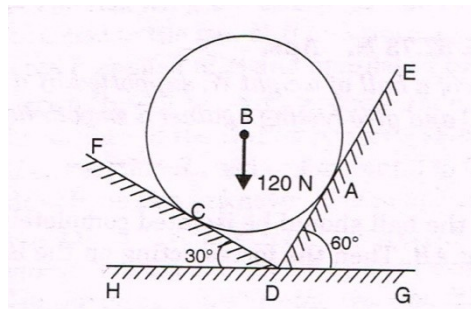
Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 Three forces of magnitude 30k, 10kN and 15kN are acting at a point O. The angle made by 30kN force, 10kN force and 15kN force with x-axis are 60° , 120° , 240° respectively determine the magnitude and direction of the resultant force. [14M]

OR

- 2 A ball of weight 120 N rests in a right-angle groove as shown in fig .The sides of the groove are inclined to an angle of 30° and 60° to the horizontal. If all the surfaces are smooth, then determine the reactions R_A and R_C at the points of contact. [14M]



SECTION-II

- 3 A block weighing 100 N is resting on a rough plane inclined 20° to the horizontal. It is acted upon by a force of 50N directed upward at angle of 14° above the plane. Determine the frictional force. If the block is about to move up the plane, determine the co-efficient of friction. [14M]

OR

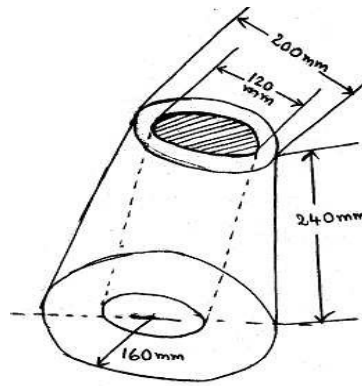
- 4 Explain the method of sections process for a simply supported truss with a suitable example. [14M]

SECTION-III

- 5 Determine the centroid for triangle of base b and height h [14M]

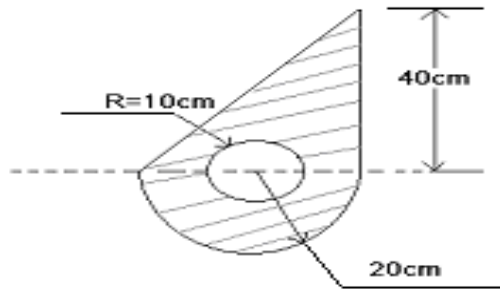
OR

- 6 Find the center of gravity for the figures given below [14M]



SECTION-IV

- 7 Find the moment of inertia about both the centroidal axes of shaded portion, as [14M] shown in the Figure



OR

- 8 State and derive the product of inertia and Determine the product of inertia of a [14M] quadrat circle.

SECTION-V

- 9 A ball is thrown so that it just clears a 8m wall 32m away. If it left the hand 1.5m [14M] above the ground and at an angle of 60° to horizontal, what was the initial velocity of the ball.

OR

- 10 Define and explain briefly about D' ALEMBERT'S PRINCIPLE with a suitable [14M] example.

Code No: R18A0304

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Fluid Mechanics & Hydraulic Machines

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 a) What is the difference between dynamic viscosity and kinematic viscosity? State their units of measurements. [7M]
b) A piston of 7.95 cm diameter and 30 cm long works in a cylinder of 8.0 cm diameter. The annular space of the position is filled with an oil of viscosity 2poise. If an axial load of 10N is applied to the piston, calculate the speed of movement of the piston. [7M]

OR

- 2 a) Discuss the different types of manometers used in pressure measurement. [7M]
b) A U- tube mercury manometer is used to measure the pressure of oil flowing through a pipe whose specific gravity is 0.85. The center of the pipe is 15 cm below the level of mercury. The mercury level difference in the manometer is 25 cm, determine the absolute pressure of the oil flowing through the pipe. Atmospheric pressure is 750 mm of Hg. [7M]

SECTION-II

- 3 a) What is meant by one-dimensional, two-dimensional and three-dimensional flows? [7M]
b) Explain the terms: [7M]
i) Path line ii) Streak line iii) Stream line iv) Stream tube

OR

- 4 a) Derive Bernoulli's equation from Euler's equation. [7M]
b) A 42° reducing bend is connected in a pipe line, the diameters at the inlet and outlet of the bend being 40 cm and 20 cm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet of bend is 20.00 N/cm². The rate of flow of water is 550 litres/s. [7M]

