

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019Subject: **Thermodynamics**Branch: **ME****Time: 3 hours****Max. Marks: 60****PART – A**Answer **ALL** questions of the following**5x2Marks=10 Marks**

1. Explain open and closed systems with relevant example.
2. Define heat sink and give suitable examples.
3. How much enthalpy change would occur in converting 1kg of water at 4°C to steam at 104°C ?
4. Give characteristic of heat and work.
5. Draw a model psychometric chart and indicate all parameters on it.

PART-BAnswer any **FIVE** Questions of the following**5x10 Marks= 50Marks**

1. a) Explain about Zeroth law of thermo dynamics with suitable examples.
b) Explain the causes of irreversibility in detail.
2. a) What do you understand by Ideal gas temperature scale?
b) Write short notes on Quasistatic process.
3. a) What is meant by “Thermal Reservoir?” Explain the terms Source and Sink?
b) The rate of heat transfer to a heat engine is 49 KJ/S and its net power output is 9.4 KW. Determine the thermal efficiency and the rate of heat rejection to the surroundings.
4. a) State the first law of thermodynamics and prove that for non-flow process it leads to $Q=W+\Delta U$
b) Write a short note on Enthalpy
5. a) Derive expressions for reversible work for adiabatic processes.
b) A piston-cylinder arrangement is containing a fluid at 10bar, the initial volume being 0.05m^3 . Find the work done by the fluid when it expands reversibly according to the law $p v^3 = \text{constant}$ to final volume of 0.06m^3 .
6. a) Derive Clausius – Clapeyron equation.
b) A 3 MPa steam received from a boiler is charged to a throttling calorimeter where its pressure and temperature are found to be 1 bar and 1460°C , respectively. Determine the quality of the boiler steam.
7. Derive an expression for Air standard Efficiency of Diesel cycle. Discuss about the sequence of Operations.
8. a) Write short notes on Ton of refrigeration
b) Write a short note on Adiabatic saturation

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Time: 3 hours

Max. Marks: 60

PART – AAnswer **ALL** questions of the following**5x2Marks=10 Marks**

1. Define Factor of Safety, Working Stress
2. Sketch shear force diagram for a simply supported beam subjected to central point load.
3. Assumptions in the theory of simple bending.
4. When Macaulay's method is preferred.
5. Define hoop stress of a thin cylinder.

PART-BAnswer any **FIVE** Questions of the following**5x10 Marks= 50Marks**

1. a) Derive the equation for strain energy of a non prismatic bar and varying axial loads.
b) Strain energy and modulus of resilience.
2. a) Define Neutral axis of beam. (2M)
b) A steel tube of 50mm in external diameter 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°C. Find the stress in each metal when heated to 170°C. Also find the increase in length, if the original length of the assembly is 350mm. Coefficients of expansion for steel and copper are 1.08×10^{-5} per °C and 1.7×10^{-5} per °C respectively. Take E for steel and copper as 2×10^5 N/mm² and 1×10^5 N/mm² respectively. (8M)
3. A simply supported beam of length 5m, carries a uniformly distributed load of 100N/m extending from the left end point 2m away. There is also a clockwise couple of 1500Nm applied at the centre of the beam. Draw the S.F and B.M diagrams for the beam and find the maximum bending moment.
4. a) Explain statistically determinate and indeterminate beams
b) Draw the Shear Force and Bending Moment diagrams for a simply supported beam of length L carrying a point load W at its middle point.
5. a) A steel plate of width 120mm and of thickness 20mm is bent into a Circular arc of radius 10m. Determine the maximum stress induced and the bending moment which will produce the maximum stress. Take $E = 2 \times 10^5$ N/mm²
b) A circular beam of 100mm diameter is subjected to a shear force of 5kN. Calculate:
(i) Average shear stress ii) Maximum shear stress iii) Shear stress at a distance of 40mm from N.A.
6. a) What are the design criteria according to the bending and relation between the bending moment and section modulus?
b) A solid steel shaft has to transmit 75 kW at 200 r.p.m. Taking allowable shear stress as 70 N/mm², find suitable diameter for the shaft, if the maximum torque transmitted at each revolution exceeds the mean by 30%.
7. a) Calculate the maximum deflection of a simply supported beam of span 6m carries a point load of 9kN at a distance of 2m from the left support. The beam has circular cross section of diameter 250mm. Take Young's modulus as 200GPa.
b) Derive torsion equation
8. a) A cylindrical thin drum 800mm in diameter and 3m long has a shell thickness of 10mm. If the drum is subjected to an internal pressure of 2.5 N/mm², then determine.
i) Change in diameter ii) change in length iii) change in volume. Take $E = 200$ GPa.
b) Derive and equation for shear stress distribution of beam.

