

Code No: R22A0307

R22

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, January 2024

Computer Aided Machine Drawing

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 60

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

Part A is compulsory which carries 20 marks. Answer any two in Part A.

Part B consists of one section which carries 40 marks

Part- A (20 Marks)

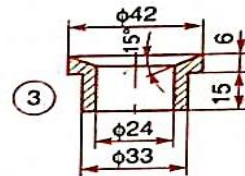
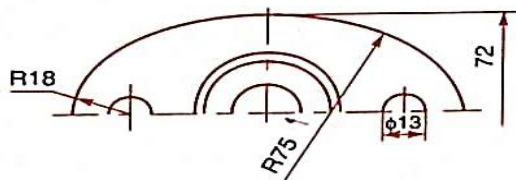
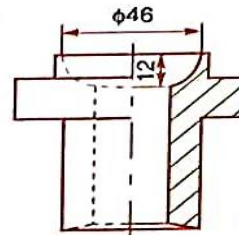
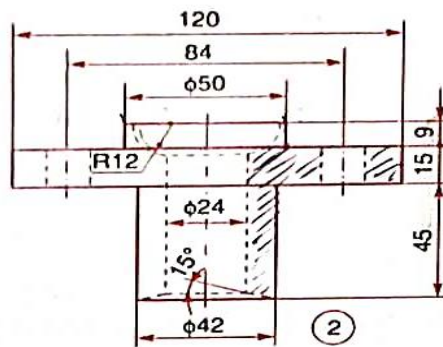
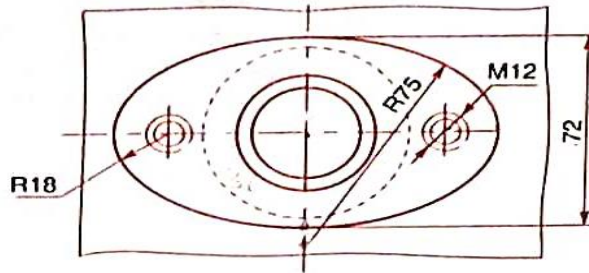
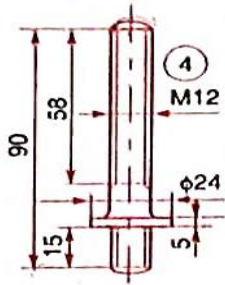
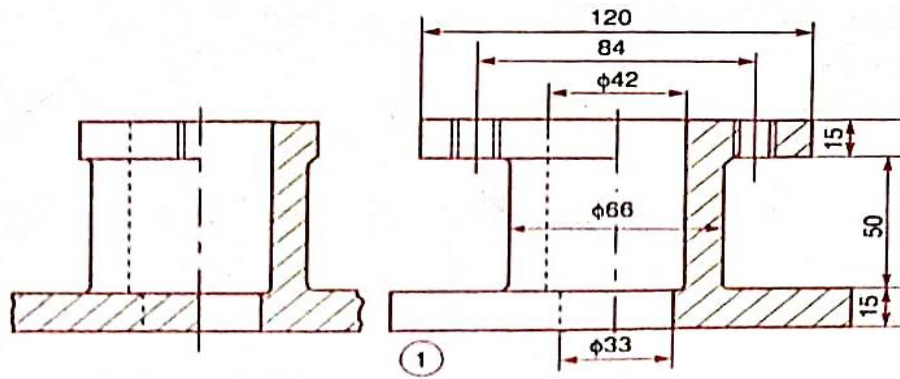
Answer any two of the following (10*2=20)

- 1) Draw the conventional representation for the following materials:
(a) Glass (b) Liquid (c)Steel (d) Wood (e)Concrete
- 2) Draw the half sectional view from the front, with top half in section and the view from the side of a cotter joint with socket and spigot ends, to connect two rods of 20 mm diameter each. Indicate dimensions in terms of diameter of rod "D."
- 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 (40Marks)

(1*40=40M)

- 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 side.