SECTION-III

- 5 a) Describe the characteristics of laminar and turbulent boundary layers. [7M]
b) Explain condition in which two pipes may be operated in series or in parallel. [7M]

OR

- 6 a) What is a Venturimeter? Derive an expression for the discharge through a Venturimeter. [7M]
b) Explain Reynold's experiment with a neat sketch. [7M]

SECTION-IV

- 7 a) Differentiate between an inward and an outward flow reaction turbine. [7M]
b) A Pelton wheel has a mean bucket speed of 30 m/s with a jet of water flowing at the rate of $0.8 \text{ m}^3/\text{s}$ under a head of 250 m. The buckets deflect the jet through an angle of 160° . Calculate the power delivered to the runner and the hydraulic efficiency of the turbine. Assume co-efficient of velocity as 0.85. [7M]

OR

- 8 a) By means of a neat sketch, explain the working of Francis Turbine. [7M]
b) How will you determine the possibility of cavitation to occur in the installation of a pump? [7M]

SECTION-V

- 9 a) Explain the principle and working of a Centrifugal pump with a neat sketch. [7M]
b) A centrifugal pump delivers water against a net head of 14.5m and design speed of 1000 rpm. The vanes are curved back to an angle of 30° with periphery. The impeller diameter is 300 mm and outlet width 50 mm. Determine the discharge of the pump if the manometric efficiency is 95%. [7M]

OR

- 10 What is the working principle of a reciprocating pump ? Explain its working with the help of an indicator diagram. [14M]

Code No: R18A0307

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Kinematics of Machinery

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 a) Describe different types of Link. [7M]
b) Explain the inversion of Single Slider Crank Chain. [7M]
OR
- 2 a) Classify and explain the Kinematic pair [7M]
b) Explain the inversion of Double Slider crank chain [7M]

SECTION-II

- 3 a) What is a Hooke's joint? What are its applications? [7M]
b) A Hooke's joint connects two shafts whose axes intersect at 150° . The driving shaft rotates uniformly at 120 rpm. The driven shaft operates against a steady torque of 150NM. And carries a flywheel whose mass is 45 kg, and radius of gyration 150 mm. Find the maximum torque which will be exerted by the driving shaft. [7M]
OR
- 4 a) Differentiate between Davi's and Ackerman steering gears. [7M]
[7M]
b) In a Davi's steering gear, the distance between the pivots of the front axle is 1 meter and the wheel base is 2.5 meters. Find the inclination of the track arm to the longitudinal axis of the car when it is moving along a straight path?

SECTION-III

- 5 Determine the velocity and acceleration of the link QR and RS in a four bar mechanism in which PQRS is a four bar mechanism with fixed link PS. Crank PQ rotates uniformly and makes an angle of 60° with PS in anti clockwise direction.. The length of the links are PQ=62.5 mm, QR= 175 mm, RS= 112.5 mm and PS= 200 mm. Crank PQ rotates at 10 radians/ second? [14M]
OR
- 6 a) Mention different types of instantaneous centres. [7M]
b) Locate the instantaneous centres for crank and slotted lever quick return mechanism? [7M]

SECTION-IV

- 7 Design a cam to raise a valve with simple harmonic motion through 15mm is $1/3$ rd of a revolution, keep it fully raised through $1/12$ th of a revolution and to lower it with SHM in $1/6$ th of a revolution. The valve remain closed during the rest of the revolution. The diameter of the roller is 20mm and the minimum radius [14M]

of the cam is 25mm. The axis of the valve rod passes through the axis of the cam shaft. If the cam shaft rotates at uniform speed of 100 rpm; find the maximum velocity and acceleration of the valve during raising and lowering. Also draw the profile of the cam

OR

- 8** Classify with neat sketches the cam follower according to their shape, location and motion. State also their advantages, if any, with respect to other followers [14M]

SECTION-V

- 9** a) Distinguish between cycloidal tooth profile and involute tooth profile [7M]
b) Distinguish velocity and gear ratio [7M]

OR

- 10** Two gear wheels mesh externally and are to give a velocity ratio of 3 to 1. The teeth are of involute form; module=6mm, addendum=one module, pressure angle 20° . The pinion rotates at 90 rpm. Determine (1) the number of teeth on the pinion to avoid interference on it and the corresponding number of teeth on the wheel, (2) The length of path and arc of contact, (3) the number of pairs of teeth in contact. (4) Maximum velocity of sliding [14M]