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019Subject: **Metallurgy and Material Science**Branch: **ME****Time: 3 hours****Max. Marks: 60****PART – A**Answer **ALL** questions of the following**5x2Marks=10 Marks**

1. Define co-ordination number.
2. Explain Gibbs phase rule.
3. What is Tie line rule?
4. Mention the types of heat treatment processes.
5. Give the Applications of Nano material.

PART-BAnswer any **FIVE** Questions of the following**5x10 Marks= 50Marks**

1. a) State fourteen Bravais lattices with suitable sketches.
b) Define solid solutions and explain the types of Solid Solutions.
2. a) Define Atomic Packing Factor (APF). Determine APF of BCC unit cell.
b) Briefly explain about Intermetallic, Interstitial and Electron Compounds.
3. a) Write short notes on eutectoids and peritectoids.
b) Explain the effect of alloying elements on Fe-Fe₃C phase diagram.
4. a) Derive the lever-rule as applied to equilibrium diagram.
b) Draw and explain Isomorphous Phase diagram.
5. a) Explain chemical composition, properties and applications of tool and die steels.
b) Discuss the classification of steels.
6. a) Define cast iron. Discuss in detail about various types of cast irons.
b) What are the various effects of alloying elements on steels?
7. a) Explain Carburising and Nitriding sketches.
b) Write about the properties and uses of bronzes and brasses.
8. Explain about i) Metal Ceramic Matrix Composites, ii) Metal Matrix Composites & iii) Carbon – Carbon composites and their applications

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019Subject: Kinematics of Machines

Branch: ME

Time: 3 hours

Max. Marks: 60

PART – A

Answer ALL questions of the following

5x2Marks=10 Marks

1. In what way a mechanism differ from a machine?
2. Explain Hooke's joint or Universal joint?
3. Calculate the number of instantaneous centers for single slider crank chain and list them with book keeping table.
4. What are the different motions of the followers?
5. Define the terms Module, Pressure angle and addendum?

PART-B

Answer any FIVE Questions of the following

5x10 Marks= 50Marks

1. a) Distinguish among complete, incomplete and successful constraint relative motion between two elements or links.
b) The length of the fixed link of a crank and slotted lever mechanism is 275 mm and that of the crank 110 mm. Determine, (i) the inclination of the slotted lever with the vertical in the extreme position. (ii) the ratio of the time of cutting stroke to the time of return stroke and (iii) the length of the stroke, if the length of the slotted lever is 495 mm and the line of stroke passes through the extreme positions of the free end of the lever.
2. a) Sketch and explain the various inversions of double slider crank chain.
b) Types of joints.
3. What is the condition for correct steering? Sketch and explain the two main types of steering gears and their relative advantages.
4. a) Distinguish between exact and approximate straight line motion mechanisms.
b) Explain Peaucellier straight line mechanism with a neat sketch
5. a) Derive the expression to determine the magnitude of the coriolis component of acceleration
b) Explain the procedure to determine the velocity and acceleration of a four-bar mechanism Klein's construction.
6. In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40mm long and rotates at 120 rpm clockwise, while the link CD = 80 mm oscillates about D. BC and AD are equal length. Find the angular velocity of link CD when angle BAD = 60° .
7. a) Define cam and the follower; also clarify the follower according to the motion.
b) Type of followers
8. a) Carry out the motion analysis for a sun and planet gear when the sun wheel is fixed using tabular method
b) A Pinion having 30teeth drives a gear having 80teeth. The profile of the gears is involute with 20 pressure angle, 12mm module and 10mm addendum, find the length of path of contact, are of contact and the contact ratio.

