Code No.: 5099/N/BL/AICTE

FACULTY OF ENGINEERING

B.E. (Mech./Prod.) IV Semester (AICTE) (Main & Backlog) (New) Examination, July/August- 2025

Subject: Manufacturing Processes

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

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. a) Enlist the pattern materials used in casting.
   b) What is meant by "directional solidification"?
   c) What do you understand by blending in powder metallurgy?
   d) Briefly discuss on polarity used in arc welding.
   e) Briefly discuss on deep drawing process.
   f) Compare soldering and brazing process.
   g) What is the electrode material used in resistance welding and why?

2. a) Define gating system. List out the elements of gating system.
   b) Explain the significance of riser in casting.

3. a) Classify the welding processes.
   b) Distinguish between TIG and MIG welding processes.

4. a) Explain friction stir welding processes with a neat sketch and mention the applications.
   b) Explain seam welding process and mention the applications.

5. a) Explain the lost wax process with a neat sketch.
   b) Explain blow moulding process and mention its advantages.

6. a) Distinguish between hot working and cold working processes.
   b) Distinguish between drawing and deep drawing processes.

7. a) What are the advantages of high rate energy forming processes over conventional processes?
   b) Explain the importance of sprue and why it should be taper?

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Code No: G-5095/N/BL/AICTE

FACULTY OF ENGINEERING

B.E. (Mech.) IV- Semester (AICTE) (Main & Backlog) (New) Examination, July/August 2025

Subject: Fluid Mechanics

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

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. a) Define specific gravity, viscosity, compressibility
   b) Distinguish between stream line and streak line.
   c) Write Bernoullis' equations, and its applications.
   d) Give the list of discharge measuring devices
   e) Define Reynold's number and its significance
   f) Explain lift and drag forces
   g) Define Mach Number and Mach angle

2. a) Define steady, unsteady, uniform and non-uniform flow.
   b) The dynamic viscosity of oil used for lubrication between a shaft and sleeve is 6 poise. The shaft dia. is 0.4m and rotates at 190 rpm. Calculate the power lost in the bearing for a sleeve length of 90mm. The thickness foil film is 1.5mm

3. a) Derive an expression for Bernoulli's equation
   b) A pipe through which water is flowing is having diameters 20cms and 10cms at cross-sections 1 and 2 respectively. The velocity of water at section 1 is 4 m/sec. Find the velocity head at section 1 and 2 and also rate of discharge?

4. a) Explain with a neat sketch of Bourdon's pressure gauge
   b) A pitot - static tube is used to measure the velocity of water in a pipe. The stagnation pressure head is 6mm and static pressure head is 5m. Calculate the velocity of flow assuming the co-efficient of velocity of tube equal to 0.98.

5. a) Explain the phenomenon of boundary layer separation. And methods to avoid separation.
   b) Find head lost due to friction in a pipe of diameter 300mm and length 50m, through which water is flowing at a velocity of 3m/s. Using Darcy's equation. Take kinematic viscosity for water=0.01 stoke.

6. a) Differentiate between the static and stagnation temperatures.
   b) Calculate the Mach number at a point on a jet propelled aircraft, which is flying at 1100Km/hour at a sea- level where air temperature is 20^0C.
   Take γ=1.4and R=287J/Kg K.

7. a) Write about Pitot tube
   b) Write about Moody's chart.

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Code No: G-5098/N/BL/AICTE

FACULTY OF ENGINEERING

B.E. (Mech./Prod/A.E) IV - Semester (AICTE) (Main & Backlog) (New) Examination, July/August 2025

Subject: Kinematics of Machinery

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

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. a) Name any two inversions of single slider crank chain.
   b) State law of gearing.
   c) Give the Classification of Gear Trains
   d) What is mean by interference of gear? How can it be avoided?
   e) Define pressure angle and Lift (or) Stroke with respect to cams.
   f) Define slip and Creep in a belt drive.
   g) Distinguish between breaks and dynamometers.

2. a) Define Kennedy's theorem.
   b) The crank of slider crank mechanism rotates clockwise at a constant speed of 300 rpm. The crank is 150 mm and the connecting rod is 600 mm long. **Determine:**
   (i) Linear velocity and acceleration at the midpoint of the connecting rod.
   (ii) Angular velocity and angular acceleration of the connecting rod, at a crank angle of 45^0 from inner dead centre position.

3. A flat belt, 8 mm thick and 100 mm wide transmits power between two pulleys, running at 1600 m/min. The mass of the belt is 0.9 kg/m length. The angle of lap in the smaller pulley is 165° and the coefficient of friction between the belt and pulley is 0.3. if the maximum permissible stress in the belt is 2 MN/m^2,Find:
   (i) Maximum power transmitted; and
   (ii) Initial tension in the belt.

4. 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 data:
   (i) Follower to move outward through 30 mm with Simple Harmonic motion during 120° of cam rotation,
   (ii) Follower to dwell for the next 60°,
   (iii) Follower to return to its original position with uniform velocity during 90° of cam rotation.
   (iv) Follower to dwell for the rest of the cam rotation.
   The least radius of cam is 20 mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 r.p.m.

