MALLA REDDY COLLEGE OF ENGINEERING & TE R17 **OGY**
(Autonomous Institution – UGC, Govt. of India)
II B. Tech I Semester Regular Examinations, November 2018
Strength of Materials
(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.

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SECTION-I

1   Derive the relation between E, G, K.   **[14M]**

OR

2   a) What is proof resilience and modulous of resilience? (7M)   **[14M]**
        b) A steel tube of 30 mm external diameter and 25 mm internal diameter encloses a gun metal rod of 20 mm diameter to which it is rigidly joined at each end. The temperature of the whole assembly is raised to 140^0C and the nuts on the rod are then screwed lightly home on the ends of the tube. Find the intensity of stress in the rod when the common temperature has fallen to 30^0C. The value of E for steel and gun metal are 2.1×10^5N/mm^2 and 1×10^5N/mm^2 respectively. The linear co efficient of expansion for steel and gun metal are 12×10^{-6} per ^{0}C and 20×10^{-6} per ^{0}C. (7 M)

SECTION-II

3   Draw SF and BM diagrams for the cantilever shown in Fig   **[14M]**
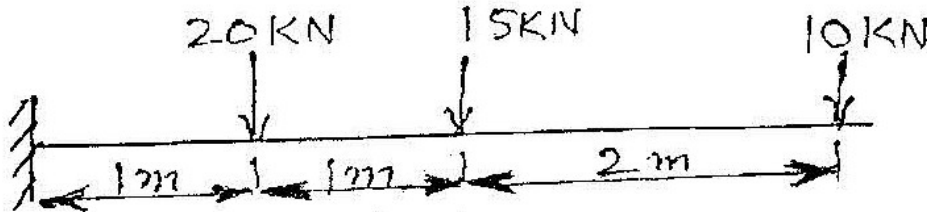
OR

4   A horizontal beam AB of length 4m in hinged at A and supported on rollers at B. the   **[14M]**
        beam carries inclined loads of 100N, 200N and 300N incised towards the roller support at 60^0; 45^0 and 30^0 Respectively to the horizontal, at 1m, 2m and 3m respectively from A. draw the SF and BM diagrams.

SECTION-III

5   a) Explain theory of simple bending, and the assumptions made. Draw stress   **[14M]**
           distribution diagram for a beam with rectangular section.(7M)
        b) A timber beam of rectangle section is simply supported at the ends and carries a point load at the center of the beam. The maximum bending stress is 12 N/mm^2 and maximum shearing stress is 1 N/mm^2. Find the ratio of the span to the depth.

OR

6   A simply supported beam carries a U.D.L. of intensity 2.5 kN/m over entire span of 5   **[14M]**
        meters. The cross-section of the beam is a T-section having the dimensions
           Flange : 125 mm X 25 mm
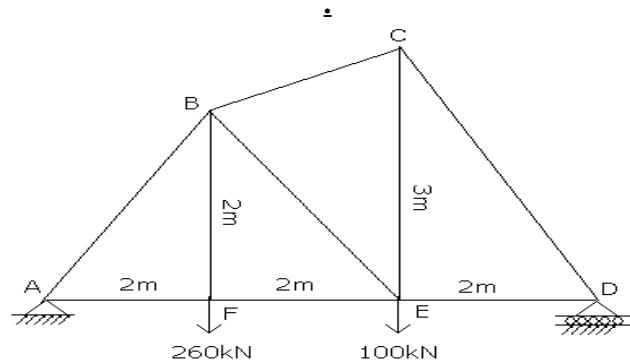
Web: 175 mm X25 mm
Calculate the maximum shear stress for the section of the beam
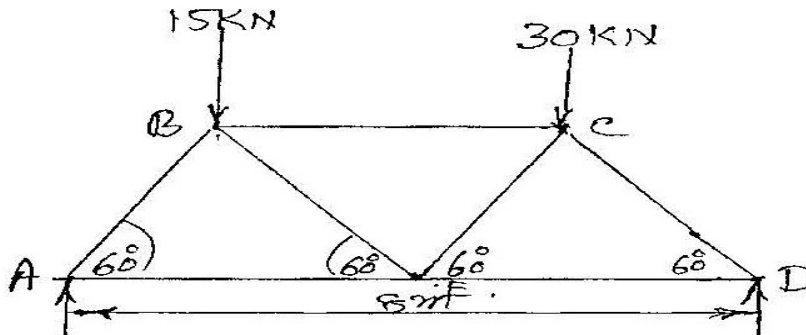
SECTION-IV

7   Analyse the frame shown in Fig   [14M]

OR

8   Find the magnitude and nature of forces in all the members of the truss shown in Fig   [14M]

SECTION-V

9   a) A solid steel shaft has to transmit 100 kW at 160 rpm. Taking allowable shear   [14M]
        stress as 70 M Pa, find the suitable diameter of the shaft. The maximum torque
        transmitted in each revolution exceeds the mean by 20 %.(7M)
     b) A cylindrical thin drum 800mm in diameter and 4m long is made of 10mm thick
        plates. If the drum is subjected to an internal pressure of 2.5MPa, determine its
        changes in diameter and length. Take E as 200GPa and poisons ratio as 0.25.(7M)

                                          OR
10   a) Find the angle of twist per metre length of a hollow circular shaft of 100 mm   [14M]
        external and 60 mm internal diameter, if the shear stress is not to exceed 35 M Pa.
        Take C = 85 G Pa. (7M)
     b) A cylindrical vessel 2m long and 500mm in diameter with 10mm thick plates is
        subjected to an internal pressure of 3MPa.Calculate the change in volume of the
        vessel .Take E=200GPa and poissons ratio=0.3 for the vessel material.(7M)
                                   ****

Code No: **R17A0206**

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B. Tech I Semester Regular Examinations, November 2018
Electrical and Electronics Engineering
(ME&AE)

Roll No										

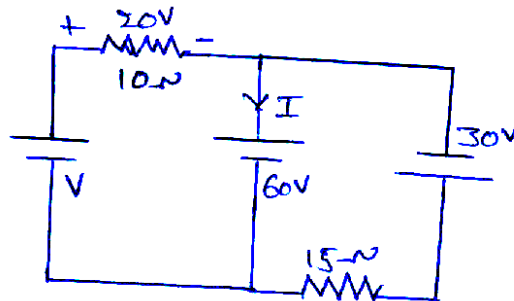**Time: 3 hours**   **Max. Marks: 70**

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

1 **a)** Explain Kirchoff's Laws with neat diagram.   **[7 M]**

    b) Using KVL and KCL, find the values of V and I for the circuit shown.   **[7 M]**

OR

2   Explain the principle of operation of Permanent magnet moving coil instrument   **[14M]**
         along with torque equation..

SECTION-II

3 **a)** Explain the operation of a D.C. motor with a neat sketch.   **[7 M]**

    b) Derive the EMF equation of DC generator.   **[7 M]**

OR

4 **a)** Explain the construction of DC generator with neat diagrams.   **[7 M]**

    b) Explain the Losses in DC Motor.   **[7 M]**

SECTION-III

5 **a)** Explain the principle and operation of single phase transformers.   **[7 M]**

    b) Derive the EMF equation of transformer.   **[7 M]**

OR

6 **a)** Explain the principle of operation of alternator.   **[7 M]**

b) Explain the principle of operation of a 3-phase induction motor. **[7 M]**

SECTION-IV

7 **a)** What is meant by Diode? Explain the V-I characteristics of P-N junction diode **[7 M]**

b) Explain the construction and operation of SCR with suitable V-I characterstics **[7 M]**

OR

8 What are the different types of transistor amplifier configurations and explain in detail about input and out characteristics of common emitter (CE) configuration and define corresponding transistor parameters. **[14 M]**

SECTION-V

9 Explain the construction and working of CRT (Cathode Ray Tube) with suitable sketch. **[14 M]**

OR

10 **a)** Discuss the Voltage and Current measurements using CRO. **[7 M]**

b) Write short notes on deflection and sensitivity. **[7 M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B. Tech I Semester Regular Examinations, November 2018
Engineering 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.

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SECTION-I

1 (a) State zeroth law of thermodynamics and explain its application.   **[4M]**
   (b) Explain about thermodynamic equilibrium.   **[6M]**
   (c) State and explain first law of thermodynamics for a cycle   **[4M]**
                                          OR
2 Derive Steady Flow Energy Equation (S.F.E.E). State the assumptions made.   **[14M]**

SECTION-II

3 (a) State and explain the two statements of second law of thermodynamics   **[6 M]**
   (b) Prove the equivalence of Kelvin Plank and Clasius statements of second
       law of thermodynamics.

                                                                                         [8 M]
                                          OR
4 (a) Define entropy. Explain the principle of increase of entropy.   **[6M]**
   (b) A heat engine is working between a source temperature of 1000 K and sink
       temperature of 300 K. It is drawing heat energy from the source at the rate
       of 2000 J/min. Thermal efficiency of the heat engine is 60% of its Carnot
       efficiency. Calculate the engine output and heat rejected to the sink.   **[8M]**

SECTION-III

5 (a) Derive the equation of Classious and Caplyron.   **[6M]**
   (b) The steam enters at 1.5 MPa, 350^0C is expanded in a throttling device to
       such that its final pressure is 0.1 MPa Find the dryness fraction of steam at
       the inlet of the throttling device.

                                                                                         [8M]
                                          OR
6 (a) Explain ideal gas equation. How is a real gas different from an ideal gas?   **[6M]**
   (b) Derive an expression for entropy change for an ideal gas subjected to
       change of state or process.   **[8M]**

7   (a) Define partial pressure. State and explain Dalton's law of partial pressures for a mixture of ideal gasses.   **[6M]**

(b) A mixture of ideal gases consists of 3 Kg of Nitrogen and 5 Kg of Carbon Dioxide at a pressure of 300 kPa and a temperature of 20^0C. Calculate the (i) mole fraction of each gas (ii) partial pressure of each gas (iii) equivalent gas constant for the mixture (iv) Equivalent Molecular weight for the mixture.   **[8M]**

OR

8   (a) Define the terms (i) Specific humidity (ii) Dry Bulb Temperature (iii) Wet Bulb Temperature (iv) Relative Humidity (v) Dew Point Temperature   **[10M]**

(b) Explain the process of adiabatic saturation of air.   **[4M]**

SECTION-V

9   (a) Derive an expression for air standard efficiency of Otto Cycle. State the assumptions made.   **[10M]**

(b) Explain the working of Vapour Compression Refrigeration system   **[4M]**

OR

10   A petrol engine working on Otto cycle receives air at 1 bar 20^0C. The compression ratio is 6. The maximum temperature of the cycle is 500^0C. Assuming the working fluid as air and ideal gas, determine the pressure and temperature at salient points and air-standard efficiency. Take $\gamma = 1.4$, $C_p = 1$ kJ/Kg-K and $C_v = 0.715$ kJ/Kg-K and R = 285 J/Kg-K. Also determine the mean effective pressure of the cycle.   **[14M]**

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R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHN _____
(Autonomous Institution – UGC, Govt. of India)
II B. Tech I Semester Regular Examinations, November 2018
Kinematics of Machinery
(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.
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SECTION-I

1   Sketch and explain any two inversions of a double slider crank chain.   **[14M]**

OR

2   In a crank and slotted lever quick return motion mechanism, the distance between   **[14M]**
the fixed centers is 240 mm and the length of the driving crank is 120mm. 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.

SECTION-II

3   Sketch and describe the Peaucellier straight line mechanism indicating clearly the   **[14M]**
conditions under which the point P on the corners of the rhombus of the
mechanism generates a straight line.

OR

4   What is the condition for correct steering? Sketch and show the two main types of   **[14M]**
steering gears and discuss their relative advantages.

SECTION-III

5   Draw and explain Klien's construction for determining the velocity and   **[14M]**
acceleration of the piston in a slider crank mechanism.

OR

6   The crank and connecting rod of a theoretical steam engine are 0.5 m and   **[14M]**
2 m long respectively. The crank makes 180 r.p.m. in the clockwise
direction. When it has turned 45° from the inner dead centre position,
determine: 1. velocity of piston, 2. angular velocity of connecting rod,
3.Velocity of point E on the connecting rod 1.5 m from the gudgeon pin.

SECTION-IV

7   Construct the profile of a cam to suit the following specifications: Cam shaft   **[14M]**
diameter = 40mm, least radius of cam = 25mm, diameter of roller=25mm, angle of
lift=120^0, Angle of fall = 150^0, Lift of the follower = 40mm, Number of pauses are
two of equal interval between motions, During the lift the motion is SHM. During
the fall the motion is uniform acceleration and deceleration. The speed of the cam
shaft is uniform. The line of stroke of the follower is off-set 12.5mm from the
center of cam.

8   A cam is to be designed for a knife edge follower with the following data: 1. Cam   **[14M]**
lift = 40mm during 90^0 of cam rotation with simple harmonic motion. 2. Dwell for
the next 30^0. 3. During the next 60^0 of cam rotation, the follower returns to its
original position with simple harmonic motion 4. Dwell during the remaining
180^0. Draw the profile of the cam when (a) the line of stroke of the follower passes
through the axis of the cam shaft, and (b) the line of stroke is offset 20 mm from
the axis of the cam shaft. The radius of the base circle of the cam is 40 mm.
Determine the maximum velocity and acceleration of the follower during its
ascent and descent, if the cam rotates at 240 rpm.

SECTION-V

9   Two involutes gears of 20° pressure angle are in mesh. The number of   **[14M]**
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

<p align="center">OR</p>

10   Classify and explain gear trains with neat sketches. Also determine the velocity   **[14M]**
ratio in each case.

<p align="center">*****</p>

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B. Tech I Semester Regular Examinations, November 2018
Machine Drawing
(ME)

Roll No									

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 compulsory which carries 42 marks.

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Part- A (28 Marks)
Answer any two of the following (14*2=28)

1. Draw the three views of a hexagonal headed bold of nominal diameter 20 mm and length 80 mm with a hexagonal nut and washer.

2. Draw the conventional representation of the following materials.

   (a) Cast iron (b) Lead (c) marble (d) glass (e) water (f) concrete (g) wood

3. Draw the sectional front view and top view of a double riveted double strap chain Butt Joint to joint two plates of thickness 10 mm.

Part-B (42 Marks)
(1*42=42M)

4. Develop the assembly drawing views as mentioned below of an Eccentric using the part drawings shown in Figure.1.
   (i)   Half-Sectional Front View with top half in section
   (ii)   Side view from right

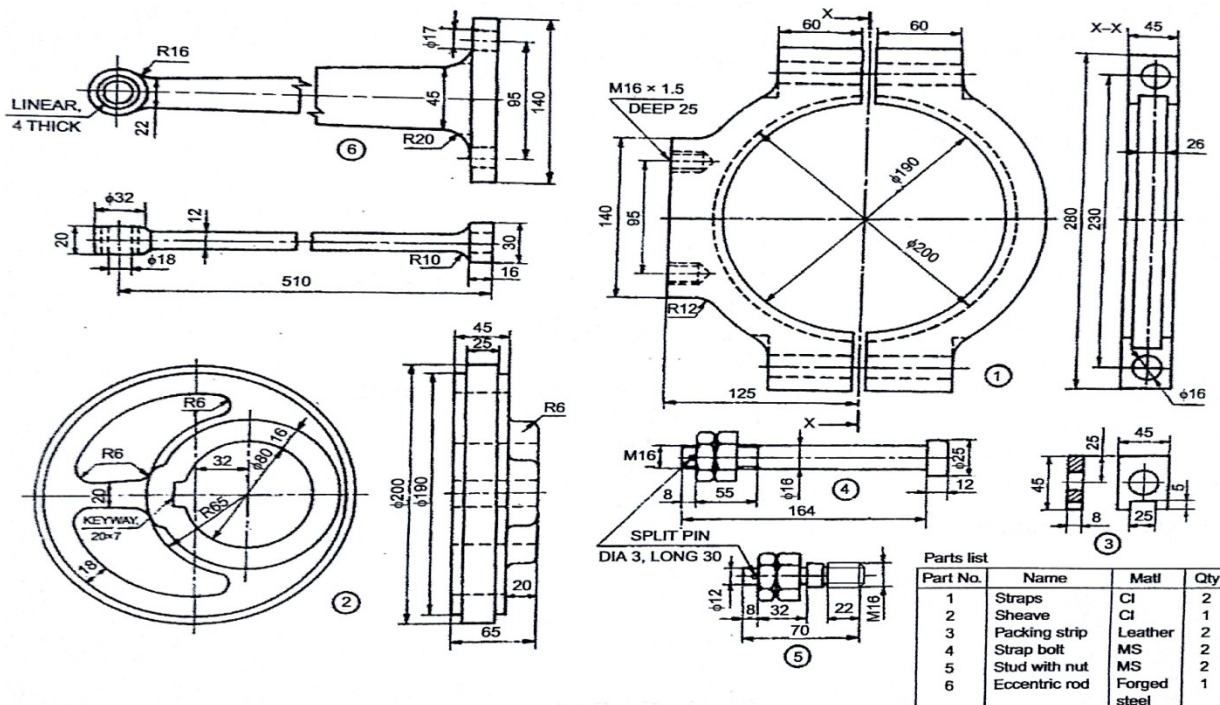| Part No.	Name	Matl	Qty
1	Straps	CI	2
2	Sheave	CI	1
3	Packing strip	Leather	2
4	Strap bolt	MS	2
5	Stud with nut	MS	2
6	Eccentric rod	Forged steel	1

Figure.1 Details of Eccentric
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Code No: **R17A0304**

MALLA REDDY COLLEGE OF ENGINEERING & TECHN **R17**

(Autonomous Institution – UGC, Govt. of India)

II B. Tech I Semester Regular Examinations, November 2018

Material Science

(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   Define the term coordination number. What is the significance of coordination number? Calculate the coordination number of three cubic space lattices.   **[14M]**

OR

2   Explain the following: (i) atomic models (7 M)   **[14M]**
     (ii) Bonding in solids (7M)

SECTION-II

3   Draw the cooling curves for short freezing range alloys and long freezing range alloys and explain salient points in it.   **[14M]**

OR

4   Describe the phase changes in the iron carbon digram.   **[14M]**

SECTION-III

5   a) What are cast irons? Why are they named so? Give the importance of cast irons in the metallurgical curriculum.   **[7+7=14M]**
     b) What are the requirements of an age-hardenable alloy? Explain in detail.