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: R22A0302

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, January 2024

Engineering Mechanics

(ME)

Roll No									
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Time: 3 hours**Max. Marks: 60****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 10 marks and Answer all questions.

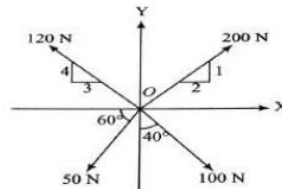
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART-A**(Write all answers of this part at one place)**

- 1
- | | | |
|---|--|------|
| A | State Lami's theorem. | [1M] |
| B | Write the equations of equilibrium for coplanar concurrent force system. | [1M] |
| C | What is meant by limiting friction? | [1M] |
| D | Define the term 'angle of friction'. | [1M] |
| E | Differentiate between centroid and center of gravity. | [1M] |
| F | State about Pappus theorem. | [1M] |
| G | Define the term 'product of inertia'. | [1M] |
| H | State perpendicular axis theorem. | [1M] |
| I | What is kinematics of a particle? | [1M] |
| J | State D'Alemberts principle. | [1M] |

PART-B
SECTION-I

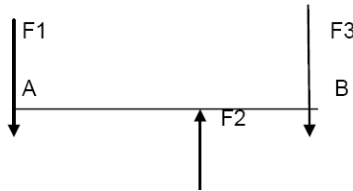
- 2
- | | | |
|---|---|------|
| A | A system of four forces acting on a body is shown in figure. Determine the resultant force and its direction. | [5M] |
|---|---|------|



- | | | |
|---|--|------|
| B | State and prove the Parallelogram law of forces. | [5M] |
|---|--|------|

OR

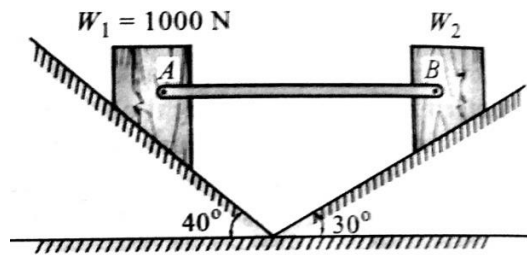
- 3
- | | | |
|---|--|------|
| A | Three parallel forces F_1 , F_2 and F_3 are acting on a body. If the force $F_1 = 250$ N and $F_3 = 1000$ N and the distance between F_1 and $F_2 = 1.0$ m, then determine the magnitude of force F_2 and the distance of F_2 from force F_3 . | [5M] |
|---|--|------|



- B Two forces of magnitude 50 N and 30 N are acting at a point. If the angle between the two forces is 60° , determine the magnitude and direction of the resultant force. [5M]

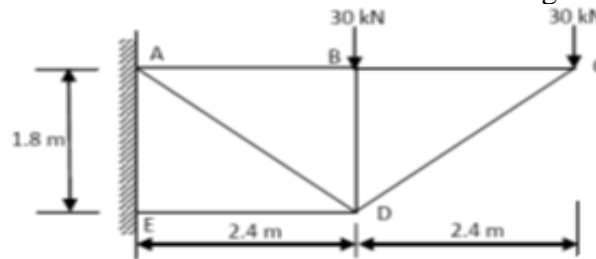
SECTION-II

- 4 Two blocks W_1 and W_2 resting on two inclined planes are connected by a horizontal bar AB as shown in figure. If W_1 equals 1000N, determine the maximum value of W_2 for which the equilibrium can exist. The angle of limiting friction is 20° at all rubbing faces. [10M]



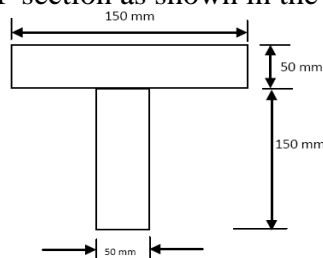
OR

- 5 Find the forces in the members of the truss shown in figure below. [10M]