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1. If $f(x) = x$ in $(-\pi, \pi)$ then find the value of a_2
2. State the Convolution theorem for Z transforms.
3. Evaluate $\int_0^\infty \int_x^\infty \frac{e^{-x}}{x} dy dx$.
4. Explain the geometrical significance of Rolle's Theorem.
5. Define Divergence.

PART-BAnswer any **FIVE** Questions of the following**5x10 Marks= 50Marks**

1. Find the Fourier transform of $f(x) = \begin{cases} 1-x^2, & |x| \leq 1 \\ 0, & |x| > 1 \end{cases}$. Hence evaluate $\int_0^\infty \frac{x \cos x - \sin x}{x^3} \cos \frac{x}{2} dx$ [10M]
2. a) Find the Fourier sine transform of $\frac{e^{-ax}}{x}$.
b) Find the Fourier cosine series for $f(x) = (x-1)^2$ in the interval $0 < x < 1$.
3. a) Solve $x(y-z)p + y(z-x)q = z(x-y)$
b) Solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$
4. a) Solve the partial differential equation: $q^2 = z^2 p^2 (1 - p^2)$.
b) Form the partial differential equation from: $f(x^2 + y^2, z - xy) = 0$.
5. Calculate $\iint r^3 dr d\theta$ over the area included between the circles $r=2 \sin \theta$ and $r=4 \sin \theta$
6. a) Show that the area between the parabolas $y^2=4ax$ and $x^2=4ay$ is $\frac{16}{3} a^2$
b) Evaluate $\int_0^4 \int_0^{x^2} x^2 y^2 dx dy$
7. Find the dimensions of the rectangular box, open at the top, of maximum capacity whose surface area is 432 sq.cm.
8. Verify Green's theorem for $\int_C [(xy + y^2)dx + x^2 dy]$, where 'C' is bounded by $y=x$ and $y=x^2$

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019Subject: Machine DrawingBranch: **Common to ME & MINING****Time: 3 hours****Max. Marks: 60****PART – A**