OR

6   a) Explain the various heat treatment methods; annealing, normalizing and hardening of steel with neat sketch.?
     b) Explain classification of steels and mention their applications.

SECTION-IV

7   a) Contrast the mechanical properties of matrix and dispersed phase for fibre reinforced composite materials.   **[7+7=14M]**
     b) Briefly explain the particle reinforced composites.

OR

8   a) What are structural ceramics? Discuss the important structural ceramics with examples and applications.   **[7+7=14M]**
     b) Write about glass ceramics and its manufacturing processing in detail .

SECTION-V

9   Briefly explain the following :   **[7+7=14M]**
     (i) High Performance fibers.   (ii) Biomedical applications of polymers.

OR

10   Briefly explain the following :   **[7+7=14M]**
     (i)   Thermosetting plastics   (ii) Thermo plastics.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNO
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, April 2023
Strength of Materials
(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**	Explain about different types of stresses and strains.	**[7M]**
	B	The temperature of a steel ring is raised through 150^0C in order to fit it on a wooden wheel of 1.2 m diameter. Find the original diameter of the steel ring and also the stresses developed in the ring, when it cools back to normal temperature. Assume $E_s = 2 \times 10^5$ N/mm^2 and $\alpha_s = 12 \times 10^{-6}$ ^{0}C.	**[7M]**

OR

2	A rectangular plate made of steel is 4 m long and 20 mm thick and is subjected to an axial tensile load of 40 kN. The width of the plate varies from 30 mm at one end to 80 mm at the other end. Find the elongation, if E = 2×10^5 N/mm^2.	**[14M]**

SECTION-II

3	**A**	Derive relation between S.F, B.M and rate of loading at a section of a beam	**[7M]**
	B	Briefly explain Point of contra flexure	**[7M]**

OR

4	Determine the maximum deflection and slope of a cantilever beam as shown in the figure.	**[14M]**
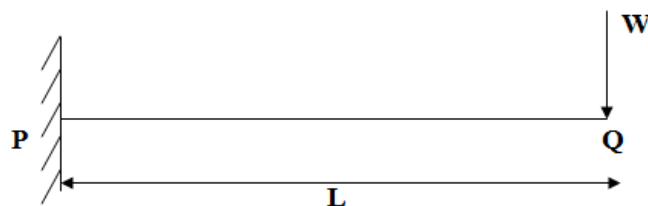
SECTION-III

5	For a T – section with dimensions flange width 100 mm, Depth = 200 mm and uniform thickness of 40 mm. obtain shear stress distribution and calculate maximum and average shear stresses if it is subjected to a S.F. = 100 kN.	**[14M]**

OR

|			
6	**A**	What do you mean by simple bending? What are the assumptions made in the theory of simple bending?	**[7M]**
	B	Show from first principles that if a beam of rectangular section is subjected to a transverse shearing force, the maximum shear stress at a cross-section is 1.5 times the mean shear stress.	**[7M]**

SECTION-IV

7 A simply supported beam span 14 m, carrying concentrated loads of 12 kN **[14M]** and 8 kN at two points 3 m and 4.5 m from the two ends respectively. Moment of Inertia I for the beam is 160 x10^3 mm^4 and E = 210 kN/mm^2. Calculate deflection of the beam at points under the two loads by macaulay's method.

OR

8 Find the forces in all the members of the truss as shown in the figure using **[14M]** method of joints
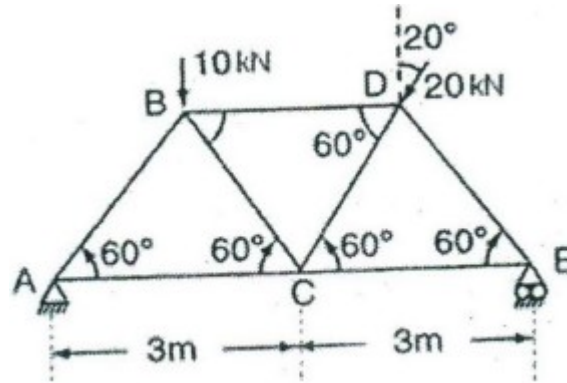
SECTION-V

9 **A** A hollow shaft has to transmit 337.5 kW at 100 rpm. If the shear stress is not **[7M]** to exceed 65 N/mm^2 and the internal diameter is 0.6 of the external diameter, find the external and internal diameters assuming that the maximum torque is 1.3 times mean.

B Define the term polar modulus. Find the expression for polar modulus for a **[7M]** solid shaft and for a hollow shaft.

OR

10 Derive the equations for the circumferential and longitudinal stresses induced **[14M]** in the thin cylindrical shells.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNO

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, April 2023
Electrical and Electronics Engineering
(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**   Explain Kirchhoff's laws. With example   **[7M]**
     B   Derive the formulas for Star – Delta transformation   **[7M]**

OR

2   **A**   Explain the Permanent magnet moving coil instruments.   **[7M]**
     B   Derive the equation for voltage and current for a resistor and inductor.   **[7M]**

SECTION-II

3   **A**   Describe how the speed of the dc motor can be controlled above and below   **[7M]**
           its rated speed?
     B   A dc generator has an armature e.m.f of 100 V when the useful flux per pole   **[7M]**
           is 20 mWb and the speed is 800 r.p.m. Calculate the generated e.m.f (i) with
           the same rated flux and a speed of 1000 r.p.m (ii) with a flux per pole of 25
           mWb and a speed of 900 r.p.m.

OR

4   **A**   With the help of neat sketch, explain the working of 3 point starter.   **[7M]**
     B   Explain the procedure of conducting swinburne's test as d.c. machine.   **[7M]**

SECTION-III

5   **A**   Explain the open circuit test and short circuit test on single phase   **[7M]**
           transformer?
     B   Discuss the working principle of single phase Transformer and also explain   **[7M]**
           the constructional details?

OR

6   **A**   Explain Principle of operation of induction motor? What are the applications   **[10M]**
           of Induction motor?
     B   A 3 phase, 50 Hz induction motor has a full load speed of 970 rpm. Calculate   **[4M]**
           (i) number of the poles (ii) slip frequency

SECTION-IV

7   **A**   Describe the pnp transistor in common Emitter configuration. How the   **[7M]**
           transistor is used as an amplifier?
     B   Draw the circuits of a full wave rectifier using 2-diodes and 4-diodes.   **[7M]**
           Discuss the relative merits and demerits?

OR

8   **A**   Explain the principle and operation of pn junction diode   **[7M]**
     B   Describe the NPN transistor operation in the common base configuration.   **[7M]**

What are its operating regions?

SECTION-V

9   *A*   Explain Voltage, Current measurements of CRO?   **[7M]**

        B   What are the applications of CRO?   **[7M]**

OR

10   *A*   With the help of neat sketch Explain working principle of Cathode ray tube.   **[7M]**

        B   Explain Deflection and Sensitivity of CRT?   **[7M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL **R17**

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, April 2023

Engineering 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

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SECTION-I

1 **A** Explain the concept of macroscopic and microscopic view points applied to the study of thermodynamics. **[7M]**

B Prove that Energy is a property of the system. **[7M]**

OR

2 **A** With a neat diagram explain about Joule's Experiment. **[7M]**

B In a steady-flow apparatus 135 kJ work is done by each kg of fluid. The specific volume of the fluid, pressure and velocity at the inlet are 0.37 m³/kg, 600 kPa and 16 m/s, respectively. The inlet is 32 m above floor level. The discharge is at floor level. The discharge conditions are 0.62 m³/kg, 100 kPa and 270 m/s. The total heat loss between inlet and outlet is 9 kJ/kg of the fluid. In flowing apparatus, does the specific internal energy increase or decrease and by how much? **[7M]**

SECTION-II

3 **A** Define thermal energy reservoir, source and sink. **[7M]**

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. **[7M]**

OR

4 **A** Derive an expression for change in the entropy of a system during a polytropic process. **[7M]**

B Considering specific entropy as function of pressure, sp. volume and temperature, derive three Tds relations. Using Tds relations, prove that **[7M]**

$$C_p - C_v = T \left(\frac{\partial v}{\partial T} \right)_p^2 \left(\frac{\partial p}{\partial v} \right)_T$$

SECTION-III

5 **A** Explain the phase transformation of water from freezing state to superheated state. **[7M]**

B Prove that the superheated steam can be modelled as an ideal gas. **[7M]**

| 6 | A | Define dryness fraction and state various methods of determination of dryness fraction. | [7M] |
| | B | Determine the enthalpies at the entry of the steam at 100 bar and 600°C and leaving at 40ºC by using steam tables. | [7M] |

SECTION-IV

| 7 | A | A cylinder of 50-litre capacity contains oxygen at 18°C and at a pressure of 10 MPa. Calculate
(a) the mass of oxygen in the cylinder,
(b) the molar volume,
(c) the density of oxygen.
The molecular mass of oxygen is 32 kg/kmol. | [7M] |
| | B | A mass of wet steam at temperature 165 ºC is expanded at constant quality 0.8 to pressure 3 bar. It is then heated at constant pressure to a degree of superheat 65ºC. Find the enthalpy and entropy changes during expansion and during heating. Draw the T- s and h-s diagrams. | [7M] |

| 8 | A | Draw the neat sketch of a psychrometric chart and represent all the psychrometric properties. | [7M] |
| | B | Air at 40°C DBT and 25°C WBT is cooled down in an air-conditioning plant to 25°C DBT and 60% RH. Calculate the heat to be removed per kg of air if the COP of the unit is 3.5. Also, find the work required to cool 3 kg of air. | [7M] |

SECTION-V

| 9 | A | Derive an expression for thermal efficiency of Otto cycle. | [7M] |
| | B | A four-stroke, four-cylinder petrol engine of 250-mm bore and 375-mm stroke works on Otto cycle. The clearance volume is 0.01052 m3. The initial pressure and temperature are 1 bar and 47°C. If the maximum pressure is limited to 25 bar, find the following: (a) The air standard efficiency of the cycle, (b) The mean effective pressure. | [7M] |

| 10 | A | Explain the working of Bell Coleman refrigeration cycle with a neat diagram also derive the expression for the coefficient of performance. | [7M] |
| | B | Air enters the compressor of an ideal Brayton refrigeration cycle at 1 atm and 270 K with a volumetric flow rate of 1.5 m^3/s. If the compressor pressure ratio is 3 and the turbine inlet temperature is 300 K, determine
(a) the net power input,
(b) the refrigeration capacity, and
(c) coefficient of performance. | [7M] |

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, April 2023
Kinematics of Machinery
(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		Sketch and explain any two inversions of double crank chain.	**[14M]**

OR

2	A	Explain the types of partially and completely constrained motions with examples.	**[7M]**
	B	In a slotted lever quick-return mechanism, the distance between fixed centres is 200 mm and driving crank is 100 mm long. Determine the ratio of the time taken on the cutting and return strokes.	**[7M]**

SECTION-II

3	A	Draw a neat sketch of the Pantograph mechanism and explain its working.	**[7M]**
	B	Explain and prove that the Hart's mechanism is used for generating exact straight-line motion.	**[7M]**

OR

4		A car with a wheel track of 147.2 cm and wheel base of 274 cm is fitted with an Ackerman's steering mechanism. The distance between the axis of the pivot pins is 122 cm and the tie-rod is 110.6 cm long. The track arm is 15.25 cm long. Find the turning circle radius of the car, so that true rolling motion is there for all the wheels.	**[14M]**

SECTION-III

5		Explain the procedure to determine the velocity and acceleration of a slider crank mechanism by Klein's construction.	**[14M]**

OR

6		In a pin jointed four bar mechanism ABCD, the lengths of the various links are AB = 30 mm, BC = 90 mm, CD = 55 mm and AD = 85 mm. The link AD is fixed and angle BAD is 1300. If the velocity of 'B' is 2 m/sec in clockwise direction, find a) velocity and acceleration of midpoint of link BC and b) Angular velocity of CB and CD.	**[14M]**

SECTION-IV

7		Use the following data in drawing the profile of a cam in which a knife-edged follower is raised with uniform acceleration and deceleration and is lowered with simple harmonic motion: Least radius of cam = 60 mm Lift of follower = 45 mm Angle of ascent = 60^0	**[14M]**

Angle of dwell between ascent and descent $= 40^0$
Angle of descent $= 75^0$
If the cam rotates at 180 rpm, determine the maximum velocity and acceleration during ascent and descent.

OR

8   Draw the displacement, velocity and acceleration diagrams for a follower when it moves with simple harmonic motion. Derive the expression for velocity and acceleration during outstroke and return stroke of the follower.   **[14M]**

SECTION-V

9   Two shafts A and B are co-axial. A gear C (50 teeth) is rigidly mounted on shaft A. A compound gear D - E gears with C and an internal gear G. D has 20 teeth and gears with C and E has 35 teeth and gears with an internal gear G. The gear G is fixed and is concentric with the shaft axis. The compound gear D - E is mounted on a pin which projects from an arm keyed to the shaft B. Sketch the arrangement and find the number of teeth on internal gear G assuming that all gears have the same module. If the shaft A rotates at 110 rpm, find the speed of shaft B.   **[14M]**

OR

10   *A*   Derive an expression for the minimum number of teeth required on the pinion in order to avoid interference in involute gear teeth when it meshes with wheel.   **[7M]**

   B   Derive an expression for the length of the arc of contact in a pair of meshed spur gears.   **[7M]**

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Code No: **R17A0305**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL **R17**

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22
Strength of Materials
(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   Draw stress strain diagram for ductile materials and indicate all salient features on it. Explain the various mechanical properties can be estimated from that diagram   **[14M]**

OR

2   a) What is proof resilience and modulous of resilience?   **[7M]**

   b) A steel tube of 30 mm external diameter and 25 mm internal diameter encloses a gun metal rod of 20 mm diameter to which it is rigidly joined at each end. The temperature of the whole assembly is raised to 140^0C and the nuts on the rod are then screwed lightly home on the ends of the tube. Find the intensity of stress in the rod when the common temperature has fallen to 30^0C. The value of E for steel and gun metal are 2.1×10^5 N/mm^2 and 1×10^5 N/mm^2 respectively. The linear co efficient of expansion for steel and gun metal are 12×10^{-6} per ^{0}C and 20×10^{-6} per ^{0}C.   **[7M]**

SECTION-II

3   A horizontal beam AB of length 4m in hinged at A and supported on rollers at B. the beam carries inclined loads of 100N, 200N and 300N incised towards the roller support at 60^0, 45^0 and 30^0 Respectively to the horizontal, at 1m, 2m and 3m respectively from A. draw the SF and BM diagrams.   **[14M]**

OR

4   Sketch the S.F. &B.M. diagrams for an Overhanging beam ABCDE shown. Mark all the salient points with respective values.   **[14M]**
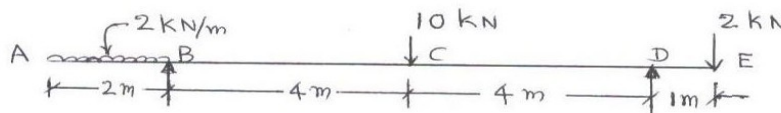
SECTION-III

5   An I – beam of 200mm depth is simply supported over an effective span of 8m. Find what max. Intensity of UDL it can carry over entire length if the allowable bending stresses in tension and compression are 30 and 45 N/mm2 respectively. Take I_{NA} = 5935.5×104 mm4. Distance of bottom fibre from NA is 87.38mm.   **[14M]**

OR

6   A simply supported beam carries a U.D.L. of intensity 2.5 kN/m over entire   **[14M]**
span of 5 meters. The cross-section of the beam is a T-section having the
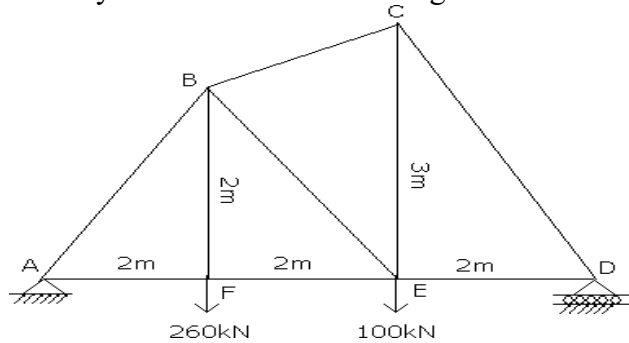dimensions

Flange : 125 mm X 25 mm

Web: 175 mm X25 mm

Calculate the maximum shear stress for the section of the beam

SECTION-IV

7   Analyze the frame shown in Fig   **[14M]**

OR

8   A simply supported beam of 8m carries a partial u d l of intensity 5KN/m and   **[14M]**
length 2m, sarting from 2m from the left end. Find slope at left support and central
deflection. Take E= 200Gpa and I=8×10^8mm^4

SECTION-V

9   A solid circular bar of steel (G=80GPa) with length L= 3.5 m and diameter d=120   **[14M]**
mm is subjected to pure torsion by a torque T. How much strain energy is stored in
the bar when the maximum shear stress is 60 MPa?