Code No: R18A0305

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Materials Engineering

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 a) What important factors control the type of structure developed in Ionic solids and covalent solids. Explain them. [10M]
b) Explain briefly about Unit Cell and Graphite [4M]
- OR
- 2 a) Explain about following crystals : i) NaCl crystal ii) CsCl crystal [9M]
b) Explain briefly about Diamond Structure [5M]

SECTION-II

- 3 a) Explain point defect, Line defect and plane defect. [7M]
b) What is a solid solution? What factors do control the solubility of elements? [7M]
- OR
- 4 a) Describe the importance of Hume-Rothery Rules in the development of alloys. [7M]
b) How do you classify the phase diagrams? What are objectives of phase diagram? [7M]

SECTION-III

- 5 a) Explain the types of cast iron and their applications [7M]
b) Draw iron-carbon equilibrium diagram and mark on it all salient temperatures, composition and phases involved. [7M]
- OR
- 6 Why hardening of steels is followed by tempering? Discuss the different stages of tempering and draw the resulting microstructures? [14M]

SECTION-IV

- 7 a) Name a few ceramic materials which are used in industry and what are their characteristics. [7M]
b) What is meant by tempered glass? Explain [7M]
- OR
- 8 Explain the term composite materials with examples. State their advantages and limitations of composites in practice. [14M]

SECTION-V

- 9 a. Classify the polymerizations and explain? [7M]
b. Explain the importance of Biomedical material applications [7M]
- OR
- 10 a. Explain the Mechanisms of polymerisation [6M]
b. Explain brief note with applications: [8M]
i) Liquid crystal polymers ii) Conductive polymers

Code No: R18A0302

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024

Engineering Mechanics

(ME)

Roll No									
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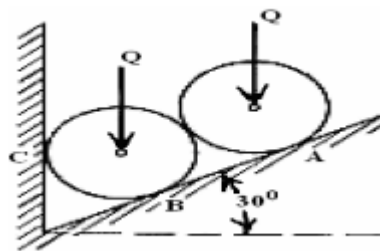
Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

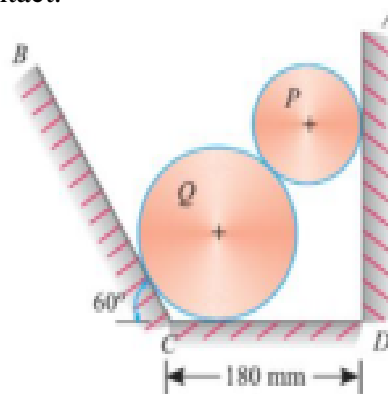
SECTION-I

- 1 **A** Two identical rollers, each of weight 100 N, are supported by an inclined plane and a vertical wall as shown in figure. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C. [7M]



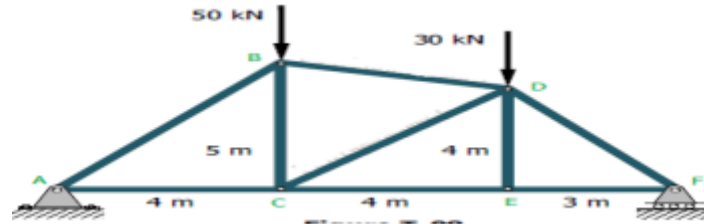
- B** State and prove parallelogram law of forces. [7M]
- OR

- 2 **A** State and Prove Varignon's Theorem [7M]
- B** Two cylinders P and Q rest in a channel as shown in Fig. The cylinder P has diameter of 100 mm and weighs 200 N, whereas the cylinder Q has diameter of 180 mm and weighs 500 N. If the bottom width of the box is 180 mm, with one side vertical and the other inclined at 60°, determine the pressures at all the four points of contact. [7M]



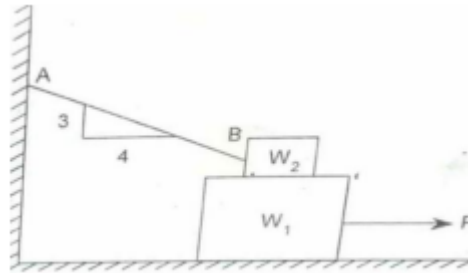
SECTION-II

- 3 Compute the force in all members of the truss shown in Fig [14M]