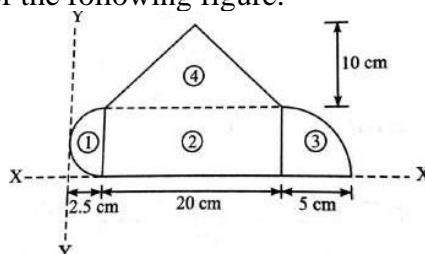
SECTION-III

- 6 Locate the centroid of T-section as shown in the figure given below. [10M]



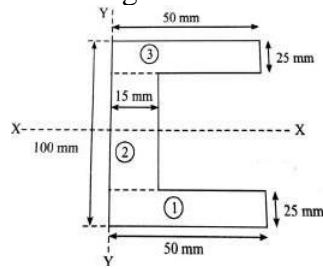
OR

- 7 Find the centroid of the following figure. [10M]



SECTION-IV

- 8 Determine moment of inertia of given section about centroidal XX axis. [10M]



OR

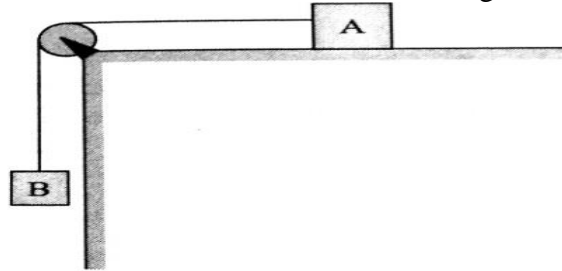
- 9 Derive the expression for the moment of inertia of a cylinder length 'l', radius 'r' and density 'w' about longitudinal centroidal axis and about the centroidal transverse axis. [10M]

SECTION-V

- 10 A A car covers 100m in 10 seconds, while accelerating uniformly at a rate of 1m/s^2 . Determine i) initial and final velocities of the car, ii) distance travelled before coming to this point assuming it started from rest, and iii) its velocity after the next 10 seconds. [5M]
- B A ball is thrown vertically upwards from the ground with an initial velocity of 20m/s. Determine i) the maximum height reached by the ball, ii) the time taken to reach the maximum height, and iii) the total time of flight. [5M]

OR

- 11 Two blocks A and B are connected with an inextensible but flexible string, as shown in figure. Let the system be released from rest. Determine the velocity of the block A after it has moved a distance of 0.7m. Assume that the coefficient of friction between block A and the plane is 0.31. The masses of the blocks are $m_A=95\text{kg}$ and $m_B=143\text{kg}$. [10M]



Code No: R22A0303

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, January 2024

Engineering Thermodynamics

(ME)

Roll No										
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Time: 3 hours**Max. Marks: 60****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 10 marks and Answer all questions.

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

Note: Psychometric charts and steam tables are permitted**PART-A (10 MARKS)****(Write all answers of this PART at one place)**

- | | | | |
|---|---|---|------|
| 1 | A | What is Quasi static process? | [1M] |
| | B | Define a thermodynamic system. | [1M] |
| | C | Define refrigerator. | [1M] |
| | D | What do you mean by the term 'Entropy'? | [1M] |
| | E | What is dryness fraction? | [1M] |
| | F | What is an ideal gas? | [1M] |
| | G | Define Dry bulb temperature. | [1M] |
| | H | Define mass fraction. | [1M] |
| | I | Draw the P-V diagram of Diesel cycle. | [1M] |
| | J | Define thermal efficiency. | [1M] |

PART-B (50 MARKS)**SECTION-I**

- | | | | |
|---|----|---|------|
| 2 | A | Briefly explain the Macroscopic approach. | [5M] |
| | B | Differentiate between open system, closed system and an isolated system. | [5M] |
| | OR | | |
| 3 | A | 2kg of gas at a pressure of 1.5 bar, Occupies a volume of 2.5 m ³ . If this gas compresses isothermally to 1/3 times the initial volume. Find initial, Final temperature, work done, heat transfer. | [5M] |
| | B | The properties of a closed system change following the relation between pressure and volume as $pV = 3.0$ where p is in bar V is in m ³ . Calculate the work done when the pressure increases from 1.5 bar to 7.5 bar. | [5M] |