OR

10   Derive torsion equation with assumptions.   **[14M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL | **R17**

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22
Electrical and Electronics Engineering
(ME&AE)

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)   Determine the resistance R **in ohms**   **[10M]**
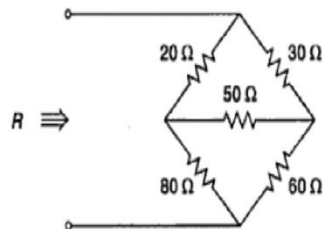
                         [4M]

    b)   Explain the Kirchhoff's Law with example?

OR

2   Explain the operation of Permanent Magnet Moving Iron instrument with a neat diagram?   **[14M]**

SECTION-II

3   Explain the Magnetization and load characteristics of DC generators?   **[14M]**

OR

4   Explain the operation of 3-point starter with a neat diagram?   **[14M]**

SECTION-III

5   Explain the principle of operation of Single-phase Transformer?   **[14M]**

OR

6   Illustrate the slip torque characteristics of an Induction motor?   **[14M]**

SECTION-IV

7   Explain the V-I characteristics of PN junction diode with its characteristics?   **[14M]**

OR

8   Explain the operation of PNP and NPN Transistor with its characteristics?   **[14M]**

SECTION-V

9   Explain the principle of operation of CRT with a neat diagram?   **[14M]**

OR

10   How to measure Voltage, Current and Frequency using CRO?   **[14M]**

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R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLO
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22
Engineering 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.
***
NOTE: Steam Tables are permitted

SECTION-I

1   a). Explain thermodynamic scale of temperature?   **[4M]**
    b)A Temperature scale of certain thermometer is given by the relation t = a ln p + b where a and b are constants and p is the thermometric property of the fluid in the thermometer. If at the ice point and steam point the thermometric properties are **[10M]** found to be 1.5 and 7.5 respectively what will be the temperature corresponding to the thermometric property of 3.5 on Celsius scale.

OR

2   a). Explain the First Law of thermodynamics as referred to closed systems   **[7M]**
       undergoing a cyclic change. Justify the Joule's Experiment?
    b). A mass of gas is compressed in a quasi-static process from 80 kPa, 0.1 m³ to **[7M]** 0.4MPa, 0.03 m³.Assuming that pressure and volume are related by PV = constant. Find the work done by the gas system.

SECTION-II

3   a).Define Heat Engine, Refrigerator and Heat pump. Explain their performance   **[7M]** parameters?
    b). A domestic food refrigerator maintains a temperature of - 12°C. The ambient air temperature is 35°C. If heat leaks into the freezer at the continuous rate of 2 **[7M]** kJ/s determine the least power necessary to pump this heat out continuously?

OR

4   a). Two Carnot engines work in series between the source and sink temperatures   **[7M]** of 550^0 K and 350^0K.If both engines develop equal power determine the intermediate temperature.
    b)300 kJ/s of heat is supplied at a constant fixed temperature of 290°C to a Heat engine The heat rejection takes place at 8.5°C.The following results were obtained: **[7M]**
    (i) 215 kJ/s are rejected.
    (ii) 150 kJ/s are rejected.
    (iii) 75 kJ/s are rejected.
    Classify which of the result report a reversible cycle or irreversible cycle or impossible results.

SECTION-III

5 a). How to measure the dryness fraction of steam. Explain any one suitable method.   **[7 M]** **[7 M]**

b). Find the specific volume, enthalpy and internal energy of wet steam at 18 bar with dryness fraction (x) = 0.85, by using Steam Tables and Mollier chart.

OR

6 A cylinder contains 0.115 m³ of a gas at 1 x 105 N/m² and 90°C. The gas is compressed to a volume of 0.0288 m³, the final pressure being 5.67 x 105 N/m². Determine :   **[14M]**

(i) The mass of gas.

(ii) The value of index 'n' for compression.

(iii) The increase in internal energy of gas.

(iv) The heat received or rejected by the gas during compression.

Note: (γ= 1.4, R = 0.3kJ/kg K).

SECTION-IV

7 a). Explain the Gravimetric and Volumetric analysis in mixture of gases?   **[6M]**

b) Following is the gravimetric analysis of air:

Constituent Percentage:

Oxygen 23.14   **[8M]**

Nitrogen 75.53

Argon 1.28

Carbon dioxide 0.05

Calculate the analysis by volume and the partial pressure of each constituent when the total pressure is 1 bar.

OR

8 a) Explain the following terms: (i) DBT and WBT (ii) Relative Humidity (iii) Degree of saturation   **[6 M]**

b) The air supplied to a room of a building in winter is to be at 17°C and have a relative humidity of 60%. If the barometric pressure is 1.01325 bar, find: (i) The specific humidity: (ii) The dew point temperature.   **[8M]**

SECTION-V

9 Derive an expression for thermal efficiency in Diesel cycle. Show it on P-V and T-S diagrams?   **[14M]**

OR

10 An engine of 250 mm bore and 375 mm stroke works on Otto cycle. The clearance volume is 0.00263m³. The initial pressure is limited to 25 bar, Evaluate the following: **[14M]**

i) The air standard efficiency of the cycle.

ii) The mean effective pressure for the cycle.

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Code No: **R17A0306**

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22
Kinematics of Machinery
(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) Write the differences between machine and structure.   **[7M]**
         b) Explain different types of constrained motions   **[7M]**
                                        OR
2   a) Define inversion of a mechanism?   **[7M]**
          b) Explain the inversions of a quadric cycle chain?   **[7M]**
SECTION-II
3   a) Explain the Peaucellier's straight line mechanism.   **[7M]**
         b) Explain the principle of generation of straight line   **[7M]**
                                        OR
4   a) Differentiate between Davi's and Ackerman steering gears.   **[7M]**
         b) In a Davi's steering gear, the distance between the pivots of the front axle is 1   **[7M]**
         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   a) Mention different types of instantaneous centres.   **[7M]**
         b) Locate the instantaneous centres for crank and slotted lever quick return   **[7M]**
         mechanism?
                                        OR
6   Determine the velocity and acceleration of the link QR and RS in a four bar   **[14M]**
         mechanism in which PQRS is a four bar mechanism with fixed link PS. Crank PQ
         rotates uniformely and makes an angle of 600 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?
SECTION-IV
7   a) Define a follower and mention the types?   **[7M]**
         b) Draw and explain the displacement and velocity diagrams for uniform velocity   **[7M]**
         motion
                                        OR
8   a) Define the following terms as applied to cams with neat sketch: **[7M]**
         i) Base circle ii) pitch circle iii) pressure angle.   **[7M]**
         b) Draw the profile of a cam with oscillating roller follower for the following
         motion: Follower to move outwards through an angular displacement of 200 mm
         during 120^0 of cam rotation, follower to dwell for 50^0 , follower to return to its

initial position during 90^0 of cam rotation with uniform acceleration and retardation motion, follower to dwell for the remaining period radius of the roller 10 mm and base circle radius 30 mm

SECTION-V

9   a) Explain the method of eliminating interference in gears.   [7M]

b) A pair of gears having 40 and 20 teeth respectively are rotating in mesh The   [7M]
speed of the smaller is 2000 rpm. Determine the velocity of sliding at the point of
engagement, at the pitch point and at the point of disengagement. Assume that the
gear teeth are20^0 involute, addendum is 5 mm and module is 5 mm

OR

10 a) Make a comparison of cycloidal and involute profiles of gears?   [7M]

b) A pair of 20^0 pressure angle gears in mesh have the following data: Speed of   [7M]
pinion = 400 rpm, Number of teeth on pinion =24, number of teeth on gear = 28.
Determine the addendum of the gears if the path of approach and recess is half the
maximum value

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R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNO
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22
Material Science
(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. Differentiate between crystalline solids and amorphous solids?   **[7M]**
        b. Find the atomic packing factor of B.C.C and F.C.C   **[7M]**

OR

2   a. Elaborate a) Ionic bond b) Covalent bond c) Metallic bond   **[7M]**
        b. Explain briefly about miller indices?   **[7M]**

SECTION-II

3   a. Write various Hume-Rothery rules?   **[4M]**
        b. Explain about Gibbs and Phase rule?   **[10M]**

OR

4   a. What is alloy? what is the necessity of alloying elements?   **[7M]**
        b. What is a Eutectic system alloy and what are its characteristics?   **[7M]**

SECTION-III

5   a. Define heat treatments? What are different heat treatment processes?   **[7M]**
        b. Draw and explain the Allotropy phase changes of pure iron.   **[7M]**

OR

6   a. Explain about copper alloy? What are the base metals of copper explain briefly? **[7M]**
        b. Identify various reactions in Iron-Carbon Equilibrium diagram and explain them. **[7M]**

SECTION-IV

7   a. What are the different types of composites classify them?   **[7M]**
        b. Explain about various types of ceramics?   **[7M]**

OR

8   a. Write application of composites in electrical and mechanical components.   **[7M]**
        b. Explains about fiber reinforced materials   **[7M]**

SECTION-V

9   a. Define polymerization and classify them?   **[7M]**
        b. Gives various Biomedical applications   **[7M]**

OR

10 a. Distinguish between addition polymerization and condensation polymerization?   **[6M]**
        b. Explain brief note with applications: **[8M]**
           i) Thermoplastics   ii) Thermosetting plastics

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, February 2021
Strength of Materials
(ME)

| Roll No										

Time: 2 hours 30 min   **Max. Marks: 70**

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

1 A steel rod of 20mm diameter passes centrally through a copper tube of 50mm **[14M]** external diameter and 40mm internal diameter. The tube is closed at each end by rigid plates of negligible thickness. The nuts are tightened lightly on the projecting parts of the rod. If the temperature of the assembly is raised by 50 ^{0}C, calculate the stresses developed in copper and steel. Take E for steel and copper as 200 GN/m^2 and 100 GN/m^2 and α for steel and copper as 12x 10^{-6} per $^{\circ}$C and 18x10^{-6} per $^{\circ}$C.

2   a) Derive the expression for elongation of Tapperd circular bar.   **[7M]**

     b) Sketch and explain the stress-strain curve of a mild steel specimen in tensile test

                                                                              [7M]

3 Draw the shear force and bending moment diagram for the beam shown in fig **[14M]** below. Find the point of contraflexture
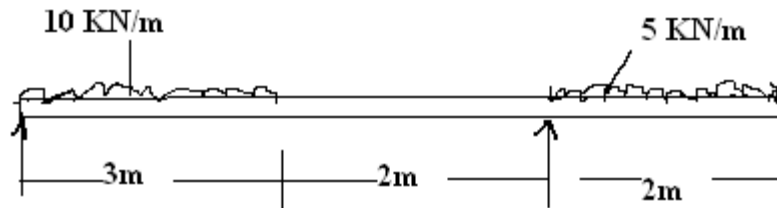

4 A beam of span 8 m has roller support at A and hinge support at B. Draw SF and **[14M]** BM diagrams when the beam is subjected to udl, a concentrated load and an externally applied moment as shown in the Figure.
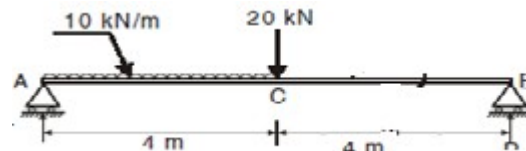

5 The cross section as shown in fig below is used as a simply supported beam on a **[14M]** span of 4m. If allowable stress in bending in compression and tension is 100MPa

and 165MPa respectively, find the safe UDL the beam can carry.
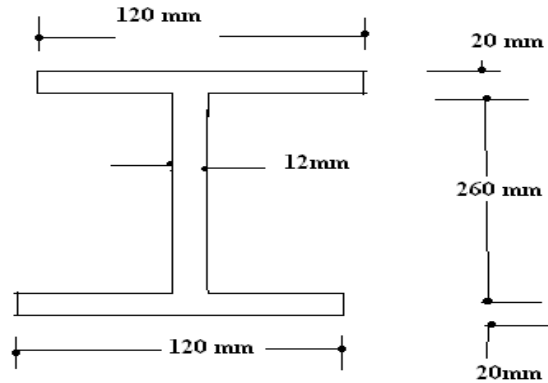
6   A simply supported beam of 2m span carries a uniformly distributed load of **[14M]**
    140KN/m over the whole span. The cross section of the beam is a T-section with a
    flange width of 120mm, web and flange thickness of 20mm and overall depth of
    160mm. determine the maximum shear stress in beam and draw the shear stress
    distribution for the section.

7   Determine the forces in all the members of a cantilever truss shown in Fig below   **[14M]**
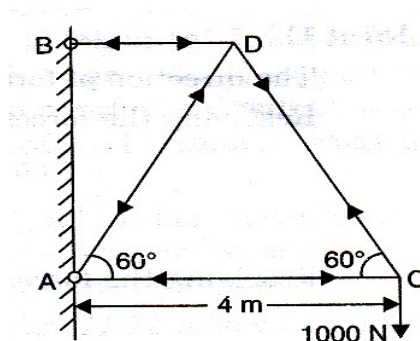
8   a) Derive equations to find the longitudinal and hoop stress   **[7M]**
    b) A thin spherical shell of 1.5m diameter is 10mm thick. It is filled with liquid at **[7M]**
    internal pressure of 3MPa. Find the hoop stress, change in thickness and change in
    volume. Assume E = 200Gpa and μ =0.3.

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R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, February 2021
Electrical and Electronics Engineering
(ME&AE)

Roll No										

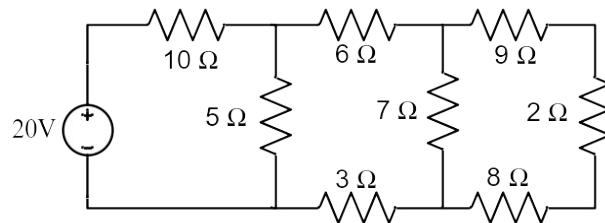**Time: 2 hours 30 min**   **Max. Marks: 70**

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

1   a) State Kirchhoff's Laws?
b) Determine the current in the Resistor R = 2Ω

                                                       [4+10M]

2   a) Write the equations of star-to-delta Transformation and delta-star transformation?
b) Explain the constructional details and working principle of moving Iron instruments   **[7+7M]**

3   a) Explain the Swinburne's Test?   **[4+5+5M]**
b) Explain the flux speed control of DC shunt
 c) Derive EMF equation of a D.C. machine.

4   a) A 30 kW, 300 V, DC shunt generator has armature and field resistance of 0.05Ω and 100 Ω respectively. Calculate the total power developed by the armature when it delivers full load output   **[7+7M]**
b) Explain and draw characteristic of dc series and dc shunt motor

5   a) What are the various losses in a transformer?
b) Explain in detail O.C and S.C. tests of a single-phase transformer with neat   **[4+10M]**
circuit diagrams. Also explain how equivalent parameters and efficiency can be evaluated by these tests.

6   a) Explain the torque – slip characteristics of 3-phase induction Motor?   **[7+7M]**
b) Explain the regulation and efficiency of the transformer?

7   a) Explains the working principle of 1-Φ full wave bridge rectifier and also   **[10+4M]**
draws the relevant waveforms.
b)What are the applications of 1- Φ full wave bridge rectifier

8   Explain the construction and principle of working of the CRO?   **[14M]**
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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL | **R17**

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, February 2021
Engineering Thermodynamics
(ME)

Roll No										

Time: 2 hours 30 min   **Max. Marks: 70**

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

NOTE: Steam Table , Mollier & Psychometric charts are allowed

1   a) What is a thermodynamic system? What is the difference between a closed   **[14M]**
        system and an open system? Give few examples for closed and open
        systems.
     b) Explain the terms state, path process and cyclic process.

2   Air at a temperature of 15° C passes through a heat exchanger at a velocity of 30   **[14M]**
     m/s where its temperature is raised to 800° C. It then enters a turbine with the
     same volocity of 30 m Is and expands until the temperature falls to 650° C. On
     leaving the turbine, the air is taken at a velocity of 60 m/s to a nozzle where it
     expands until the temperature has fallen to 500° C. If the air flow rate is 2 kg/s,
     calculate (a) the rate of heat transfer to the air in the hat exchanger, (b) the power
     output from the turbine assuming no heat loss, and (c) the velocity at exit from the
     nozzle, assuming no heat loss. Take the enthalpy of air as h = $C_p t$, Where C_p is the
     specific heat equal to 1.005 kJ/kg K and t the temperature.

3   One kg of ice at - 5° C is exposed to the atmosphere which is at 20°C. The ice   **[14M]**
     melts and comes into thermal equilibrium with the atmosphere. (a) Determine the
     entropy increase of the universe. (b) What is the minimum amount of work
     necessary to convert the water back into ice at - 5°C? Cp of ice is 2.093 kJ/kg K
     and the latent heat of fusion of ice is 333.3 kJ/kg.

4   A system has a heat capacity at constant volume $Cv = AT^2$ Where A = 0.042 J I   **[14M]**
     K^3 The system is originally at 200K, and a thermal reservoir at 100K is available.
     What is the maximum amount of work that can be recovered as the system is
     cooled down to the temperature of the reservoir?

5   **[14M]**

     Steam at l0 bar, 250° C flowing with negligible velocity at the rate of 3 kg / min
     mixes adiabatically with steam at l0bar, *0.75* quality, flowing also with negligible
     velocity at the rate of 5 kg / min. The combined stream of steam is throttled to 5
     bar and then expanded isentropically in a nozzle to 2 bar. Determine (a) the state
     of steam after mixing, (b) the state of steam after throttling, (c) the increase in
     entropy due to throttling (d) the velocity of steam at the exit from the nozzle, and
     (e) the exit area of the nozzle. Neglect the K.E. of steam at the inlet to the nozzle

6   A mass of air is initially at 260°C and 700 kPa, and occupies 0.028 m3. The air is   **[14M]**
     expanded at constant pressure to 0.084 m³. A polytropic process with n = 1.50 is

then carried *out,* followed by a constant temperature process which completes a cycle. All the processes are reversible. (a) Sketch the cycle in the p-v and T-s planes (b) Find the heat received and the heat rejected in the cycle (c) Find the efficiency of the cycle.