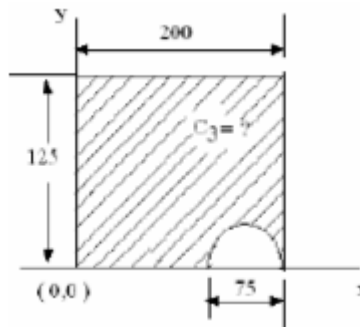
OR

- 4 A block of weight $W_1=1290\text{ N}$ on a horizontal surface and supports another block of weighing $W_2=570\text{ N}$ on the top of its as shown in figure. The block of weight W_2 is attached to a vertical wall by an inclined string AB. Find the force P applied to the lower block that will be necessary To cause slipping to impend. the Coefficient of friction between block 1 and 2 is 0.25 and between block 1 and horizontal surface is 0.4 [14M]



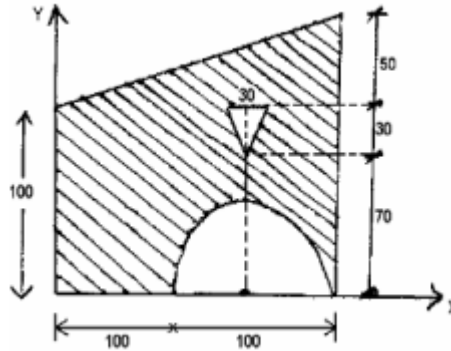
SECTION-III

- 5 A Determine the centre of gravity of right solid circular cone of radius R and height h [7M]
 B Determine the centroid of the shaded area as shown in figure [7M]



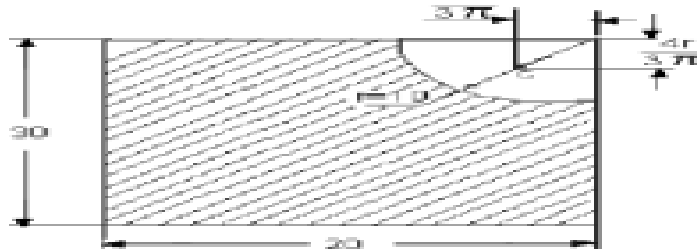
OR

- 6 A State and prove Pappus theorem [7M]
 B Locate the centroid of the shaded area and also find the moment of inertia about horizontal centroidal axis shown in figure. All dimensions in mm. [7M]



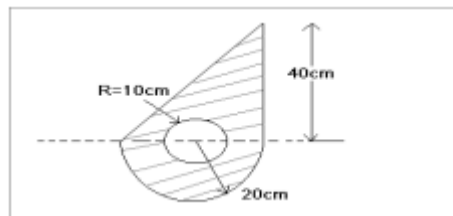
SECTION-IV

- 7 **A** Determine the mass moment of inertia of sphere about its diametrical axis [7M]
B Find the Moment of inertia of the shaded area shown in figure about Centroidal X and Y axis. All dimensions are in cm. [7M]



OR

- 8 **A** Determine moment of inertia of a quarter circle having the radius 'r' [7M]
B Find the moment of inertia about the horizontal centroidal axis. [7M]



SECTION-V

- 9 **A** Derive the Expression for the Equations of motion of the body when it is accelerated uniformly. [7M]
B Two bodies of weights 40N and 25N are connected to the two ends of a light in extensible spring passing over a smooth pulley. The weight of 40N is placed on a rough horizontal surface while the weight of 25N is hanging free in air. The angle of plane is 150° . Determine a) the acceleration of the system b) The tension ($\mu=0.2$) in the string. c) The distance moved by the weight 25N in 3 seconds starting from rest [7M]

OR

- 10 **A** State and Explain D'Alembert's principle [7M]
B Blocks A and B weighing 500 N and 1500 N respectively are connected by a weightless rope passing over a frictionless pulley as shown in the figure. The coefficient of friction is 0.3 on all contact surfaces. Determine the following using D'Alembert's principle: i) Tension in the rope. ii) Velocity of the system 5 sec after starting from rest. [7M]

Code No: **R18A0304****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024**Fluid Mechanics & Hydraulic Machinery**

(ME)

Roll No									
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Time: 3 hours**Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

*********SECTION-I**

- 1 A Define the following terms: [7M]
 i) Specific gravity
 ii) viscosity
 iii) Capillarity
- B What is Manometer? How they are classified [7M]
- OR
- 2 A i) What do you mean by vacuum pressure [3M]
 ii) Differentiate between Absolute pressure and gauge pressure [4M]
- B A simple U-tube manometer containing mercury is connected to a pipe in which an oil of sp.gr. 0.8 is flowing. The pressure in the pipe is vacuum. The other end of the manometer is open to the atmosphere. Find vacuum pressure in a pipe, if the difference of mercury level in the two limbs is 20cm and height of oil in the left limb from the center of the pipe is 15cm below. [7M]