SECTION-II

- | | | | |
|---|----|--|------|
| 4 | A | State and prove Clausius theorem. | [5M] |
| | B | Discuss the significance of Gibbs and Helmholtz functions. | [5M] |
| | OR | | |
| 5 | A | Is the Third law of thermodynamics, an extension of second law? Is it an independent law of nature? Explain. | [5M] |
| | B | Two blocks of metal, each having a mass of 10 kg and having a specific | [5M] |

heat of 0.4 kJ/kg K, are at a temperature of 40°C. 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°C between the two blocks.

SECTION-III

- 6 A What is critical state? Explain the terms critical pressure, critical volume and critical temperature of water? [5M]
- 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 quality down to 60%? Also calculate the pressure and temperature of the steam that remains in the pressure cooker after the heat rejection. [5M]

OR

- 7 A Explain with a neat diagram p-V-T surface. [5M]
- B Derive the Vander walls equations. [5M]

SECTION-IV

- 8 A Discuss why does the enthalpy of air-vapour mixture remains constant during an adiabatic saturation process. [5M]
- B An air-water vapour mixture at 0.1 MPa, 30°C, 80% relative humidity has a volume of 50 m³. Calculate Specific humidity, Dew point, WBT, mass of dry air and mass of water vapour. [5M]

OR

- 9 A State and explain Amagata's Law. [4M]
- B Define the following terms : [6M]
- (i) Relative humidity (ii) Specific humidity (iii) Vapour pressure

SECTION-V

- 10 Explain the air standard Diesel cycle with the help P-V and T-S diagrams. [10M]

OR

- 11 Explain with the help of neat diagram a simple Rankine cycle. [10M]

Code No: **R22A0304****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, January 2024**Fluid Mechanics & Hydraulic Machines**

(ME)

Roll No									
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Time: 3 hours**Max. Marks: 60****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 10 marks and Answer all questions.

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

PART-A (10 MARKS)**(Write all answers of this part at one place)**

- 1 A Define density [1M]
- B Define surface tension [1M]
- C Mention the different types of fluid flow [1M]
- D Name different methods of describing fluid motion [1M]
- E Define Reynolds number [1M]
- F Expand and define HGL [1M]
- G Classify hydraulic turbines [1M]
- H Explain the use of draft tube of a turbine [1M]
- I When do you connect centrifugal pumps in series? [1M]
- J List out the components of reciprocating pump [1M]

PART-B (50 MARKS)**SECTION-I**

- 2 A Explain briefly the U- tube manometer and differential manometer [5M]
- B A differential manometer connected at the two points A and B in a pipe connecting an oil of specific gravity of 0.9 shows a difference in mercury levels as 250 mm. Find the difference in pressure at the two points. [5M]

OR

- 3 A Establish a relationship among absolute, gauge & atmospheric pressure with a simple sketch. [5M]
- B State the advantages of mechanical pressure gages over the manometers. [5M]

SECTION-II

- 4 A Differentiate between: (i) Steady flow & Unsteady flow. (ii) Uniform & non uniform flow. [5M]
- B Distinguish between pathlines, stream lines and streak lines. [5M]

OR

- 5 A List the applications of momentum equation. [5M]
- B A horizontal venturimeter with inlet diameter 300 mm and throat diameter 150 mm is used to measure the flow of water. The pressure at inlet is 0.18 N/mm^2 and the vacuum pressure at the throat is 280 mm of mercury. Find the rate of flow. The value of C_d may be taken as 0.98. [5M]