7   Explain the terms i) specific humidity ii) enthalpy of the mixture iii) dew point   **[14M]**
    temperature

8   An engine working on the Otto cycle is supplied with air at 0.1 MPa, 35°C . The   **[14M]**
    compression ratio is 8. Heat supplied is 2100 kJ/kg. Calculate the maximum
    pressure and temperature of the Cycle, the cycle efficiency, and the mean effective
    pressure. (For air, Cp = 1.00S, Cv = 0.718, and R = 0.287 kJ/kg K).

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R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLO

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, February 2021
Kinematics of Machinery
(ME)

Roll No										

Time: 2 hours 30 min   **Max. Marks: 70**

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

1	What do you mean by inversion of a mechanism? Explain with sketches all the inversions of a Quadric Cycle Chain.	**[14M]**
2	a) Write a short note on the classification of Kinematic Pairs.	**[7M]**
	b) Differentiate between Machine and Mechanism, lower pair and higher pair.	**[7M]**
3	With a neat sketch, explain the working of Scott-Russel mechanism and modified Scott-Russel mechanism.	**[14M]**
4	a) Describe with a neat sketch the principle and working of the pantograph.	**[7M]**
	b) Two shafts with an included angle of 160^0 are connected by a Hooke's joint. The driving shaft runs at a uniform speed of 1500 rpm. 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.	**[7M]**
5	The crank and connecting rod of a reciprocating engine are 200 mm and 700 mm respectively. The crank is at 30° to inner dead center and rotating in clockwise direction at 120 rad/s. Find: a) Velocity and acceleration of the piston, and b) Angular velocity and angular acceleration of the connecting rod.	**[14M]**
6	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 = 135^0. If the velocity of B is 1.8 m/s in the clockwise direction, find Angular velocity and angular acceleration of link CB and CD.	**[14M]**
7	A cam drives a Knife edge follower in the following manner: (a) Follower moves outwards through a distance of 20 mm with simple harmonic motion during the first 120° rotation of the cam. (b) Follower dwells during next 30° of cam rotation. (c) Follower moves inwards with simple harmonic motion for the next 120° of cam rotation. (d) The follower dwells for the remaining period. Draw the profile of the cam, when the minimum radius of cam is 25 mm. Also calculate the maximum velocity and acceleration during outward and inward motion of the follower when the cam rotates with 200 rpm.	**[14M]**
8	An epicyclic gear train is shown in the figure. How many revolutions does the arm makes, (a) when A makes one revolution in clockwise and D makes ½ a revolution in the opposite sense (b) when A makes one revolution in clockwise and D remains stationary. The number of teeth in gears A and D are 40 and 90 respectively.	**[14M]**
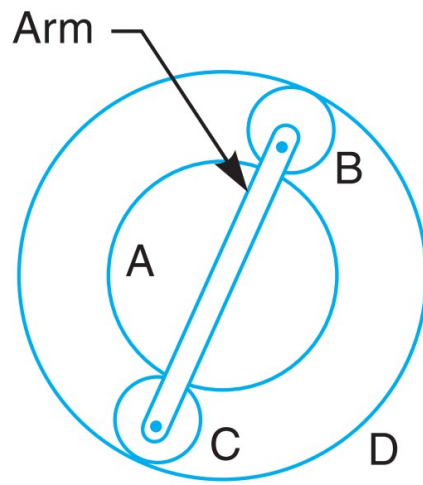
Arm

A

B

C

D

****

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, February 2021
Material Science
(ME)

Roll No										

Time: 2 hours 30 min   **Max. Marks: 70**

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

1	Explain about various types of bonds with examples	**[14M]**
2	Define a unit cell. Determine the APF for FCC structure	**[14M]**
3	Describe about eutectoid and eutectic reactions	**[14M]**
4	State Lever rule with an example.	**[14M]**
5	With a neat sketch describe Iron-carbide diagram.	**[14M]**
6	Describe about microstructural changes that occur during cooling of 0.4% steel from liquid state?	**[14M]**
7	Define composite material, list the functions of Matrix material and reinforcement materials	**[14M]**
8	Differentiate between thermoplastic polymers and thermosetting polymers. Give minimum two examples of each type	**[14M]**

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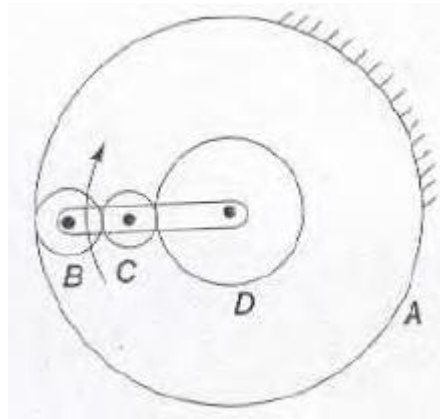
R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, January 2024
Electrical and Electronics Engineering
(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	State and the KCL and KVL with a neat sketch.	[10M]
	B	What are the torques required for an indicating instrument?	[4M]

OR

2	A	Derive the relationship for converting a 3-terminal delta connected resistance into an equivalent star.	[7M]
	B	State and explain the working principle of a Permanent magnet moving coil instrument.	[7M]

SECTION-II

3	A	Draw the magnetization and load characteristics of DC shunt and series generators.	[6M]
	B	What is the principle of operation DC Generator.	[8M]

OR

4	A	Explain the Swinburne's Test with a neat sketch.	[10M]
	B	What is the necessity of a 3-Point starter?	[4M]

SECTION-III

5	A	Explain the OC and SC tests of a single-phase transformer.	[8M]
	B	Derive the EMF equation a transformer.	[6M]

OR

6	A	How does the induction motor rotates?	[10M]
	B	Draw the slip–torque characteristics of an induction motor.	[4M]

SECTION-IV

7	A	Explain the construction and working of SCR.	[10M]
	B	Draw the forward and reverse characteristics of a PN Junction Diode.	[4M]

OR

8	A	Explain the operation of a full wave bridge rectifier with necessary waveforms.	[11M]
	B	Mention at least three applications of a diode.	[3M]

SECTION-V

9	A	Discuss the construction and working of a Cathode Ray Tube.	[10M]
	B	Define Deflection, Sensitivity.	[4M]

OR

10	A	With a block diagram, explain the working of CRO.	[10M]
	B	Mention the applications of CRO.	[4M]

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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										

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 Degree of Freedom and its importance	**[4M]**
	B	Explain the working of Whitworth quick return Mechanism with neat sketch	**[10M]**

OR

2	*A*	Explain the inversion double slider crank chains.	**[7M]**
	B	Define kinematic pair. Explain different types of kinematic pairs.	**[7M]**

SECTION-II

3	*A*	Derive an expression for the ratio of shaft velocities in a Hooke"s joint.	**[7M]**
	B	Discuss the Ackermann Steering gear Mechanism with neat sketch	**[7M]**

OR

4	*A*	What is straight line motion? Mention different mechanism.	**[4M]**
	B	A Hooke"s joint connects two shafts whose axes intersect at 150^0. 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.	**[10M]**

SECTION-III

5	*A*	Explain Klien's construction for determining velocity and acceleration of slider crank mechanism.	**[7M]**
	B	Derive the expression for Coriolis component of acceleration with neat sketch.	**[7M]**

OR

6		Locate all the Instantaneous centers of slider crank mechanism with crank length of 25mm rotating clockwise at a uniform speed of 100rpm. The crank makes 45^0 with IDC and the connecting rod is 400mm long. Determine the velocity of the slider and the angular velocity of connecting rod?	**[14M]**

SECTION-IV

7	*A*	Draw and explain the displacement and velocity diagrams for Simple Harmonic motion.	**[4M]**
	B	Draw the profile of a cam with oscillating roller follower for the following motion: Follower to move outwards through an angular displacement of 30 mm during 120^0 of cam rotation, follower to dwell for 50^0, follower to return to its initial position during 90^0 of cam rotation with (uniform acceleration and retardation motion) UARM, follower to dwell for the remaining period.	**[10M]**

8 **A** Explain with the help of displacement, velocity and acceleration diagrams the UARM. **[7M]**

B Derive an expression for the tangent cam when the follower is contacting the convex flanks. **[7M]**

SECTION-V

9 **A** Derive an expression for minimum number of teeth (T) on the wheel if interference is to be avoided between two mating gears **[7M]**

B Derive the formula for the length of the path of contact for two meshing spur gear having involute profile **[7M]**

OR

10 An epicyclic gear train, as shown in figure, is composed of a fixed annular wheel A having 150 teeth. The wheel A is meshing with wheel B which drives wheel D through an idler wheel C, D being concentric with A. The wheels B and C are carried on an arm which revolves clockwise at 100rpm about the axis of A and D. If the wheels B and D have 25 teeth and 40 teeth respectively, find the number of teeth on C and the speed and sense of rotation of C. **[14M]**

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R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, January 2024
Strength of Materials
(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**   Derive the relation between young's modulus and Rigidity modulus   **[7M]**

    B   A bar 30 mm X 30 mm X 250 mm long is subjected to a pull of 90 kN in the direction of its length. The extension of the bar was found to be 0.125 mm, while the decrease in each lateral dimension is found to be 0.00375 mm. Find the Young's Modulus, Poisons ratio, Modulus of rigidity and Bulk modulus for the material of the bar.   **[7M]**

OR

2   **A**   Draw stress- strain diagram for ductile material and mention salient points over them   **[7M]**

    B   The bar shown in Figure is tested in universal testing machine. It is observed that at a load of 40 kN the total extension of the bar is 0.280 mm. Determine the Young's modulus of the material.   **[7M]**

SECTION-II

3   **A**   How are beams classified? Give a brief explanation with neat diagrams.   **[4M]**

    B   Obtain the expression for shear force and maximum bending moment for a simply supported beam of span L subjected to uniformly distributed load of W per unit length over entire span. Draw the shear force and bending moment diagrams   **[10M]**

OR

4   **A**   What is point of contra flexure? Discuss in detail with an example about maximum bending moment and point of contra flexure.   **[7M]**

    B   A cantilever of length 2.0 m carries a uniformly distributed load of 1kN/m run over a length of 1.5 m from the free end. Draw the shear force and bending moment diagrams for the cantilever beam   **[7M]**

SECTION-III

5   List out the assumptions involved in the theory of simple bending and Derive the Bending Equation from first principles   **[14M]**

OR

6   **A**   Draw variation of shear stresses across rectangle, triangle, circular and I-   **[4M]**

sections

B A T section beam with 100 mm x 15 mm flange and 150 mm x 15 mm web **[10M]** is subjected to a shear force of 10 KN at a section. Draw the variation of shear stress across the depth of beam and obtain the value of maximum shear stress at the section.

SECTION-IV

7 Analyze the given frame and find the forces in the members of **[14M]** the Truss shown in Fig

OR

8 **A** A cantilever beam of length L carries a point load W at free end determine **[7M]** the maximum slope and deflection.

B A simply supported beam of span 2.5 m is subjected to a central point load of **[7M]** 10 KN. What is the maximum slope and deflection at the center of the beam? Take EI for the beam as 6×10^{10} N-mm^2

SECTION-V

9 **A** Define polar Modulus. Write equation for following **[4M]** i. solid shaft section ii. Hollow shaft section

B A shaft to transmit a torque of 30KNm. The maximum shear stres is not to **[10M]** exceed 100MPa and the angle of twist is not to exceed 1°/m length. G= 80 GPa. Design the shaft according to the given specifications if it is a (i) solid shaft (ii) hollow shaft of internal diameter 90% of the external diameter.

OR

10 **A** Distinguish between cylindrical shell and spherical shell, Derive a formula **[7M]** for the hoop stress in a thin spherical shell subjected to an internal pressure

B A Cast iron pipe of 400 mm internal diameter and 100mm thickness carries **[7M]** water under a pressure of 8 N/mm^2. Determine maximum and minimum intensities of hoop stress across the section.

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R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLO

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, June 2022
Strength of Materials
(ME)

Roll No										

Time: 3 hours   **Max. Marks: 70**

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

1	Derive the relation between E, G, K.	**[14M]**
2	A steel tube 50mm in external diamerter and 3mm thick encloses centrally a solid copper bar of 35mm diameter. The bar and the tube are rigidly connected together at the ends at a temperature of 20 ^{0}C. Find the stress in each metal when heated to 170^0C. Also find the increase in length, if the original length of the assembly is 350mm. Take α_S=1.08 x 10-5 per 0C and α_c=1.7 x 10 -5 per 0C. Take E_S =2X105 N/mm2, E_c =1X105 N/mm2.	**[14M]**
3	An overhanging beam ABC of length 7 m is simply supported at A and B over a span of 5 m and portion BC overhangs by 2 m. Draw the shearing force and bending moment diagrams and determine the point of contra-flexure if it is subjected to uniformly distributed loads of 3 KN/m over the portion AB and a concentrated load of 8 kN at C.	**[14M]**
4	Draw SF and BM diagrams for the cantilever shown in Fig	**[14M]**
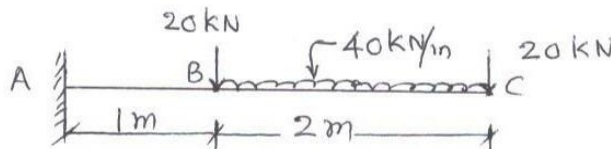
5	Derive and Prove the following relation $\dfrac{M}{I} = \dfrac{\sigma}{y} = \dfrac{E}{R}$, Where M is moment applied on the beam, I is moment of Inertia, σ is bending stress, y is the distance between neutral axis and extreme fiber, E is young's modules, R is Radius if curvature.	**[14M]**
6	A rectangular beam of 100mm wide and 150mm deep is subjected to Shear force of 30KN, Determine ratio of Maximum shear stress to Average shear stress. Derive the equation which is used to find out the shear stress.	**[14M]**
7	A beam section is 10m long and is simply supported at ends. It carries concentrated loads of100kN and 60kN at a distance of 2m and 5m respectively	**[14M]**

from the left end. Calculate the deflection under the each load find also the maximum deflection. Take $I = 18 \times 10^8 mm^4$ and $E = 200kN/mm^2$.

8   A shell 3.25m long and 1m diameter is subjected to an internal pressure of 1.2   **[14M]**
     N/mm^2. If the thickness to the shell is 10mm, find the circumferential and longitudinal stresses. Find also the maximum shear stress and changes in dimensions of the shell. Take $E = 200 kN/mm^2$, poissons ratio=0.3.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL **R17**
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, June 2022
Electrical and Electronics Engineering
(ME&AE)

Roll No										

Time: 3 hours   **Max. Marks: 70**

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

1   Find the equivalent resistance between terminals x-y in the resistance network   **[14M]**
     shown in Figure below by using Y- Δ transformation.
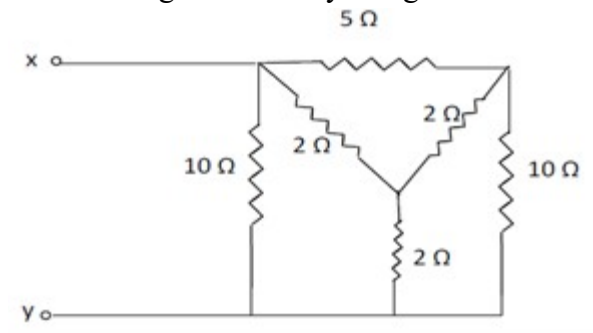
2   Explain Kirchoff's laws with suitable examples   **[14M]**

3   Explain the principle and operation of DC Generator?   **[14M]**

4   Illustrate the speed control of DC shunt motor?   **[14M]**

5   Determine the equivalent circuit parameters of a Transformer using OC and SC   **[14M]**
     test?

6   Determine the regulation of Alternator using Synchronous Impedance Method?   **[14M]**

7   Explain the operation of Full wave rectifier with its characteristics?   **[14M]**

8   Explain the electrostatic and magnetic deflection in CRT?   **[14M]**

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Code No: **R17A0303**

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL(
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, June 2022
Engineering Thermodynamics
(ME)

Roll No										

Time: 3 hours   **Max. Marks: 70**

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

<u>**Note: Steam Tables, Psychometric charts and Mollier charts are permitted.**</u>

1	Explain briefly the following terms with diagram (wherever necessary)	
	a. Thermodynamic System, Surroundings & Boundary	**[3M]**
	b. Control Volume & Control Surface	**[2M]**
	c. Intensive & Extensive Property	**[3M]**
	d. Path Function & Point Function	**[3M]**
	e. Thermodynamic Equilibrium	**[3M]**

2	a) Describe the working principle of constant volume gas thermometer with a neat sketch.	**[7M]**
	b)State and explain first law of thermodynamics with its corollaries.	**[7M]**

3   At the inlet to a certain nozzle the enthalpy of fluid passing is 2800 kJ/kg, and the **[14M]**
velocity is 50 m/s. At the discharge end the enthalpy is 2600 kJ/kg. The nozzle is
horizontal and there is negligible heat loss from it.
a. Find the velocity at exit of the nozzle.
b. If the inlet area is 900 cm^2 and the specific volume at inlet is 0.182 m^3/kg, find
the mass flowrate.
c. If the specific volume at the nozzle exit is 0.498 m^3/kg, find the exit area of
nozzle

4	a). State and explain second law of thermodynamics with its corollaries.	**[10M]**
	b). Describe briefly about Maxwell's equations.	**[4M]**

5   a). Explain briefly about the vanderwaals equation of state. **[4 M]**
b). A vessel of 0.04 m^2 Contains a mixture of saturated water and saturated steam **[10M]**
at a temperature of 250°C. The Mass of liquid present is 9kg. Find pressure, mass,
specific volume, enthalpy, entropy and the internal energy.