SECTION-II

- 3 A Define and distinguish between Stream lines, pathlines, streak lines and stream tube [7M]
- B State the momentum equation. How will you apply momentum equation for determining the force exerted by a floating liquid on a pipe bend? [7M]
- OR
- 4 Formulate Euler's equation of motion along a stream line integrate it to obtain Bernoulli's equation. State all assumptions made. [14M]

SECTION-III

- 5 A Determine the loss of head due to friction in pipe by using Darcy formula [7M]
- B A pipe of 300mm diameter conveying $0.3\text{m}^3/\text{s}$ of water has a right-angled bend in a horizontal plane. Find the resultant force exerted on the bend if the pressure at inlet and outlet of the bend are $24.252\text{N}/\text{cm}^2$ [7M]
- OR
- 6 A What do you mean by boundary layer separation? What is the effect of pressure gradient on boundary layer separation? Explain? [7M]
- B A horizontal venturimeter with inlet and throat diameters 30cm and 15cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and throat is 20cm of mercury. Determine the rate of flow. Take $C_d=0.98$ [7M]

SECTION-IV

- 7 A List out various characteristics of turbines and explain any one in detail. [7M]
B A kaplan turbine runner is to be designed to develop 9100Kw. The net available head is 5.6m. If the speed ratio=0.68, overall efficiency=86% and the diameter of the boss is 1/3 the diameter of the runner. Find the diameter of the runner, its speed and the specific speed of the turbine. [7M]

OR

- 8 A Differentiate between(i) the impulse and reaction turbine and (ii) radial and axial flow turbines. [7M]
B A 2.5cm diameter jet of water strikes a symmetrical vane tangentially at one end and leaves at the other end. After impingment, the jet gets deflected through 160° by the vane. Calculate the thrust exerted by jet on the vane if the discharge is $0.0736\text{m}^3/\text{sec}$. Assume the vane to be smmoth [7M]

SECTION-V

- 9 A Explain the principle and working of a centrifugal pump with a neat sketch. [7M]
B A centrifugal pump delivers water against a net head of 14.5 m and design speed of 1000rpm. The vanes are curved back to an angle of 30° with periphery. The impeller diameter is 300 mm and outlet width 50mm. Determine the discharge of the pump if the manometric efficiency is 95% [7M]

OR

- 10 A Define and explain slip, percentage slip and negative slip of a reciprocating pump [7M]
B What is indicator diagram for a reciprocating pump? Explain slip and coefficient of discharge of a reciprocating pump. [7M]

Code No: **R18A0307****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024**Kinematics of Machinery**

(ME)

Roll No									
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Time: 3 hours**Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

1 *A* Define Kinematic pair and discuss various types of kinematic pairs with example. [7M]

B Write notes on complete and incomplete constraints in lower and higher pairs, illustrating your answer with neat sketches. [7M]

OR

2 *A* What is inversion of mechanism? Explain any two inversions of double slider crank mechanism with sketches. [7M]

B Sketch and describe the working of two different types of quick return mechanisms. Give examples of their applications. [7M]

SECTION-II

3 *A* Draw a neat sketch and explain Peaucellier's exact straight line mechanism. [7M]

B Derive an expression for the ratio of shafts velocities for Hooke's joint and draw the polar diagram. [7M]

OR

4 *A* With a neat sketch, explain the Ackermann steering gear of an automobile. [7M]

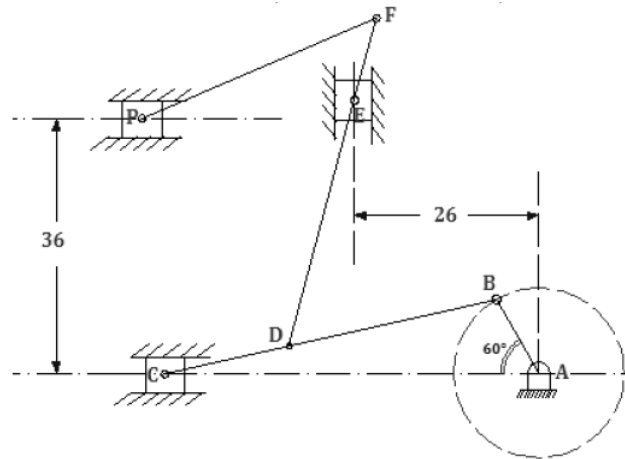
B What is the condition for correct steering? Sketch and show the two main types of steering gears and discuss their relative advantages. [7M]