SECTION-III

6 Define the terms: Major energy losses and minor energy losses in pipe. [10M]

OR

7 A Explain the characteristics of laminar and turbulent boundary layer. [5M]

B A horizontal venturimeter with 300 mm diameter at inlet and 100 mm diameter at throat is used for measuring the flow of water through a pipe line. If pressure in pipe is 1.5 k.Pa. And the vacuum pressure at the throat is 400 mm of mercury, calculate the rate of flow. It may be presumed that 5% of differential head is lost between the pipe main and the throat section. Also determine the discharge coefficient. Take specific weight of water 9810 N/m^3 . [5M]

SECTION-IV

8 A Show that the efficiency of a free jet striking normally on a series of flat vanes mounted on a periphery of a wheel can never exceed 50%. [5M]

B A jet of water 75 mm diameter having a velocity of 20 m/s, strikes normally a flat smooth plate. Determine the thrust on the plate (a) if the plate is at rest, (b) if the plate is moving in the same direction as the jet with a velocity of 5 m/s. Also find the work done per second on the plate in each case and the efficiency of the jet when the plate is moving. [5M]

OR

9 Draw a schematic diagram of a Peltonwheel turbine and explain briefly its construction and working. [10M]

SECTION-V

10 Explain with neat sketches the working of a centrifugal pump. [10M]

OR

11 A Explain an indicator diagram of a reciprocating pump? [5M]

B A single acting reciprocating pump has a plunger of diameter 350 mm and stroke of 450 mm. If the speed of the pump is 60 r.p.m. and it delivers 16.5 litres per second of water against a suction head of 5 m and a delivery head of 20 m, find the theoretical discharge, coefficient of discharge, the slip, the percentage slip of the pump and the power required to drive the pump. [5M]

Code No: R22A0306

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Regular Examinations, January 2024**Kinematics of Machinery (ME)**

Roll No										
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Time: 3 hours**Max. Marks: 60****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 10 marks and Answer all questions.

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

PART-A (10 Marks)**(Write all answers of this Part at one place)**

- | | | | |
|---|---|--|------|
| 1 | A | Define what is a machine | [1M] |
| | B | What is mean by inversion of mechanism | [1M] |
| | C | What do you mean by straight line motion mechanism | [1M] |
| | D | What is correct steering mechanism? | [1M] |
| | E | What is meant by component of acceleration for a link? | [1M] |
| | F | Discuss briefly about Hooke's Joint | [1M] |
| | G | Define cam and follower | [1M] |
| | H | Define what is pressure angle in cam and follower | [1M] |
| | I | State the Law of Gearing | [1M] |
| | J | Define train value of gear train | [1M] |

PART-B(50 Marks)**SECTION-I**

- | | | | |
|---|---|---|------|
| 2 | A | Explain the classification of kinematic pairs with the help of examples | [5M] |
| | B | Explain with neat sketch about the crank and slotted lever of quick return mechanisms | [5M] |

OR

- | | | | |
|---|--|---|-------|
| 3 | | In a crank and slotted lever quick return motion mechanism, the distance between the fixed centres is 240 mm and the length of the driving crank is 120 mm. Find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. If the length of the slotted bar is 450 mm, find the length of the stroke if the line of stroke passes through the extreme positions of the free end of the lever. | [10M] |
|---|--|---|-------|

SECTION-II

- | | | | |
|---|---|--|------|
| 4 | A | Explain and prove that the Peaucellier mechanism with a neat sketch. | [5M] |
| | B | Explain with neat sketch about Chebicheff mechanism | [5M] |

OR

- | | | | |
|---|---|--|------|
| 5 | A | Explain with neat sketch about Scott Russell mechanism | [5M] |
| | B | Explain with neat sketch about Davis Steering gear Mechanism | [5M] |

SECTION-III

- | | | | |
|---|--|---|-------|
| 6 | | In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60°. | [10M] |
|---|--|---|-------|

OR

- | | | | |
|---|---|--|------|
| 7 | A | Discuss briefly about Polar diagram and its salient features of driven shaft speed of Hooke's joint. | [5M] |
|---|---|--|------|

- B Two shafts with an included angle of 160° are connected by a Hooke's joint. [5M]
The driving shaft runs at a uniform speed of 1500 r.p.m. The driven shaft carries a flywheel of mass 12 kg and 100 mm radius of gyration. Find the maximum angular acceleration of the driven shaft and the maximum torque required.