6   a) Explain the phase change of a pure substance on p-V-T surface. **[6M]**
b) 2 kg. of gas at a temperature of 20^{0}C undergoes a constant pressure process **[8M]**
until the temperature is 100^{0}C. Find the heat transferred, ratio of specific heats,
specific gas constant, work done, and change in entropy during the process. Take

$C_V = 0.515$ KJ/kg ^{0}K, $C_P = 0.6448$ KJ/kg ^{0}K

7   a) Write notes on the following terms   **[10M]**
        i) Dry bulb Temperature
        ii)Wet Bulb Temperature,
        iii) Dew point Temperature
        iv) Specific Humidity
        v) Relative Humidity
        b) .Explain the various terms involved psychometric chart.   **[4M]**

8   Derive an expression for thermal efficiency in Otto cycle. Show it on P-V and T-S   **[14M]**
    diagrams?

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL | R17 |

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, June 2022
Kinematics of Machinery
(ME)

Roll No										

Time: 3 hours   **Max. Marks: 70**

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

1	a) Define link and kinematic pair.	**[4M]**
	b) Enumerate any two inversions of double slider crank chain mechanism	**[10M]**

2	a) Define machine and structure.	**[4M]**
	b) Enumerate any two inversions of single slider crank chain mechanism	**[10M]**

3	a) What is an approximate straight line mechanism?	**[7M]**
	b) Explain a mechanism which consists of a sliding pair	**[7M]**

4 a) What is a Hooke's joint? What are its applications? **[7M]**
b) A Hooke's joint connects two shafts whose axes intersect at 1500 .The driving **[7M]**
shaft rotates uniformely 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

5 a) Explain Klien's construction for determining velocity and acceleration of slider **[7M]**
crank mechanism.
b) Explain the method of determining the Coriolis component of acceleration in **[7M]**
crank and slotted lever quick return mechanism?

6 a) Define Instantaneous centre **[4M]**
b) Locate all the Instantaneous centers of slider crank mechanism with crank **[10M]**
length of 25mm rotating clockwise at a uniform speed of 100 rpm. The crank
makes 450 with IDC and the connecting rod is 400 mm long .Determine the
velocity of the slider and the angular velocity of connecting rod?

7   A cam operating a knife edge follower has the following data: Follower moves **[14M]**
outward through 40 mm during 60^0 of cam rotation with uniform
velocity ,follower dwells for the next 45^0 , follower returns to its original position
during next 90^0 with Uniform velocity and dwells for the remaining period. Draw
the cam profile.

8   a) What is a gear train and what are its types? **[7M]**

b) The speed ratio of a reverted gear train is 12. The module pitch of gears A and **[7M]** B which are in mesh is 3.125 mm and of gears C and D which are in mesh is 2.5 mm .Calculate the suitable number of teeth for the gears. No gear is to have less than 20 teeth. B-C is a compound gear.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLO

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, June 2022
Material Science
(ME)

Roll No										

Time: 3 hours   **Max. Marks: 70**

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

1	a. Explain the atomic packing factor with examples?	**[6M]**
	b. Explain about following crystals	**[8M]**
	i) NaCl crystal ii) CsCl crystal	
2	Find the atomic packing factor of HCP crystal structure.	**[14M]**
3	Explain about the Triple point with a proper example.	**[14M]**
4	a. Write the specific effect of copper when alloying with gold?	**[7M]**
	b. Explain with neat sketch a peritectic system?	**[7M]**
5	Explain following Terms	
	i) Annealing	**[3M]**
	ii) Hardening	**[3M]**
	iii) Tempering	**[3M]**
	iv) Normalizing	**[3M]**
	v) Surface hardening	**[2M]**
6	a. Explain about aluminum alloy? Give composition of various of aluminum alloys with applications?	**[7M]**
	b. Explain about classification of steel.	**[7M]**
7	a. Explain and application of Fiber reinforced materials.	**[7M]**
	b. Explain in detail about the glass manufacturing process.	**[7M]**
8	a. Explain the Mechanisms of polymerisation	**[6M]**
	b. Explain brief note with applications:	
	i) Liquid crystal polymers	**[4M]**
	ii) Conductive polymers	**[4M]**

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Code No: **R17A0305**

R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, May 2019
Strength of Materials
(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) Draw stress-strain curve for a mild steel rod subjected to tension and explain   **[7M]**
about the salient points on it.

b) A vertical tie, fixed rigidly at the top end consist of a steel rod 2.5 m long
and 20 mm diameter encased throughout in a brass tube 20 mm internal
diameter and 30 mm external diameter. The rod and the casing are fixed
together at both ends. The compound rod is loaded in tension by a force of
10 kN. Calculate the maximum stress in steel and brass. Take
$E_s=2x10^5 N/mm^2$ and $E_b=1x10^5 N/mm^2$.   **[7M]**

OR

2 A steel tube 50mm in external diamerter and 3mm thick encloses centrally a   **[14M]**
solid copper bar of 35mm diameter. The bar and the tube are rigidly
connected together at the ends at a temperature of 20 ^{0}C. Find the stress in
each metal when heated to 170^0C. Also find the increase in length, if the
original length of the assembly is 350mm. Take $\alpha_s=1.08 \times 10^{-5}$ per ^{0}C and
$\alpha_c=1.7 \times 10^{-5}$ per ^{0}C . Take $E_s =2X10^5 N/mm^2$, $E_c =1X10^5 N/mm^2$.

SECTION-II

3 A 30m long horizontal beam carries a uniformly distributed load of 1 kN/ m   **[14M]**
on the whole length along with a point load of 3 kN at the right end. The
beam is freely supported at the left end. Determine the position of the second
support so that the maximum bending moment on the beam is as small as
possible. Also draw the shear force and bending moment diagrams indicating
main values.

OR

4 A Beam A B C, 5m long has one support at the end A and other support at   **[14M]**
B, 8m from A. It carries a point load of 4kN at the middle point of AB and a
point load of 3kN at C Draw SFD and BMD.

SECTION-III

5 a) A simply supported symmetric I-section has flanges of size 200 mmX 15   **[7M]**
mm and its overall depth is 520 mm. Thickness of web is 10mm. It is
strengthened with a plate of size 250 mm X 12mm on compression side.
Find the moment of resistance of the section if permissible stress is 160 M
Pa. How much uniformly distributed load it can carry if it is used as a
cantilever of span 3.6m.

b) A simply supported beam of 2m span carries a U.D.L. of 140 kN/m over the
whole span. The cross section of the beam is T-section with a flange width
of 120mm, web and flange thickness of 20mm and overall depth of 160mm.   **[7M]**
Determine the maximum shear stress in the beam and draw the shear stress
distribution for the section.

6   A steel beam of I – section, 200mm deep and 160mm wide has 16 mm thick   **[14M]**
flanges and 10mm thick web. The beam is subjected to a shear force of 200 KN.
Determine the shear stress distribution over the beam section if the web of the
beam is kept horizontal.

SECTION-IV

7   Find the forces in all the members of the truss as shown in the figure using   **[14M]**
method of joints.
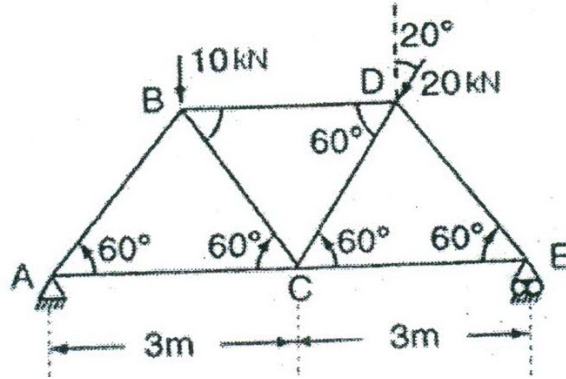
OR

8   a)   Determine the force in member EB of the roof truss shown in the figure.   **[14M]**
Indicate whether the member is in tension or compression.
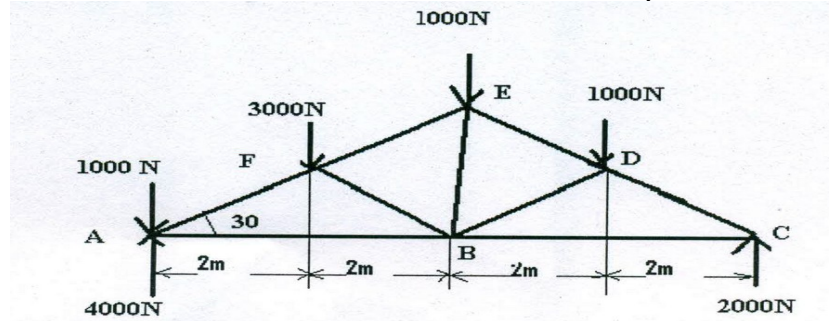
SECTION-V

9   **a)**   A solid shaft of 200mm diameter gas the same cross sectional area as a   **[10M]**
hollow shaft of the same material with inside diameter of 150mm. Find the
ratio of powers transmitted by both the shafts at the same angular velocity.

     b)   Derive the expression for circumferential stress for a thin cylinder. .   **[4M]**

OR

10   A shell 3.25m long and 1m diameter is subjected to an internal pressure of   **[14M]**
1.2 N/mm^2. If the thickness to the shell is 10mm, find the circumferential
and longitudinal stresses. Find also the maximum shear stress and changes in
dimensions of the shell. Take E = 200 kN/mm^2, poissons ratio=0.3.

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MALLA REDDY COLLEGE OF ENGINEERING & TE⬜OGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, May 2019
Electrical and Electronics Engineering
(ME & AE)

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)** Define and explain Ohm's law with an example.   **[7M]**

   b) Find the current supplied by 10 V battery by using Star – Delta transformation for the following network   **[7M]**

OR
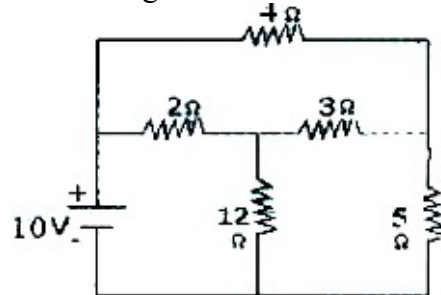
2   Explain the principle of operation of Permanent magnet moving coil instrument.   **[14M]**

SECTION-II

3 **a)** Explain the characteristics of DC shunt motor.   **[7M]**
   b) Explain the types of DC generators with neat diagrams.   **[7M]**

OR

4 **a)** Explain the construction of DC generator with neat diagrams.   **[7M]**
   b) Derive the expression for torque developed in a DC motor.   **[7M]**

SECTION-III

5 **a)** Draw and explain the single phase transformer equivalent circuit.   **[7M]**
   b) Explain the slip-torque characteristics of 3-phase induction motor.   **[7M]**

OR

6 **a)** Explain Regulation by synchronous impedance method of alternator.   **[7M]**
   b) Explain how you will pre-determine the efficiency and regulation from OC & SC tests on a transformer.   **[7M]**

SECTION-IV

7 **a)** Draw the circuit diagram of a bridge rectifier and explain its operation. **[7M]**
   b) Draw and explain SCR characteristics.   **[7M]**

OR

8 **a)** Draw and explain V-I Characteristics of a P-N diode.   **[7M]**
   b) Discuss how the transistor acts as an amplifier.   **[7M]**

SECTION-V

9 **a)** Explain Principle of CRO (Cathode Ray Oscilloscope)   **[7M]**

    b) Discuss the frequency measurements using CRO.   **[7M]**

OR

10 **a)** Explain Electrostatic and magnetic deflections   **[7M]**

    b) Mention the Applications of CRO.   **[7M]**

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R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, May 2019
Engineering 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) Explain about macroscopic and microscopic approaches in the study of thermodynamics   **[4M]**

         (b) Define quasi-static process. Distinguish between reversible process and irreversible process.   **[6M]**

         (c) State and explain first law of thermodynamics for a process.   **[4M]**

OR

2   (a) Write Steady Flow Energy Equation (S.F.E.E) and explain the terms.   **[6M]**

         (b) Explain the applications of Steady Flow Energy Equation   **[8M]**

SECTION-II

3   (a) Define COP for refrigerator and heat pump. How are they related?   **[6 M]**

         (b) Sketch Carnot cycle on p-v and T-s planes and explain the processes.   **[8 M]**

OR

4   (a) State Clasius theorem and derive Clasius inequality.   **[14M]**

SECTION-III

5   (a) Define dryness fraction of steam. Explain how it can be determined using simple throttling calorimeter.   **[8M]**

         (b) Steam at 5 bar dry saturated is isentropically expanded to 1bar in a steam turbine. Determine the dryness fraction at exit and enthalpy and entropy of steam at the inlet and exit points.   **[6M]**

OR

6   (a) Define real gas. Explain the Vander Waal's equation for real gas.   **[6M]**

         (b) Air of mass 5 Kg at 10 bar 500^0C is expanded polytropically to a final pressure of 1 bar. The index of expansion is 1.25. Determine the work done by the gas during expansion process. Take R for air as 285 J/Kg-K   **[8M]**

SECTION-IV

7   A mixture of ideal gases contain 2 Kg of Carbon Dioxide and 4 Kg of Nitrogen at a pressure of 400 kPa and a temperature of 30^0C. The mixture is heated at constant volume to a final temperature of 60^0C. Find the changes in internal energy, enthalpy and entropy for the mixture during the process. Take γ =1.4 for both gases and Universal Gas Constant = 8315 J/Kg-K.   **[14M]**

8   (a) Define thermodynamic wet bulb temperature.   **[4M]**

       (b) Sketch Psychrometric chart and indicate various constant property lines on it. Indicate cooling and de-humidification process on it.   **[10M]**

SECTION-V

9   Define air standard efficiency. Derive an expression for the air-standard efficiency of Diesel cycle. State the assumptions made.   **[14M]**

OR

10   (a) Compare air standard cycles for Otto cycle, Diesel cycle and Dual cycle using p-v or T-s diagram.   **[8M]**

       (b) With a neat sketch explain the working of Bell-Coleman air refrigeration system.   **[6M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLO | **R17**

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, May 2019

Kinematics of Machinery

(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) What is the significance of degrees of freedom of a kinematic chain when it   **[14M]** functions as a mechanism.(7M)

b) Sketch and explain any two inversions of a slider crank chain. (7M)

OR

2 Find the maximum and minimum transmission angles for the mechanism as   **[14M]** shown in figure. The figure indicates the dimensions in standard units of length.
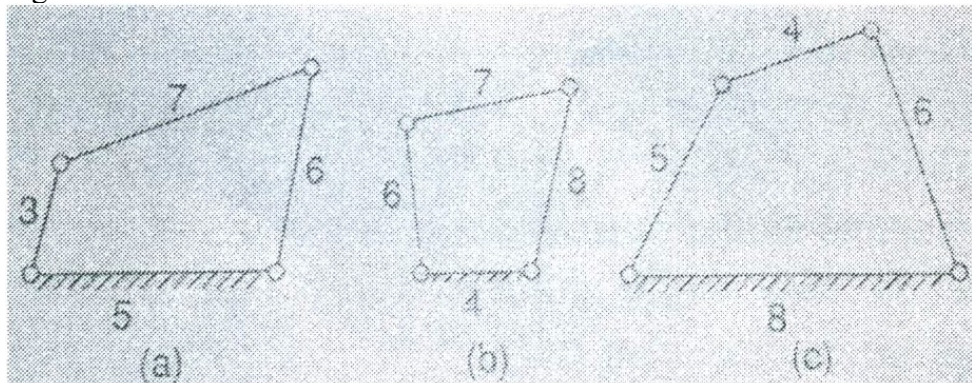
SECTION-II

3 In the four bar mechanism shown in fig., AB = 190mm, BC=CD=280mm,   **[14M]** AD=500mm, Determine i. Acceleration of C, ii. Angular acceleration of links Bc and CD.
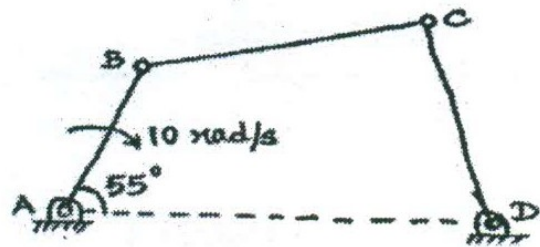
OR

4 Explain Scott Russel mechanism for tracing a straight line.   **[14M]**

SECTION-III

51. State and prove the Kennedy's theorem as applicable to instantaneous centers of rotation of three bodies. How is it helpful in locating various instantaneous centers of a mechanism?   **[14M]**

OR

6 Explain in detail about the various methods to find velocity and acceleration of links of a mechanism.   **[14M]**

SECTION-IV

7 Explain the construction of cam profile for simple harmonic motion to the roller follower of the cam. Also derive the expression for maximum velocity and maximum acceleration of the follower.   **[14M]**

OR

81. 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: **[14M]**
(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.

SECTION-V

9 A pair of gears, having 40 and 20 teeth respectively, are rotating in mesh, the speed of the smaller being 2000 rpm. Determine the velocity of sliding between the gear teeth faces at the point of engagement, at the pitch point, and at the point of disengagement if the smaller gear is the driver. Assume that the gear teeth are 20^0 involute form, addendum length is 5 mm and the module is 5 mm. Also find the angle through which the pinion turns while any pairs of teeth are in contact.   **[14M]**

OR

10 In an epi cyclic gear train of the sun and planet type as shown in Fig, the pitch circle diameter of the internally toothed ring D is to be 216 mm and the module 4 mm. When the ring D is stationary, the spider A, which carries three planet wheels C of equal size, is to make one revolution in the same sense as the sun wheel B for every five revolutions of the driving spindle carrying the sun wheel B, Determine suitable number of teeth for all the wheels and the exact diameter of pitch circle of the ring.   **[14M]**
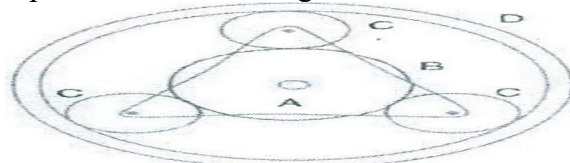
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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, May 2019
Machine Drawing
(ME)

Roll No										

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 consist of one question which is compulsory which carries 42 marks.