SECTION-III

5 In a slider crank mechanism, the length of crank OB and connecting rod AB are 125 mm and 500 mm respectively. The centre of gravity G of the connecting rod is 275 mm from the slider A. The crank speed is 600 r.p.m. clockwise. When the crank has turned 45° from the inner dead centre position, determine: 1. velocity of the slider A, 2. velocity of the point G, and 3. angular velocity of the connecting rod AB. [14M]

OR

6 In a mechanism shown in Figure, the crank OA rotates clockwise at 200 rpm. The link lengths are: AB = 12 cm; BC = 48 cm; CD = 18 cm; DE = 36 cm; EF = 12 cm; FP = 36 cm. Find the velocities of the points C, E, and P, using the Instantaneous center method. (All dimensions are in cm). [14M]



SECTION-IV

- 7 **A** Explain the procedure to layout the cam profile for a reciprocating follower. [7M]
B Derive relations for velocity and acceleration for a convex cam with a flat faced follower. [7M]

OR

- 8 A cam with 30mm as minimum diameter is rotating clockwise at a uniform speed of 1200rpm and has to give the following motion to a roller follower 10mm in diameter: (i) Follower to complete outward stroke of 25mm during 120° of cam rotation with equal uniform acceleration and retardation. (ii) Follower to dwell for 60° of cam rotation. (iii) Follower to return to its initial position during 90° of cam rotation with equal uniform acceleration and retardation. (iv) Follower to dwell for remaining 90° of cam rotation. Draw the cam profile if the axis of the roller follower passes through the axis of the cam. [14M]

SECTION-V

- 9 **A** Make a comparison of cycloidal and involute tooth forms. [4M]
B Two 20° pressure angle involute gears in mesh have a module of 10mm. Addendum is module. Large gear has 50 teeth and the pinion has 13 teeth. Does interference occur? If it occurs, to what value should the pressure angle be changed to eliminate interference? [10M]

OR

- 10 **A** Classify and explain gear trains with neat sketches. [6M]
B Two involute gears of 20° pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5 mm, and the pitch line speed is 1.2 m/s, assuming addendum as standard and equal to one module, find (i) the angle turned through by pinion when one pair of teeth is in mesh; and (ii) the maximum velocity of sliding [8M]

Code No: R18A0306

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024

Machine Drawing

(ME)

Roll No										
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Time: 3 hours

Max. Marks: 70

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 30 marks. Answer any two in Part A.

Part B consists of one section which carries 40 marks

Part- A (30 Marks)

Answer any two of the following (15*2=30)