SECTION-IV

- 8 A cam, with a minimum radius of 25 mm, rotating clockwise at a uniform speed is to be designed to give a roller follower, at the end of a valve rod, motion described below : [10M]

1. To raise the valve through 50 mm during 120° rotation of the cam ;
2. To keep the valve fully raised through next 30° ;
3. To lower the valve during next 60° ; and
4. To keep the valve closed during rest of the revolution i.e. 150° ;

The diameter of the roller is 20 mm and the diameter of the cam shaft is 25 mm. Draw the profile of the cam when the line of the stroke is offset 15 mm from the axis of the cam shaft

OR

- 9 A cam is to give the following motion to a knife-edged follower: 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 [10M]

SECTION-V

- 10 A Derive an expression for length of path of contact between two mating gears [5M]
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 the contact ratio. [5M]

OR

- 11 A Discuss briefly about reverted gear train [5M]
B In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D - E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise. [5M]

Code No: R22A0305

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

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

(ME)

Roll No									
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Time: 3 hours**Max. Marks: 60****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 10 marks and Answer all questions.

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

PART-A (10 MARKS)**(Write all answers of this part at one place)**

- 1 A State the main difference between ionic, covalent, and metallic bonding. [1M]
 B Define Alloy and Phase. [1M]
 C What is solidus lines? [1M]
 D What is allotropy? [1M]
 E Why gray cast iron can be machined easily without the use of lubricant? [1M]
 F What is aluminizing? State its significance. [1M]
 G What is the effect of inadequate time of soaking of steel even at appropriate temperature of hardened steel? [1M]
 H Define the term ceramics. Give examples for different traditional ceramics. [1M]
 I What is the purpose of reinforcement? [1M]
 J What is a matrix? [1M]

PART-B (50 MARKS)**SECTION-I**

- 2 A What are the most common crystal structures of metals? Give two examples for each of these crystal structures. [5M]
 B Calculate the atomic packing factor for FCC and BCC crystal structure. [5M]

OR

- 3 A Distinguish fully between interstitial compounds and interstitial solid solutions. [5M]
 B Explain about electron compounds. [5M]

SECTION-II

- 4 A Draw and explain the cooling curve for Pure metal. [5M]
 B Draw and explain a typical eutectic type diagram in which two metals are completely insoluble in solid state. [5M]

OR

- 5 A Explain peritectic, eutectic and eutectoid reactions in the iron-carbon system. [5M]
 B Explain how much proeutectoid ferrite is there in a slowly cooled 0.6%C steel? [5M]

SECTION-III

- 6 A Write the composition and applications of malleable cast iron. [5M]
 B Give the composition, properties and applications of the HCS and Stainless steels. [5M]

OR

- 7 A Describe the properties and applications of pure copper. Explain why copper is a suitable material for automobile radiators. [5M]
 B What are the properties of aluminium that make it a useful engineering material? [5M]

SECTION-IV

- 8 A Describe the process of hardening. [5M]
 B Distinguish between Annealing and Normalizing. [5M]

OR

- 9 A Explain Ceramics and Write the Properties of it? [5M]
 B Write briefly about Continuous fibres and Dis-continuous fibres. [5M]

SECTION-V

- 10 A What do you understand by particulate strengthened composite materials? Discuss in detail. [5M]
 B Write the Application of composites. [5M]

OR

- 11 A Write about the mechanism of Polymerization. [5M]
 B Write about Biomedical applications of polymers. [5M]