******

Part- A (28 Marks)
Answer any two of the following (14*2=28)

1. Draw the sectional front view of a universal coupling joining two shafts of diameter 50 mm. Show the dimensions.
2. Draw the sectional view from the front and top view of a single riveted single strap butt joint with plates of thickness 15 mm.
3. Sketch the sectional front view of rag foundation bolt of diameter 25 mm. Show the proportionate dimensions in the drawing.

Part-B (42 Marks) (1*42=42M)

4. Develop the assembly drawing views as mentioned below of Screw Jack using the part drawings shown in Figure.1.
   (i)   Half-Sectional Front View
   (ii)   Top View

Parts list			
Part No.	Name	Matl	Qty
1	Body	CI	1
2	Nut	GM	1
3	Screw	MS	1
4	Cup	CS	1
5	Washer	MS	1
6	Screw	MS	1
7	Tommy bar	MS	1
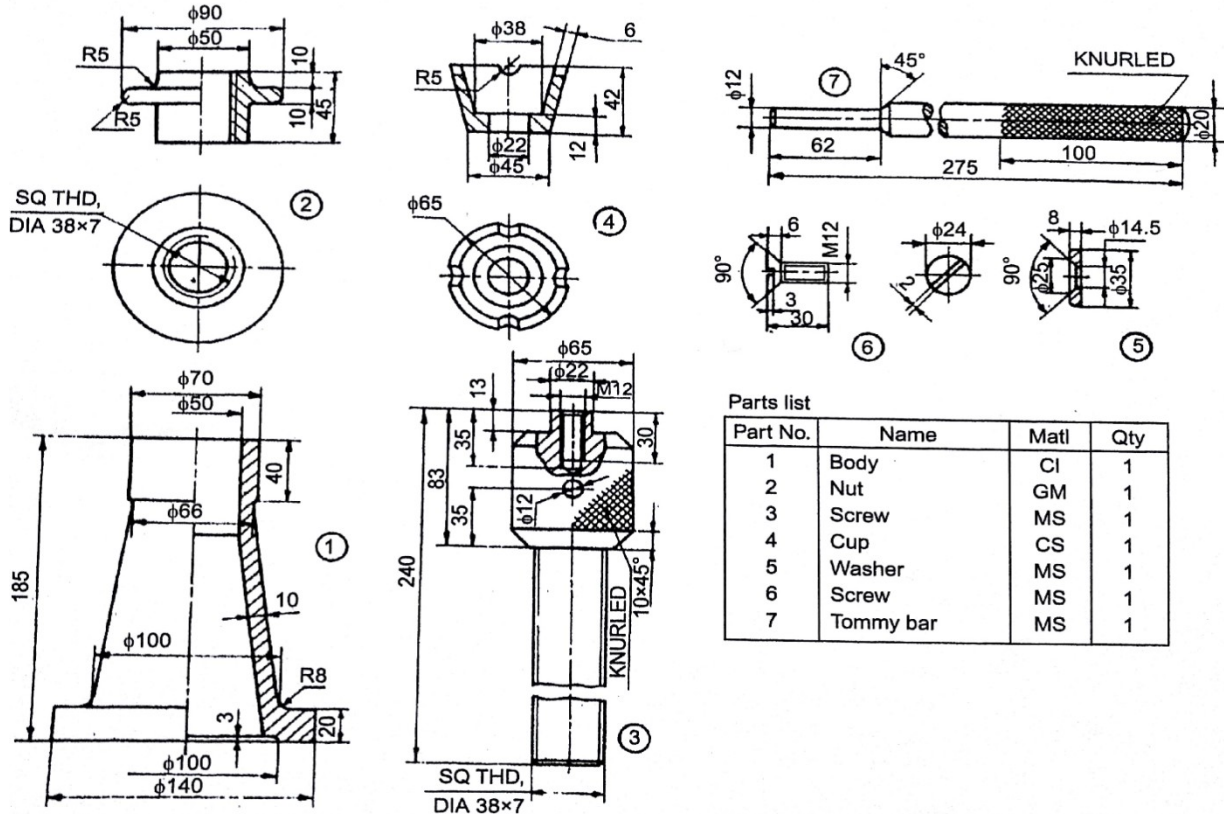
Figure 1. Details of Screw Jack
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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R17

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, May 2019
Material Science
(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   Explain different types of bonds in solids with neat sketch. Discuss nucleation and growth.   **[14M]**

OR

2   Find the APF of BCC and FCC crystals   **[14M]**

SECTION-II

3   Draw a neat sketch of Fe-Fe$_3$C diagram and label all important points, lines and phases in it.   **[14M]**

OR

4   a)   State Hume Rothery's rules for the formation of substitutional type solid solutions.   **[7M]**

     b)   Carbon when dissolved in iron forms interstitial solid solution. Explain.   **[7M]**

SECTION-III

5   a)   Distinguish between malleable iron and ductile iron in term of i) manufacturing process ii) structure iii) Properties iv) applications.   **[7M]**

     b)   Why are alloying elements added to steels? Give some examples of common alloying elements and their effect on the properties of steel.   **[7M]**

OR

6   a)   Explain theory of tempering? What are the effects of tempering on the mechanical properties of steel   **[7M]**

     b)   Explain the following processes: (i) Nitriding (ii) Carburising) (iii) Cyaniding   **[7M]**

SECTION-IV

7   a)   What are ceramic materials? Explain the properties and applications.   **[7M]**

     b)   What are composites? Explain the different types of composites in detail.   **[7M]**

OR

8   a)   What are the important characteristics of ceramics? What are naturally occurring ceramics?   **[7M]**
[7M]
     b)   What is the most serious problem with ceramic matrix composites? How is this problem addressed?

SECTION-V

9   a)   Explain mechanism of polymerisation.   **[7M]**

     b)   Differentiate between thermoplastics and thermosetting plastics.   **[7M]**

OR

10   a)   Explain the applications of Engineering Plastics.   **[7M]**

     b)   Differentiate between liquid crystal polymers and conductive polymers.   **[7M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNO

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, November 2019

Strength of Materials

(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) Draw stress strain diagram for mild steel and explain various properties evaluated from that diagram.   **[5M]**

b). Derive the relations between E, G & K.   **[9M]**

OR

2   a) Derive the formula for elongation of uniformly tapered circular cross section bar under axial load   **[7M]**

b) A steel rod of diameter 32 mm and length 500 mm is placed inside an aluminum tube of internal diameter 35 mm and external diameter 45 mm which is 1 mm longer than the steel rod. A load of 300 kN is placed on the assembly through the rigid collar. Find the stress induced in steel rod and aluminum tube. Take the modulus of elasticity of steel as 200 Gpa and that of aluminum as 80 Gpa.   **[7M]**

SECTION-II

3   Draw the S.F. &B.M. diagrams for an Overhanging beam ABCDE shown. Mark all the salient   **[14M]**
points with respective values.
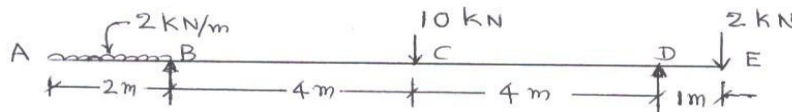
OR

4   Draw the SFD and BMD for the cantilever beam shown   **[14M]**
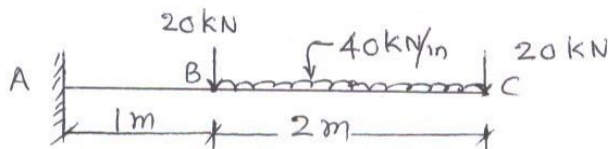
SECTION-III

5   A rectangular beam 300 mm deep is simply supported over a span of 4m. Determine the uniformly distributed load per meter which the beam may carry, if the bending stress should not exceed 120 N/mm^2. Take I = 8x10^6 mm^4.   **[14M]**

OR

6   What is pure bending? What are the assumptions for simple bending. Derive the relation M/I=E/R= /y   **[14M]**

SECTION-IV

7   Using method of joints determine the forces in all members of the pin-jointed plane truss as shown in figure.   **[14M]**
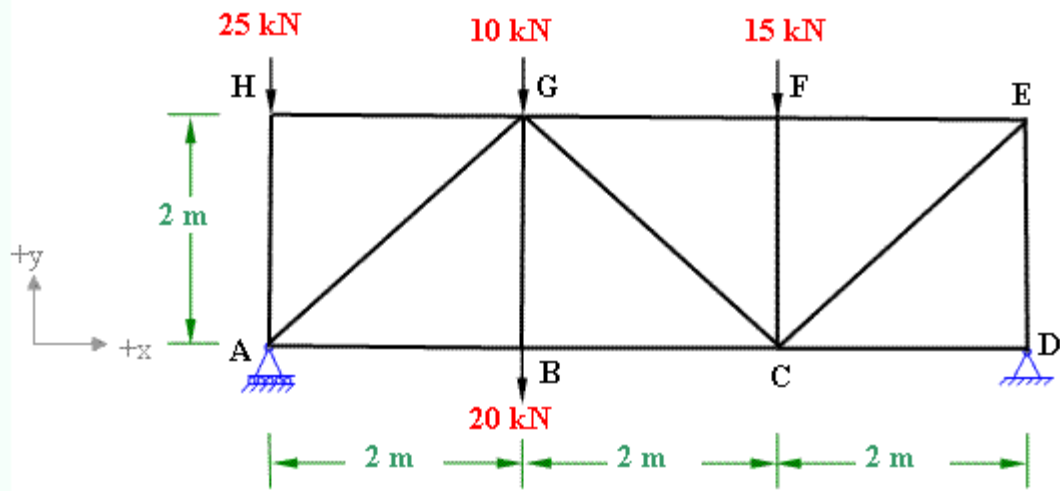
8 . Derive the deflection equation for elastic curve of a beam. Write important **[14M]** assumption made in its derivation.

SECTION-V

9 Derive the relation $T/J= /R=G /L$ **[14M]**

10 A thin spherical shell of internal diameter 1.5 m and of thickness 8 mm is subjected **[14M]** to an internal pressure of 1.5 N/mm^2 Determine the increase in diameter and increase in volume. Take E = 2 x 105 N/mm^2 and v = 0.3

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL **R17**
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, November 2019
Electrical and Electronics Engineering
(ME&AE)

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)   Three equal resistances of value R ohms are connected in a delta (mesh) fashion.   **[10M]**
This is to be replaced by an equivalent star connected resistance R1, R2 and R3.
What are the values of R1, R2 and R3 in the terms of R?

(b)   State and explain Ohm's law. What are the limitations of Ohm's law?   **[4M]**

OR

2(a)   State and explain Ohm's law. What are the limitations of Ohm's law?   **[7M]**

(b)   When three resistors are connected in parallel show the relation between obtain the equation   **[7M]**
for currents

SECTION-II

3   What are the factors that control the speed of the d.c motor? Explain any two methods for   **[14M]**
controlling the speed of the shunt motor

OR

4(a)   Obtain the expression for voltage generated in d.c. generator with usual notation.   **[7M]**

(b)   A 4 pole dc generator runs at 900 rpm and is lap wound and has a useful flux per   **[7M]**
pole of 0.07Wb. The armature windings consists of 220 turns each of 0.004 ohms
resistance. Calculate the terminal voltage when running at 900 rpm. If the armature
current is 50 A.

SECTION-III

5   a) Explain the principle and operation of a transformer. Also list different types of   **[7M]**
transformers

b) A 50Hz single phase transformer has 6600V/400V. Having e.m.f per turn is 10V   **[7M]**
and the maximum flux density in the core is 1.6 Tesla. Find the i) Suitable number
of primary and secondary turns ii) Cross sectional area of the core

OR

6(a)   Explain the constructional features of 3-phase induction motor.   **[7M]**
(b)   What is an alternator? Explain the principle of operation of alternator.   **[7M]**

SECTION-IV

7   With a neat circuit diagram, explain the operation of full wave bridge rectifier with   **[14M]**
neat wave forms.

OR

8(a)   Analyse the operation of forward biased diode with the help of its characteristics.   **[7M]**
(b)   With a neat circuit, explain the operation of Bridge rectifier   **[7M]**

SECTION-V

9 Explain What the function and uses and applications of the cathode ray oscilloscope **[14M]**
(C.R.O.) with block diagram.

OR

10(a) (i)Explain about losses of Transformers **[7M]**
(ii)Illustrate about working principle of Induction motor
(iii)Write the Merits and Demerits of MI and MC type Instruments

(b) Name different components of CRT and write the function of each component **[7M]**

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R17

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLO
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, November 2019
Engineering 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.

Note: Steam tables are permitted
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SECTION-I

1   a) What is the concept of continuum? How will you define density and pressure using this concept?   **[7M]**

b) Show that work is a path function, and not a property.   **[7M]**

OR

2   A closed system of constant volume experiences a temperature rise of 20°C when a certain process occurs. The heat transferred in the process is 18 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 kg of this substance. Determine the change in internal energy and the work done.   **[14M]**

SECTION-II

3   a) State and prove Clausius inequality.   **[7M]**

b) Explain a heat engine cycle performed by a steady flow system.   **[7M]**

OR

4   An iron cube at a temperature of 400°C is dropped into an insulated bath containing 10 kg water at 25°C. The water finally reaches a temperature of 50°C at steady state. Given that the specific heat of water is equal to 4186 J/kg K. Find the entropy changes for the iron cube and the water. Is the process reversible? If so why?   **[14M]**

SECTION-III

5   a) Explain with a neat diagram p-V-T surface.   **[7M]**

b) Write a short note on Mollier chart.   **[7M]**

OR

6   In a throttling calorimeter the pressure of the steam measure before and after throttling are 16 bar and 1 bar respectively. Find the dryness fraction of steam before passing through the calorimeter if the temperature after throttling is 150°C. Assume CP for superheated steam at 1 bar is 2.1 KJ/kgK.   **[14M]**

SECTION-IV

7   The gas in an engine cylinder has a volumetric analysis of 12% of CO_2, 11.5% O_2 and 76.5% N_2. The temperature at the beginning of expansion is 1000°C and the gas mixture expands reversibly through a volume ratio of 7:1, according to a law $pv^{1.25}$ = constant. Calculate the work done and the heat flow per kg of gas. The values of c_p for the constituents are as follows: c_p for CO_2 = 1.235 kJ/kg K ; c_p for O_2 = 1.088 kJ/kg K ; c_p for N_2 = 1.172 kJ/kg K.   **[14M]**

8 a) Show that for an ideal gas, $c_{p} - c_{v} = R$. **[7M]**

b) Draw the psychrometric chart and show any two psychrometric processes on it. **[7M]**

SECTION-V

9 a) With the help of p-V and T-s diagrams, compare the air-standard Otto, Diesel, and Dual Combustion cycles. **[7M]**

b) A diesel engine has a compression ratio of 20 and cut-off takes place at 5 % of the stroke. Find the air-standard efficiency. Assume $\gamma=1.4$. **[7M]**

OR

10 An air refrigeration system operating on Bell Coleman cycle, takes in air from cold room at 268 K and compresses it from 1.0 bar to 5.5 bar. The index of compression being 1.25. The compressed air is cooled to 300 K. The ambient temperature is 20°C. Air expands in an expander where the index of expansion is 1.35. **[14M]**

Calculate: (i) C.O.P. of the system (ii) Quantity of air circulated per minute for production of 1500 kg of ice per day at 0°C from water at 20°C. (iii) Capacity of the plant in terms of kJ/s.

Take c_{p} = 4.18 kJ/kg K for water, c_{p} = 1.005 kJ/kg K for air

Latent heat of ice = 335 kJ/kg.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, November 2019
Kinematics of Machinery
(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)What is the difference between an element and a kinematic link of a machine? How do you classify links of a machine?	**[07M]**
	(b) What do you mean by degree of freedom of a kinematics pair? How are pairs classified? Give examples.	**[07M]**

OR

2	Sketch and explain the inversions of double slider crank chain	**[14M]**

SECTION-II

3	a) Sketch Peacellier's mechanism and prove that it can trace a straight line.	**[07M]**
	b) With a neat sketch explain the condition for correct steering for Ackermann's mechanism	**[07M]**

OR

4	(a) Name the different mechanisms which are used for approximate straight line motion	**[07M]**
	(b) Describe the Watt's parallel mechanism for straight line motion and derive the condition under which the straight line is traced	**[07M]**

SECTION-III

5	Locate all the instantaneous centres of the slider crank mechanism. The crank (OA) is 160mm and the connecting rod (AB) is 470mm long. If the crank rotates clockwise with an angular velocity of 12 rad/s, Determine (i) Linear velocity of slider -B (ii) Angular velocity of Connecting Rod-AB, at a crank angle of 30^0 from inner dead centre position using instantaneous centre method	**[14M]**

OR

6	Figure shows a mechanism in which OA =300 mm, AB = 600 mm, AC =BD = 1.2 m. OD is horizontal for the given configuration. If OA rotates at 200 rpm in the clockwise direction find: (a) the linear velocities of C and D, and (b) the angular velocities of links AC and BD.	**[14M]**
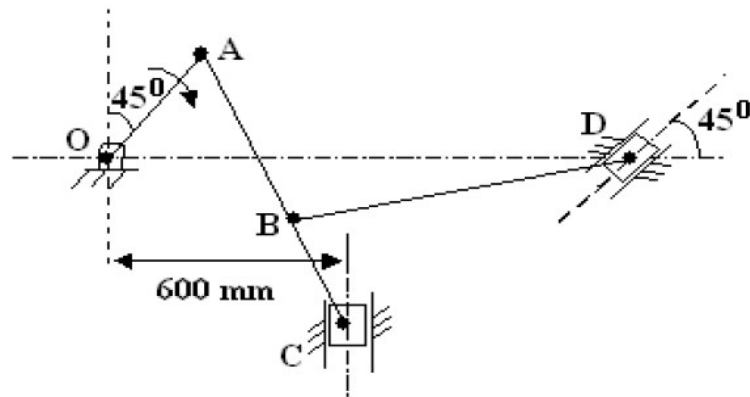
SECTION-IV

7 Draw the profile of a cam for operating the exhaust valve of an oil engine. It is required to give equal uniform acceleration and retardation during opening and closing of the valve each of which corresponds to 60^0 of cam rotation. The valve must remain in fully open position for 20^0 of cam rotation.