Q. No1. Draw the conventional representation for the following materials:

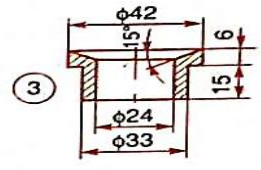
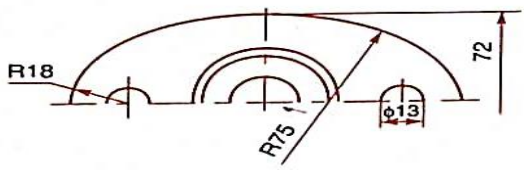
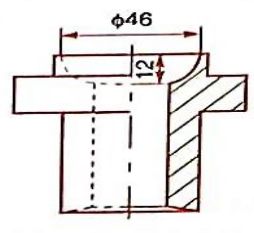
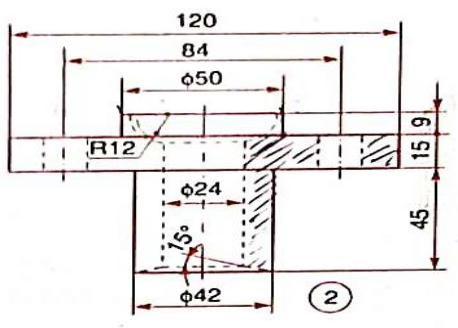
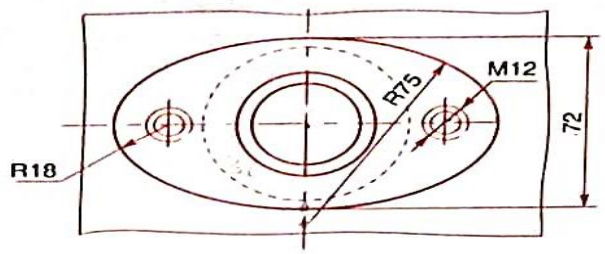
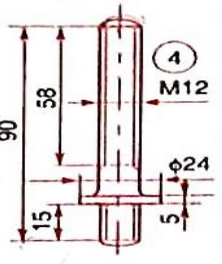
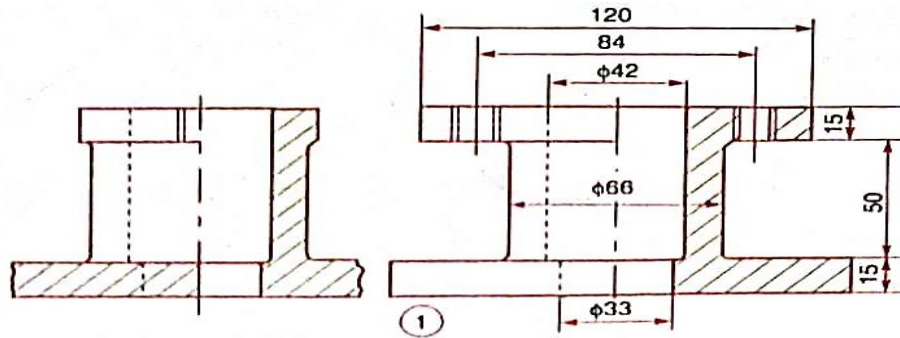
(a) Glass (b) Liquid (c)Steel (d) Wood (e)Concrete

Q. No. 2. Draw the three views of a hexagonal headed bolt of nominal diameter 25 mm and length 100 mm; with a hexagonal nut and washer.

Q. No. 3. Draw the sectional front view and top view of single riveted, single strap chain butt joint to join plates of thickness 10 mm.

Part-B (40 Marks)

Q. No. 4. Assemble all parts of the stuffing box for a vertical steam engine, shown in Fig and draw, (a) Half sectional view from the front, (b) view from above.



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

Code No: **R18A0305****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024**Materials Engineering**

(ME)

Roll No									
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Time: 3 hours**Max. Marks: 70****Note:** This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 A What are different atomic models? Explain any one in detail. [7M]
B Why FCC metals are more ductile than BCC and HCP metals? [7M]

OR

- 2 A Classification Bonds? Explain In Detail. [8M]
B Explain the terms (a) Unit Cell (c) Crystalline and Amorphous Solid [6M]

SECTION-II

- 3 A Explain Edge dislocation and Screw dislocation? [6M]
B Differentiate between Eutectic transformation and Eutectoid transformation. [8M]

OR

- 4 A What is Gibbs phase rule? Explain its importance. [6M]
B Explain the solidification of pure metals. [8M]

SECTION-III

- 5 A Explain about Iron- Carbon Equilibrium diagram. [10M]
B Write briefly about Surface hardening process. [4M]

OR

- 6 A Give the classification of steels? [8M]
B Distinguish between Annealing and Normalizing [6M]

SECTION-IV

- 7 A Explain Ceramics and Write the Properties of it? [7M]
B Write briefly about Continuous fibres and Dis-continuous fibres. [7M]

OR

- 8 A Why are fibre glass reinforced composites used extensively. [8M]
B Write the Application of composites. [6M]

SECTION-V

- 9 A What do you mean by Elastomers and How it differs from Thermoplastics? [8M]
B Explain briefly about Liquid Crystal polymer and Conductive Polymers [6M]

OR

- 10 A Write about the mechanism of Polymerization. [7M]
B Write about Biomedical applications of polymers. [7M]

Code No: R18A0303

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024**Thermodynamics**

(ME)

Roll No									
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Time: 3 hours**Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

Note: Psychometric charts and steam tables are permitted**SECTION-I**

- 1 **A** With a neat sketch explain briefly about constant volume gas thermometer. [7M]
 B A piston and cylinder machine contains a fluid system which passes through a complete cycle of four processes. During a cycle, the sum of all heat transfers is - 170kJ. The system completes 100 cycles per minute. Complete the following table showing the method for each item and compute the net rate of work output in kW. [7M]