Answer any TWO Questions

2 x 10 Marks = 20 Marks

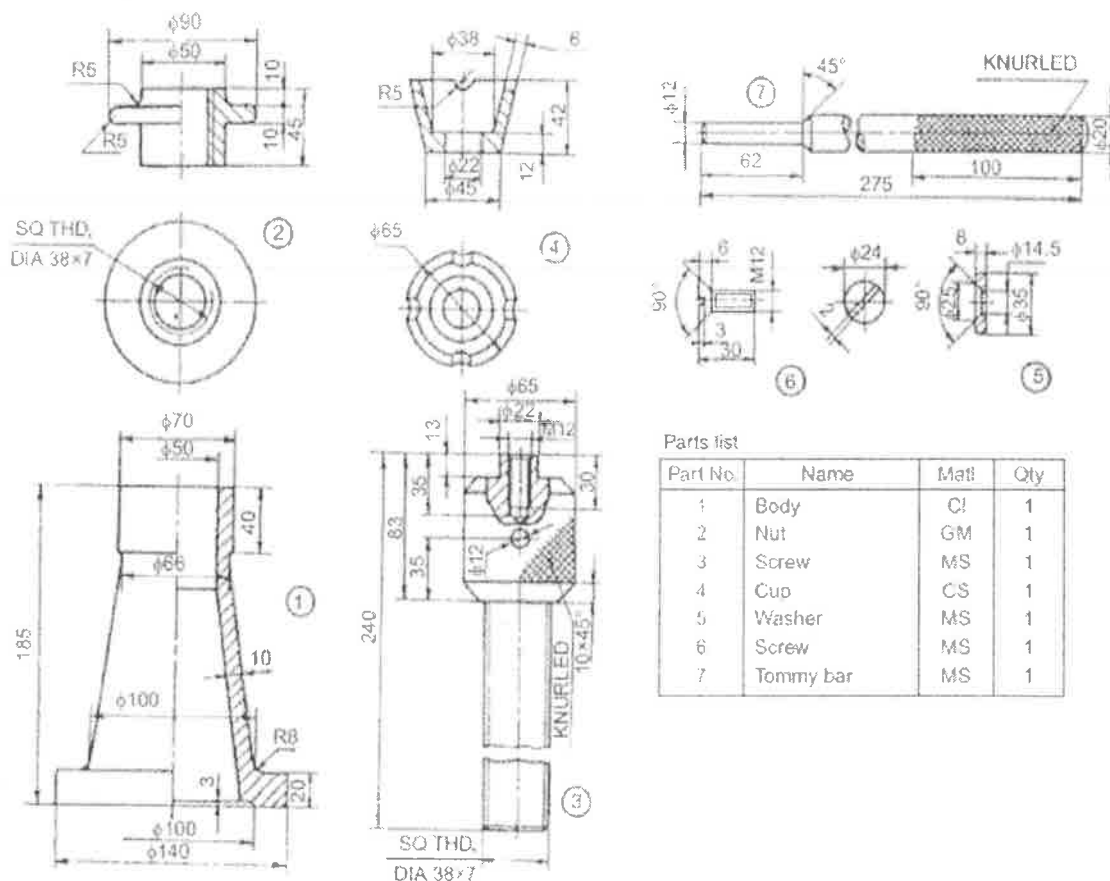
- Sketch a flanged coupling showing the sectional front view and side view to connect two rods of 25 mm diameter.
- Sketch the schematic representation of threaded parts.
 - V – threads
 - Square threads.
- Draw the double riveted double strap Zig-Zag Butt joint to join 12mm plates.

PART – B

Answer the following Question

1x40 Marks=40Marks

- Assemble all parts of the screw jack, shown in Fig. and draw the following views:
 - Half sectional view from the front and 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

SCREW JACK

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019Subject: Human Values and Professional EthicsBranch: **Common to CE, ME & MINING****Time: 3 hours****Max. Marks: 60****PART – A**Answer **ALL** questions of the following**5x2Marks=10 Marks**

1. What is empathy?
2. Define Empathy and Self- Confidence.
3. Explain the importance of commitment.
4. How do you differentiate Right and Wrong?
5. How to maintain relationship with family?

PART-BAnswer any **FIVE** Questions of the following**5x10 Marks= 50Marks**

1. a) Discuss the stages of Lawrence Kohlberg's theory of moral development.
b) What is moral inquiry? Discuss the various types of moral inquiry.
2. a) What is engineering ethics? Explain the different core values.
b) Define character. What role does the character play in the conduct of an individual?
3. a) "Honesty is the best policy". Comment and explain how it is favorable to an engineering student to make the career.
b) What is Work Ethic? Explain its significance in the engineering field.
4. a) "Choosing a goal and sticking to it-changes everything". Comment
b) Differentiate between Honesty and Courage.
5. a) Define a Goal and discuss the purpose of goal setting.
b) Write short notes on types of goals and smarter goals.
6. Write short notes on: a) Valuing Time b) Customs and religion
7. a) Write a note on human-human relationships.
b) Write a note on humanistic education in detail.
8. a) What are the foundational values of relationships? How can they be used to ensure strong and mutually relationships?
b) What are the values in interaction of human beings with the material things? Give one example of each.