The lift of the valve is 37.5mm and the least radius of cam is 40mm. The follower provided with a roller radius of 20mm and its line of stroke passes through the axis of the cam **[14M]**

OR

8 Draw the profile of a cam operating a knife-edge follower when the axis of the follower passes through the axis of cam shaft from the following date: follower to more outward through 30mm with simple harmonic motion during 120^0 of cam rotation, follower to dwell for the next 60^0 ,follower to return to its original position with uniform velocity during 90^0 of cam rotation, follower to dwell for the rest of the cam rotation. The least radius of cam is 20mm and the cam rotates at 240rpm.

Determine (i) maximum velocity & maximum acceleration of the follower during out stroke.

(ii) maximum velocity & maximum acceleration of the follower during return stroke. **[14M]**

SECTION-V

9 A pinion having 24 teeth drives a gear having 60 teeth. The profile of the gears is involute with 20^0 pressure angle, 10mm module and 10mm addendum. Find the length of path of contact, arc of contact and the contact ratio **[14M]**

OR

10 An epicyclic gear train consists of a sun wheel (S), a stationary internal gear (E) and three identical planet wheels (P) carried on a star planet carrier (V). The size of different toothed wheels are such that the planet carrier C rotates at 1/5 of the speed of sun wheel. The minimum number of teeth on any wheel is 16. The driving torque on the sun wheel is 100Nm. Determine (i) Number of teeth on different wheels of train. (ii) Torque necessary to keep the internal gear stationary. **[14M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, November 2019
Machine Drawing
(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.

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Part- A (28 Marks)
Answer any two of the following (14*2=28)

1. Sketch the conventional representation of the following
    i) Metals ii) Springs iii) Bearings iv) Glass
2. Draw the two views of Oldham's coupling for shaft of 50 mm diameter
3. Sketch the three views of triple riveted zig-zag lap joint of 12 mm thick plates

Part-B (42 Marks)

4. Draw the following views as assembly of eccentric mechanism as shown in
    Fig.1.
    a) Sectional front view. b) Right side view
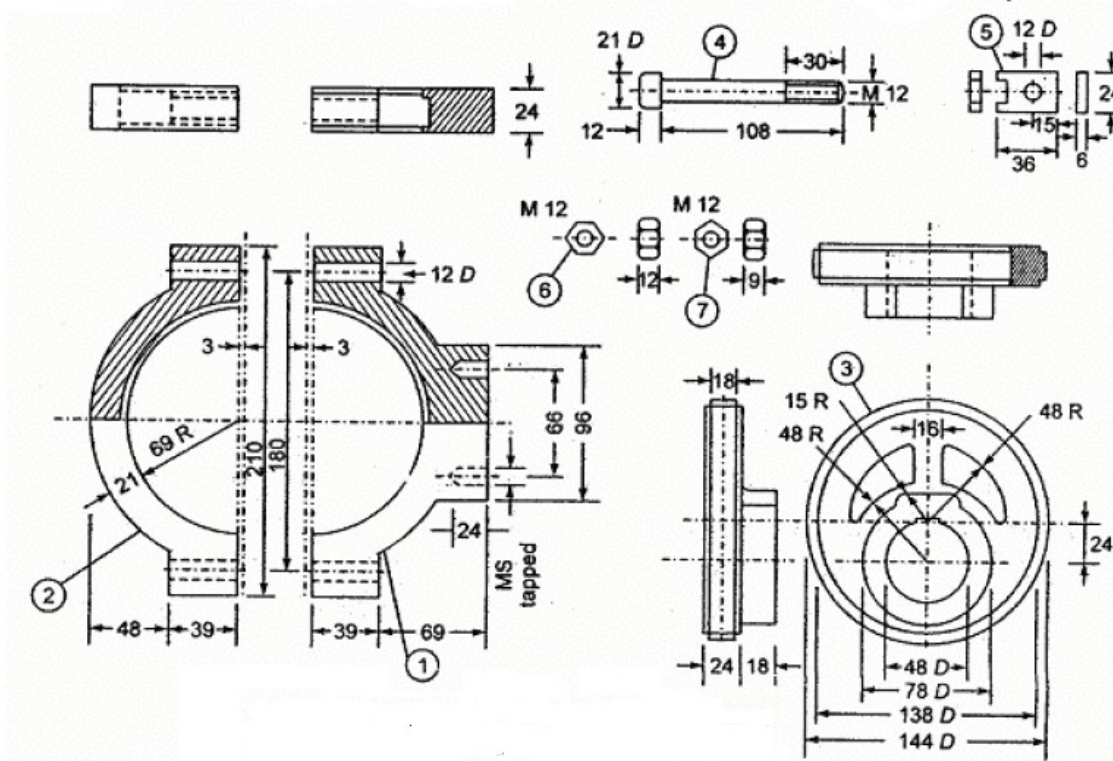
Part List

S.no.	Part name	Material	No. off
1.	Eccentric strap	C.I.	1
2.	Do	Do	1
3.	Sheave	C.I.	1
4.	Strap bolt	M.S.	2
5.	Packing strip	Brass	2
6.	Nut	M.S.	2
7.	Nut	M.S.	2

Fig. 1 *Eccentric (Details)*

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNO **R17**
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, November 2019
Material Science
(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) Find the atomic packing factor of simple cube, BCC and FCC crystals.   **[7M]**

b) Explain why a covalent bond is directional while ionic and metallic bonds are non-directional.   **[7M]**

OR

2   a) Discuss the different types of crystal structures in metals with appropriate examples   **[7M]**

b) Write the factors control the structure of ionic and covalent bond solids. Illustrate with examples.   **[7M]**

SECTION-II

3   a) Explain briefly about the various types of crystal imperfections, with the help of neat sketches.   **[7M]**

b) Determine the phase present, the composition of each of the phases, and the relative amounts of each phase for 1.0% C steel at 810^0C, 760^0C and 700^0C (Assume Equillibrium conditions).   **[7M]**

OR

4   a) What are Hume-Rothery's rules and explain them?   **[7M]**

b) What is Gibb's phase rule? Explain formation of eutectic type Phase diagram for binary alloys.   **[7M]**

SECTION-III

5   a) Discuss the purpose of adding the following alloying elements to steels.   **[7M]**
i. Nickle
ii. Chromium
iii. Manganese.

b) Explain various high resistivity alloys giving emphasis on composition and applications   **[7M]**

OR

6   Write about annealing, hardening and tempering. Explain in detail with the help of critical temperatures.   **[14M]**

SECTION-IV

7   Explain different types of advanced ceramic materials mentioning with their properties and applications   **[14M]**

OR

8   What are composites? How are they classified? Explain advantages, disadvantages and applications of composites over metals and alloys?   **[14M]**

9   a) How polymers are classified? Explain the mechanism of polymerisation   **[7M]**

     b) Explain various biomedical applications of polymers   **[7M]**

OR

10   a) What are various commercially important polymers? Explain any two of them in detail?   **[7M]**

     b) Write a not on the following: i) Elastomers   ii) Thermosets   **[7M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, November 2022
Strength of Materials
(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**   State Hooke's law. Explain the stress-strain diagram for a ductile material like mild steel.   **[7M]**

      B   The extension in a rectangular steel bar of length 800 mm and of thickness 20 mm to be 0.25 mm. The bar tapers uniformly in width from 80 mm to 40 mm. If E for the bar is 2×10^5 N/mm^2, determine the axial tensile load on the bar.   **[7M]**

OR

2   A steel bar is placed between two copper bars of same area and length at a temp of 15^{0}C. At this stage, they are rigidly connected together at both ends. When the temperature is raised to 315^0 C, the length of bars increases by 1.6 mm. Find the original length and stresses in bars. Take E_s = 200 GPa, E_c = 100 GPa, α_s = 0.000012 per ^{0}C, α_c = 0.000018 per ^{0}C.   **[14M]**

SECTION-II

3   A simply supported beam of span 10 m carry as UDL of 10 KN/m over a length of 3 m from left support and also from right support. Draw SF and BM diagram.   **[14M]**

OR

4   A cantilever beam of 2 m long is loaded with a uniformly distributed load of 3 kN/m run over a length of 1 m from the free end. It also carries a point load of 5 kN at a distance of 1.5 m from the free end. Draw the S.F and B.M diagram.   **[14M]**

SECTION-III

5   A rolled steel Joist of I-Section has flange length of 300 mm. wide and 20 mm thick with a web thickness of 20 mm. and overall depth of I-Section is 600 mm. If this beam carries a UDL of 40 KN/m over the simply supported beam of span 10 m, find the maximum stress produced in the beam.   **[14M]**

OR

6   Derive the equation $M/I = f/y = E/R$ Where M=B.M, I= Plane M.I, f = bending stress, y= distance of a layer from N.A, E= elastic modulus and R=radius of curvature.   **[14M]**
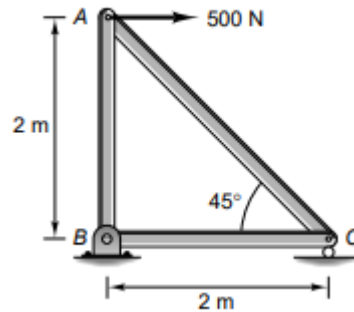
SECTION-IV

7   A beam simply supported over a span of 10 meters, carries point loads 40   **[14M]** kN, 20 kN and 60 kN at 2 m, 5 m and 9 m from the right-hand support. Determine the maximum deflection of the beam. Take E = 0.2 MN/mm² and I = 45200 cm⁴.

OR

8   Use the method of joints to calculate the force in each member of the truss   **[14M]** illustrated as well as the reaction forces at the pin B and roller C.

SECTION-V

9   Derive the expression for hoop and longitudinal stress in cylindrical shells.   **[14M]** What are the assumptions made in the analysing thin cylindrical shells?

OR

10   Determine the diameter of a solid shaft which will transmit 300 KW at 250   **[14M]** rpm. The max. shear stress should not exceed 30 N/mm² and twist should not be more than 1⁰ in a shaft length of 2.0 m. Take modulus of rigidity = 1×10⁵ N/mm².

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2

MALLA REDDY COLLEGE OF ENGINEERING & TECHNO **R17**
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, November 2022
Electrical and Electronics Engineering
(ME&AE)

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.

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SECTION-I

1 A Derive the equation for energy stored in the capacitor and Inductor   **[7M]**
   B Explain active and passive elements?   **[7M]**

OR

2 A Write the formulas for (i) Star – Delta (ii) Delta-star conversion   **[7M]**
      Solve for the value of I in the circuit segment shown in figure below
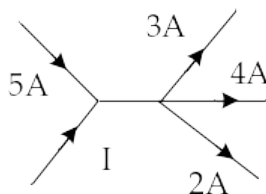
   B Explain the Permanent magnet moving coil and moving iron instruments.   **[7M]**

SECTION-II

3 A Explain the principle of operation for DC motor in detail.   **[7M]**
   B Sketch and explain the load characteristics of the following types of DC   **[7M]**
      Generators: i) Series Generator ii) compounded generator iii) Shunt
      Generator?

OR

4 A Explain the Speed control of DC shunt motor-Flux and armature voltage   **[7M]**
      control methods?
   B With the help of neat sketch, explain about Swinburne's test?   **[7M]**

SECTION-III

5 A Discuss the working principle of single phase Transformer and also explain **[10M]**
      the constructional details?
   B Why OC-test conduct on LV-side and SC-test conduct on HV-side?   **[4M]**

OR

6 A A single phase 50Hz transformer has 100 turns on the primary and 400 turns **[10M]**
      on the secondary winding. The net cross sectional area of core is 250cm^2. If
      the primary winding is connected to a 230V, 50Hz supply determine: i) The
      EMF induced in the secondary winding ii) The maximum value of flux
      density in the core.

	B	Explain the slip–torque characteristics of induction motor?	**[4M]**

SECTION-IV

7	*A*	Discuss the operation of half wave and full wave bridge rectifiers?	**[10M]**
	B	Define SCR? Explain SCR characteristics and Applications?	**[4M]**

OR

8	*A*	Explain the VI characteristics of PN Junction diode with neat diagrams.	**[4M]**
	B	Differentiate between NPN and PNP transistor construction and operation and discuss the input and output characteristics of the transistor in CE, CB and CC configurations	**[10M]**

SECTION-V

9	*A*	With the help of neat sketch Explain working principle of CRT?	**[10M]**
	B	Explain Deflection and Sensitivity of CRT?	**[4M]**

OR

10	*A*	Explain Voltage, Current and frequency measurements of CRO?	**[10M]**
	B	What are the applications of CRO?	**[4M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL **R17**

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, November 2022
Engineering 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.

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SECTION-I

1   **A**   Define thermodynamic equilibrium. What are the conditions necessary to establish thermodynamic equilibrium to a system?   **[7M]**

     B   A non-flow system undergoes a frictionless process according to a law p = (4.5/v) + 2, where p is in bar and the volume v is in m3/kg. During the process, the volume changes from 0.12 m^3/kg to 0.04 m^3/ kg and the temperature increases by 133°C. The change in internal energy of the fluid is given as du = C_v dT, where C_v = 0.71 kJ/kg K and dT is temperature change. Find out (a) heat transferred, and (b) change in enthalpy. Assume a fluid quantity of 10 kg.   **[7M]**

OR

2   **A**   With a neat sketch describe the constant-volume gas thermometer.   **[7M]**

     B   75 kg/min air enters the control volume of a steady-flow system at 2 bar and 100°C, at an elevation of 100 m above the datum. The same mass leaves the control volume at 150 m elevation from datum with pressure of 10 bar and at a temperature of 300°C. The entrance velocity is 40 m/s and exit velocity is 20 m/s. During the process 54,000 kJ/h of heat is transferred to control volume and rise in enthalpy is 8 kJ/kg. Calculate the power developed.   **[7M]**

SECTION-II

3   **A**   Prove that the Kelvin Plank and Clausius's statements of the second law of thermodynamics are equivalent to each other.   **[7M]**

     B   300 kg of fish at 5°C is to be frozen at –2°C. The specific heat of fish above freezing point is 4.182 kJ/kg.K and the latent heat of fusion is 234.5 kJ/ kg. Freezing point is –2°C. A refrigerator is used for this purpose which rejects heat in the ambient at 40°C. The COP of the refrigerator is 60% of the COP of a Carnot refrigerator operating between the same temperatures limits. How much power must be required to remove the heat in 10 hours?   **[7M]**

OR

4   **A**   Prove that dS =dQ / T for a reversible process and show that the entropy is a property of a system.   **[7M]**

     B   Considering u = f (T, v), prove that   **[7M]**

$$du = CvdT + \left[T\left(\frac{\partial p}{\partial T}\right)_v - p \right]dv$$

5 **A** Describe the phase-change process of water using a T–v diagram. **[7M]**

B Prove that for a constant pressure process, dq = dh. **[7M]**

OR

6 **A** Determine the critical pressure of oxygen using perfect gas equation and Van der Waal's equation. Take $V_c = 0.0745$ m^3/kg-mol, Tc = – 118.10°C. **[7M]**

B Explain the procedure of obtaining dryness fraction of steam by a throttling calorimeter. **[7M]**

SECTION-IV

7 **A** 10 kg of carbon monoxide at 40°C occupies 3 m^3. Determine the gas pressure in bar. An additional mass of carbon monoxide is then very slowly added to raise the tank pressure to 10 bar. Assuming that the gas temperature remains constant, how much extra mass has been added? Assume R = 0.297 kJ/kg.K. **[6M]**

B State the following terms **[2M]**
   i)   Avogadro's Laws of additive volumes, **[2M]**
   ii)   ii) Mole fraction **[2M]**
   iii)   iii) Volume fraction **[2M]**
   iv)   iv) Degree of saturation.

OR

8 **A** Draw a neat sketch of Basic air-conditioning processes represent and define the following. **[7M]**
   a) Sensible heating and cooling
   b) Humidification and dehumidification
   c) Humidification with heating/cooling
   d) Dehumidification with heating/cooling
   e) Mixing of two air streams.