Proce	Q,	w, kJ/min	ΔU , kJ/min
a-b	0	2170	-----
b-c	21000	0	-----
c-d	2100	-----	-36600
d-a	-----	-----	-----

OR

- 2 **A** A closed system of constant volume experiences a temperature rise of 25°C when a certain process occurs. The heat transferred in the process is 30 kJ. The specific heat at constant volume for the pure substance comprising the system is 1.2 kJ/kg°C, and the system contains 2.5 kg of this substance. Determine: (i) The change in internal energy ; (ii) The work done [7M]
 B Differentiate between Microscopic view and Macroscopic view of study. [7M]

SECTION-II

- 3 **A** A Spherical balloon has a diameter of 0.3m and contains a pressure of 147kPa The diameter of the balloon increases to 0.4m due to heating and during this process the pressure proportional to diameter. Calculate the work done during this process. [7M]
 B A heat engine is supplied with 300kJ/s of heat at constant fixed temperature of 327°C with rejection of heat at 7°C at the rates of i) 210 ii) 140 and iii) 70kJ/s. Comment on the nature of cycle in each case. [7M]

OR

- 4 **A** Explain the Carnot cycle on p-V and T-s diagrams also derive the expression for the efficiency of Carnot cycle [7M]
 B 2kg of air at a pressure of 7 bar occupies a volume of 0.28m³ This air is then expanded to a volume of 1.4m³. This expansion takes place according to the law $pV^{1.2} = \text{constant}$. Find work done, change in internal energy, heat absorbed or rejected during the process, change in enthalpy and change in [7M]

entropy during the process. For air $C_p = 1 \text{ kJ/kgK}$ and $C_v = 0.72 \text{ kJ/kg K}$

SECTION-III

- 5 **A** Calculate the entropy and internal energy of a steam at a pressure of 12 bar i) [7M]
When the steam is having a dryness fraction of 0.8. ii) When the steam is saturated and iii) When the steam is super heated to a degree of super heat of 20°C .

- B** A vessel of volume 0.04 m^3 contains a mixture of saturated water and saturated steam at a temperature of 250°C . The mass of the liquid present is 9kg. Find the pressure, mass, specific volume, entropy, enthalpy and internal energy [7M]

OR

- 6 **A** Explain the process of steam generation at constant pressure. Show the various stages on p-V, T-s, and h-s diagrams [7M]

- B** Steam initially at 1.5MPa, 300°C expands adiabatically in steam turbine to 40°C . Determine the work output of the turbine per kg of steam [7M]

SECTION-IV

- 7 **A** A sling psychrometer reads 40°C DBT and 36°C WBT. Find the humidity ratio, relative humidity, dew point temperature, specific volume and enthalpy of air. [7M]

- B** Define the following terms i) Mole fraction ii) Mass fraction iii) Volume fraction iv) Dry bulb temperature v) Wet bulb temperature vi) Dew point temperature vii) Relative humidity. [7M]

OR

- 8 **A** A gas mixture contains 1kg of O_2 and 3kg of N_2 . The pressure and temperature of the mixture are 1 bar and 27°C . Determine i) mass fraction and mole fraction of each constituent ii) Average molecular weight of mixture iii) Partial pressure of constituents iv) Specific gas constituent v) Mixture volume and vi) Mixture density. [7M]

- B** Explain i) Dalton's law of partial pressures ii) Amagat's law of additive volumes ii) Avogadro's law [7M]

SECTION-V

- 9 **A** Explain the Brayton cycle with the aid of P-V and T-S diagrams. Derive an expression for the efficiency. [7M]

- B** A n engine operating on ideal Otto cycle has a compression ratio of 8:1. At the beginning of the compression stroke air is at 103.5kN/m^2 and 300K. if the heat supplied is 920kJ/kg of air, Calculate the maximum pressure and the temperature in the cycle and the efficiency. Assume $C_v=0.718\text{kJ/kgK}$ and $\gamma=1.4$. [7M]

OR

- 10 **A** Derive the expression for efficiency of Otto cycle on P - V and T -S diagrams. [7M]

- B** A mass of 1kg of air is taken through a Diesel cycle initially the air is at 15°C and 1 bar. The compression ratio is 1 and the heat supplied is 1850kJ. Calculate the ideal cycle efficiency and mean effective pressure. Assume $R=0.287\text{kJ/kgK}$, $C_p=1.005 \text{ kJ/kgK}$ and $\gamma=1.4$. [7M]