B Moist air enters a duct at 10 °C, 80% relative humidity, and a volumetric flow rate of 150 m^3/min. The mixture is heated as it flows through the duct and leaves at 30°C. No moisture is added or removed and the mixture pressure remains approximately constant at 1 bar. For steady-state operation, determine (a) the rate of heat transfer, and (b) relative humidity at exit. Changes in kinetic and potential energy can be ignored and use a psychrometric chart for the solution. **[7M]**

SECTION-V

9 **A** Derive an expression for thermal efficiency of Diesel cycle. **[7M]**

B An air-standard Diesel cycle has a compression ratio of 14. The pressure at the beginning of the compression stroke is 1 bar and the temperature is 300 K. The maximum cycle temperature is 2500 K. Determine the cut-off ratio and thermal efficiency. **[7M]**

OR

10 **A** Explain the working of vapour compression refrigeration cycle with a neat diagram. **[7M]**

B A refrigerator used R-12 as a working fluid and it operates on an ideal vapour compression cycle. The temperature of refrigerant in the evaporator is – 20°C and in the condenser is 40°C. The refrigerant is circulated at the rate of 0.03 kg/s. Determine the coefficient of performance and capacity of refrigeration plant in the TR. **[7M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNO| **R17**

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, November 2022
Kinematics of Machinery
(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 Explain the various types of kinematic pairs with suitable examples. **[14M]**

OR

2 *A* 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. **[7M]**

 B In a Crank-and-Slotted lever Quick-Return motion mechanism, derive an expression for the ratio of the time of cutting stroke to the time of cutting stroke. **[7M]**

SECTION-II

3 What are the conditions for correct steering and explain with a sketch the working of Ackerman's steering gear. **[14M]**

OR

4 A Hooke's joint connects two shafts which are having 160^0 as the included angle. The driving shaft rotates uniformly at 1500 rpm. Find the maximum angular acceleration of the driven shaft, and the maximum torque required if the driven shaft carries a flywheel of mass 12 kg and 100 mm radius of gyration. **[14M]**

SECTION-III

5 If 'P' is a point on a link OR which is rotating about the fixed point 'O' with an angular velocity of ω, and P is sliding inwards towards 'O' on the link OR with a linear velocity v, derive the expression for Coriolis component of acceleration when (a) both ω and v are constant, b) both ω and v vary with time. **[14M]**

OR

6 In a pin-jointed four bar mechanics ABCD link AD is fixed and crank AB rotates at 12 rad/sec clockwise. AB = 60mm; BC = CD = 70 mm; DA = 120mm when the angle DAB = 60^0 and both B and C lie on the same side of AD, find a) angular velocities of BC and CD and b) angular accelerations. **[14M]**

SECTION-IV

7   **A**   Explain various types of follower motions used in cam mechanisms.   **[7M]**

       B   The follower of a tangent cam is operated through a roller of 50 mm diameter **[7M]** 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 25^0 from the full – lift position.

<div align="center">OR</div>

8   A cam rotating in clockwise direction at a uniform speed of 1000 rpm is **[14M]** required to give a roller follower the motion defined below:
a) Follower moves outwards through 50 mm during 120^0 of cam rotation.
b) Follower dwells for next 60^0 of cam rotation
c) Follower returns to its original position during next 90^0 of cam rotation
d) Follower dwells for rest of cam rotation
The minimum radius of the cam is 50 mm and the diameter of roller is 10 mm. The line of stroke of follower is off-set by 20 mm from the axis of the cam shaft. If the displacement of the follower is to take place with SHM on both the strokes, draw the profile of the cam. Also determine the maximum velocity and acceleration during the outwards and return strokes.

SECTION-V

9   The number of teeth on the gear and the pinion of two spur gears in mesh are **[14M]** 30 and 18 respectively. Both the gears have a module of 6 mm and a pressure angle of 20^0. 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.

<div align="center">OR</div>

10   Explain briefly the differences between simple, compound, reverted and **[14M]** epicyclic gear trains. What are the special advantages of epicyclic gear trains?

<div align="center">**********</div>

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL **R17**

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, October 2020

Strength of Materials

(ME)

| Roll No										

Time: 2 hours   **Max. Marks: 70**

Answer Any **Four** Questions

All Questions carries equal marks.

***

1   a) Derive the relationship between Modulus of Elasticity and Rigidity modulus?
b) A steel tube 120mm internal dia., 150mm external dia. is surrounded by a brass tube of inner dia. 151mm and outer dia . 170mm. Both are rigidly connected. The compound tube is subjected to an axial compressive load of 10KN.Find the stresses developed in each tube and the load carried by each tube. Take Es =200GPa and E_b=100GPa.

2   A uniform metal bar of 1.8m length and area of cross section 100mm^2 has an elastic limit of 160N/mm^2. Find its proof resilience, if E=200GPa. Find also the maximum load which can be suddenly applied without exceeding the elastic limit. Calculate the magnitude of the gradually applied load which will produce the same extension.

3   Sketch SFD and BMD for the cantilever beam shown
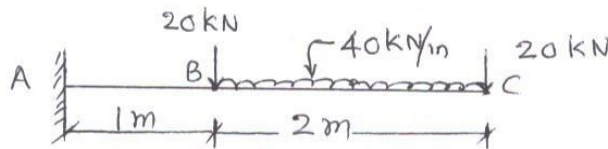
4   Draw SF and BM diagrams for the simply supported beam shown. Mark all the salient values and points.
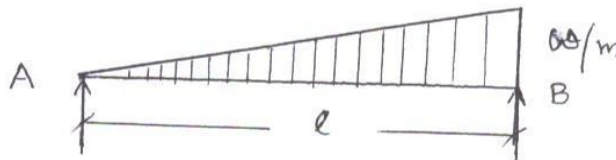
5   (a) Obtain the dimensions of the strongest rectangular section that can be cut from a circular log of wood of 250mm diameter.
(b) A beam of circular section of 150 mm diameter is subjected to a shear force of 20 kN. Calculate the value of maximum shear stress and also sketch the variation of shear stress along the depth of the beam.

6   (a) Find ratio of maximum shear stress to average shear stress for circular
(b) A simply supported beam having span 4 m is subjected to a UDL of 30 kN/m over whole span. The cross-section of beam is T section. The dimensions of flange are 120mmx10mm and that of web are 200mmx15mm. Draw shear stress

distribution across the depth of cross-section marking the values at salient points.

7 A simply supported beam of span 6m carries two point loads of 60KN and 50KN at 1m and 3m respectively from the left end. Find the position and magnitude of max. deflection. Take E= 200 GPa and I =8500 cm^4. Also determine the value of deflection at the same point if one more load of 60KN is placed over the left support.

8 Find the minimum wall thickness of a thin cylinder contains fluid at a pressure of 500 N/m^2, the internal diameter of the shell is 0.6 m and tensile stress in the material is to be limited to 9000 N/m^2.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL | **R17**
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, October 2020
Electrical and Electronics Engineering
(ME&AE)

Roll No										

Time: 2 hours   **Max. Marks: 70**
Answer Any **Four** Questions
All Questions carries equal marks.
***

1(a)   For the circuit shown below, find (i)the current I and (ii)the voltage across 30Ω
resister.
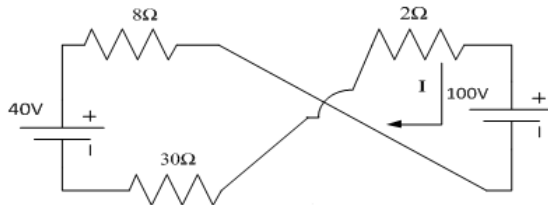
(b)   Describe the construction and working of an attraction type moving iron instrument with neat diagram

2(a)   Illustrate the construction and operation of a dc machine with a neat sketch.

(b)   A 500V shunt motor runs at its normal speed of 250rpm when the armature current is 200A. The resistance of armature is 0.12 Ω. Calculate the speed when a resistance is inserted in the field, reducing the shunt field to 80% of normal value, and the armature current is 100A.

3(a)   Explain the principle of operation and construction details of three phase induction motor.

(b)   Explain the speed-current, torque-current and speed-torque characteristics of dc shunt motor.

4   Explain the Principle and operation of single phase transformer.

5 (a)   Explain the procedure of conducting OC & SC test on single phase transformer. With neat diagrams.

(b)   A 600KVA 1-φ transformer has an efficiency of 92% both at full load and half load at unity p.f. Determine its efficiency at 60% of full load at 0.8 p.f. lagging.

6 (a)   Explain the principle of operation of full wave bridge rectifier and draw the waveforms.

(b)   Draw the symbol of diode and write the significance of symbol

7   Draw a neat sketch of CRO. And explain the principle of operation of CRT.

8(a)   Name different components of CRT and write the function of each component.

(b)   Explain the application of CRO in the field of electrical measurements.
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MALLA REDDY COLLEGE OF ENGINEERING & TECHNO | **R17**

(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, October 2020
Engineering Thermodynamics
(ME)

Roll No										

Time: 2 hours   **Max. Marks: 70**

Answer Any **Four** Questions
All Questions carries equal marks.
Note: Steam tables, Mollier charts and Sychometric charts are permitted.

1 **a)** Define a thermodynamic system. Differentiate between open system, closed system and an isolated system.
  b) Explain briefly Zeroth law of thermodynamics.

2 In the turbine of a gas turbine unit the gases flow through the turbine is 17 kg/s and the power developed by the turbine is 14000 kW. The enthalpies of the gases at inlet and outlet are 1200 kJ/kg and 360 kJ/kg respectively, and the velocities of the gases at inlet and outlet are 60 m/s and 150 m/s respectively. Calculate the rate at which the heat is rejected from the turbine. Find also the area of the inlet pipe given that the specific volume of the gases at inlet is 0.5 m^3/kg.

3 A heat engine operating between two reservoirs at 100 K and 300 K is used to drive heat pump which extracts heat from the reservoir at 300 K at a rate twice that at which engine rejects heat to it. If the efficiency of the engine is 40 % of the maximum possible and the co efficient of performance of heat pump is 50 % of the maximum possible, make calculations for the temperature of the reservoir to which the heat pump rejects heat. Also work out the rate of heat rejection from the heat pump if the rate of supply of heat to the engine is 50 kW.

4 a) Deduce the efficiency of Carnot cycle in terms of temperature from its p-V diagram.
  b) Bring out the concept of entropy and importance of T-s diagram.

5 Find the internal energy of one kg of steam at 14 bar under the following conditions :
  (i) When the steam is 0.85 dry ;
  (ii) When steam is dry and saturated ; and
  (iii) When the temperature of steam is 300°C. Take cps = 2.25 kJ/kg K.

6 a) Draw and explain a p-T (pressure-temperature) diagram for a pure substance.
  b) Does wet steam obey laws of perfect gases? Explain.

7 a) Explain the following terms :
  (i) Partial pressure (ii) Mole fraction
  (iii) Volume fraction of a gas constituent in a mixture.
  b) State and explain 'Dalton's law of partial pressure'.

8 An engine of 250 mm bore and 375 mm stroke works on Otto cycle. The clearance volume is 0.00263 m3. The initial pressure and temperature are 1 bar and 50°C. If the maximum pressure is limited to 25 bar, find the following :
  (i) The air standard efficiency of the cycle.
  (ii) The mean effective pressure for the cycle.
  Assume the ideal conditions.

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R17

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)

Roll No										

Time: 2 hours   **Max. Marks: 70**

Answer Any **Four** Questions
All Questions carries equal marks.
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1. (a) Define a kinematic pair. Explain the various types of kinematic pairs giving at least one distinguishing feature of each.
   (b) Define kinematic chain. How does it differ from a mechanism?

2. (a) Define 'Machine' and 'Mechanism'. How are these different from each other?
   (b) Explain completely, partially and incompletely constrained motion of a kinematic pair with examples.

3. a) What are limitations of Scott-Russell Mechanism?
   b) Under what conditions Scott-Russell mechanism traces out a straight line and an ellipse?

4. State the Robert's-chebyshev theorm, prove it by considering a four-bar mechanism.

5. a) Define Instantaneous centre and state the types of instantaneous centres.
   b) In a slider crank mechanism the crank OA=300mm and connecting rod AB=1200mm. The crank OA is turned 30^0 from inner dead centre. Locate all the instantaneous centres. If the crank rotate at 15 rad/sec clockwise. Find : i) Velocity of slider, B; ii) Angular velocity of connecting rod AB.

6. In a four bar chain ABCD, AD is fixed link 12cm long, crank AB is 3 cm long is rotate uniformly at 100 rpm clockwise while the link CD is 6 cm long and oscillates about D. Link BC=link AD. Find the angular velocity of link DC when the Angle BAD is 60 ^{0}

7. Draw the profile of a cam operating a knife edge follower having a lift of 30mm. The cam raises the follower with SHM for 150^0 of the rotation followed by a period of dwell for 60^0. The follower descends for the next 100^0 rotation of the cam with uniform velocity, again followed by a dwell period. The cam rotates at a uniform velocity of 120rpm and has a least radius of 20mm. What will be the maximum velocity and acceleration of the follower during the lift and the return.

8. a) State and prove Law of Gearing.
   b) A pair of spur gears has 16 teeth and 18 teeth, a module 12.5mm, an addendum 12.5mm and a pressure angle 14.5^0. Prove that the gears have interference. Determine the minimum number of teeth and velocity ratio to avoid interference.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, October 2020
Machine Drawing
(ME)

Roll No										

Time: 2 hours   **Max. Marks: 70**

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Part- A
Answer any one of the following
1. Draw any five thread profiles of thread of pitch 10 mm
2. Sketch the double riveted double strap butt joint of 12 mm thick plates

Part-B
3. Figure.1 gives the part drawings of Plummer block. Assemble all the parts and draw the following assembled views.

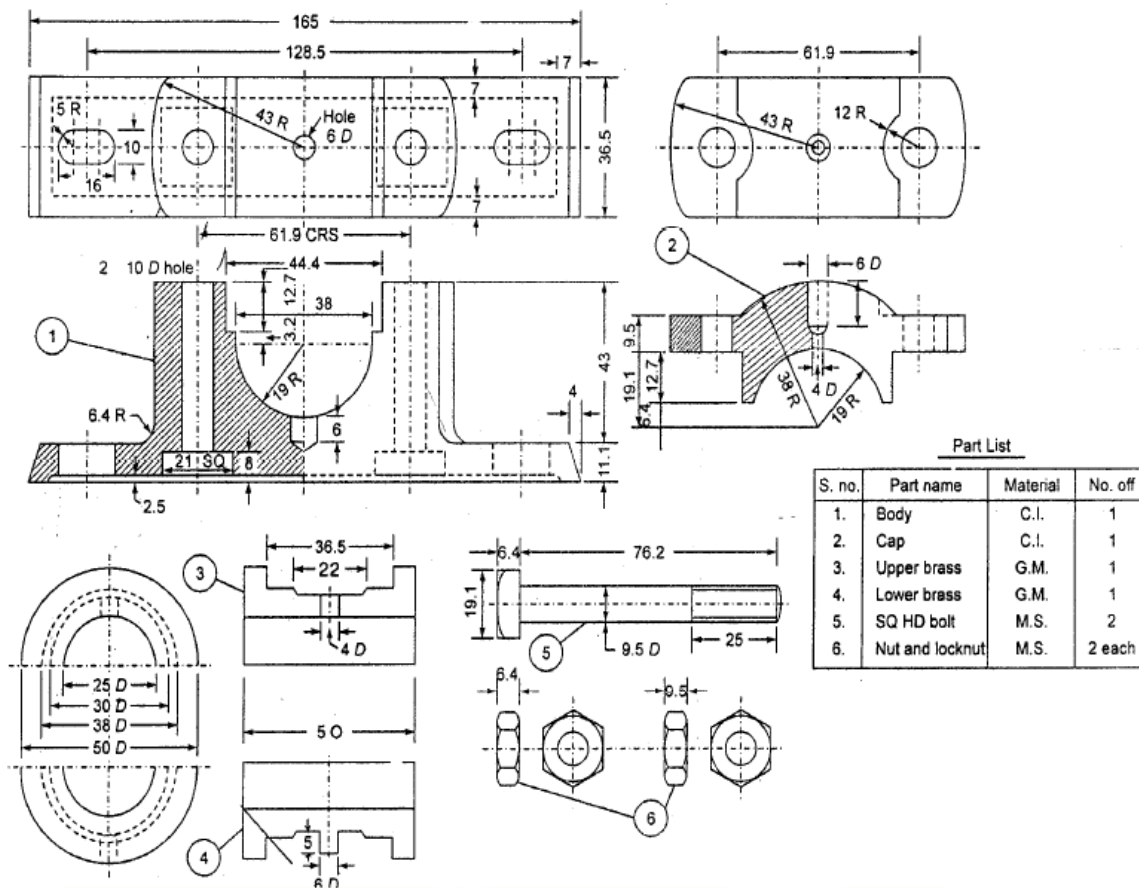a) Sectional front view   b) Top view.

Figure .1 Details of Plummer block

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNO $\boxed{\textbf{R17}}$

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, October 2020
Material Science
(ME)

Roll No										

Time: 2 hours   **Max. Marks: 70**

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

1 (a) Differentiate between a crystal, a dendrite, a grain and a grain boundary.
   (b) Copper is FCC and has an atomic diameter of 2.555°A. Calculate it's lattice parameter.
   (c) What are different types of Bonding formed in solids ?

2 (a) Draw a neat sketch of HCP crystal structure and calculate the theoretical c/a ratio for the above structure.
   (b) Define the term co-ordination number. What is the significance of co-ordination number? Calculate the Co-ordination number of three cubic space lattices.

3 (a) Zinc dissolves up to 38.4% in copper where as copper dissolves up to only 3%.Justify the statement with the necessary reasons.
   (b) Why is it difficult to distinguish between a pure metal and solid solution under microscope? Explain.
   (c) What are the possible phases in an alloy? Explain them.

4 a) What do you understand by the term equilibrium diagram? Explain with an example?
   b) Explain the various applications of phase diagrams.
   c) What is lever rule? Explain how it is useful.

5 (a) Explain different types of annealing treatments and their objects.
   (b) What is the minimum carbon content percentage required in steel, so that it may respond to hardening by heat treatment? Why?
   (c) Explain the theory of tempering. What are the effects of tempering on the mechanical properties of steels.

6 a) Explain the different kinds of carbon steels. Also give their applications
   b) Distinguish the annealing and normalizing heat treatment processes?

7 a) Discuss functional properties and applications of ceramic materials
   b) What are Cermets how they differ from ceramic materials? Give examples.
   c) Explain various applications of composites in electrical and mechanical components.

8 a) Explain different types of thermo plastic materials.
   b) What are various commercially important polymers? Explain any two of them detail?

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