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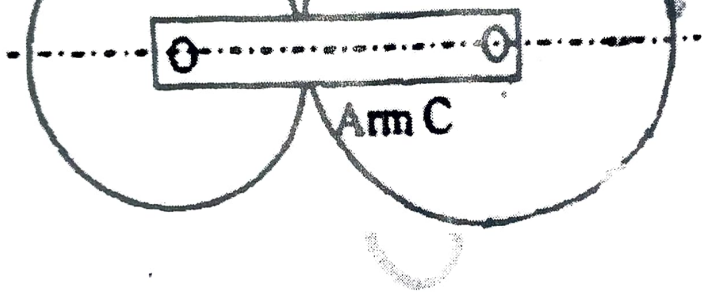
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Code No: G-5097/N/BL/AICTE

FACULTY OF ENGINEERING

B.E. (Mech.) IV - Semester (AICTE) (Main & Backlog) (New) Examination, July/August 2025

Subject: Applied Thermodynamics

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

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. a) Define 'Inter cooling' and 'after cooling' as referred to a reciprocating air compressor?
   b) Define fuel pump in a CI engine?
   c) Differentiate between wet sump and dry sump lubrication?
   d) List any three water tube boilers. Why are boilers used?
   e) Sketch and explain convergent-divergent nozzles.
   f) Explain and write an expression for a nozzle efficiency in a steam nozzle?
   g) What are surface condensers? Explain.

2. A single stage single acting air compressor delivers 0.6 kg of air per minute at 6 bar. The temperature and pressure at the end of suction stroke are 30 °C and 1 bar. The bore and stroke of the compressor are 100 mm and 150 mm. The clearance is 3% of the swept volume. Assuming the index of compression and expansion to be 1.3 find (i) volumetric efficiency (ii) Power required if the mechanical efficiency is 85% and (iii) speed of the compressor in rpm.

3. a) Mention different types of cooling systems typically used for IC engines. Explain any one of them clearly.
   b) Discuss the merits and demerits of battery ignition system over magneto ignition system?

4. a) Explain the phenomenon of the stages of combustion in CI engines.
   b) Mention the circumstances under which combustion process in a CI engine turns "uncontrolled". Define "cetane number" and give its significance?

5. Briefly explain "Mountings" and "accessories" as referred to steam boilers. Mention the functions of at least two under each category.

6. a) Explain the phenomenon of flow of steam through convergent divergent Nozzle?
   b) Air enters a frictionless adiabatic converging nozzle at 10 bar, 500 K with negligible velocity. The nozzle discharges to a region at 2 bar. If the exit area of the nozzle is 2.5 cm^2, find the flow rate of air through the nozzle. Assume for air Cp = 1005 kJ/kgK and Cv=718 J/kgK.

7. a) With a neat labelled diagram, explain the working of any one 'super critical boilers'?
   b) What is the usefulness of drawing up a "Heat balance sheet" of an I.C. engine?

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FACULTY OF ENGINEERING

B.E.(Mech./Prod./A.E) IV Semester (AICTE) (Main & Backlog) (New) Examination, July/August 2025

Subject: Mechanics of Materials

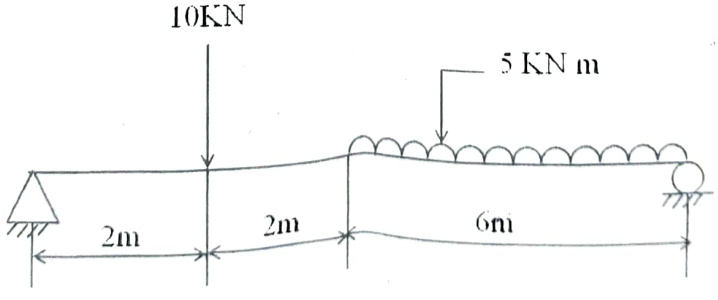
Time: 3 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. a) State and explain Hooke's law of elasticity.
   b) What do you mean by a beam?
   c) Write the formula for longitudinal and circumferential stresses in case of thin cylinder.
   d) State the assumptions made in deriving flexural formula of beams.
   e) Draw the shear stress distribution of rectangular cross-sectioned beam.
   f) Define polar moment of inertia.
   g) Write the limitations of strain energy method.

2. a) A bar of inner and outer diameter of 25 mm and 50 mm respectively is subjected to a suddenly applied load of 60KN. Determine the stress induced in the bar.
   b) A steel rod of 30 mm diameter passes centrally through a copper tube of 48 mm external diameter and 36 mm internal diameter and 2.5 m long. The tube is closed at each end by 12 mm thick steel plates, which are secured by nuts. The nuts are tightened until the copper tube is reduced in length by 0.555 mm. The whole assembly is then raised in temperature by 50°C. Determine the stresses in copper tube and steel rod assuming the thickness of the plates unchanged. Take $E_s = 2 \times 10^5$ N/mm^2, $E_c = 1.04 \times 10^5$ N/mm^2, $\alpha_s = 1.2 \times 10^{-6}$ / °C, $\alpha_c = 1.8 \times 10^{-6}$ / °C.

3. a) A thin cylindrical vessel 2.5 m long and 400 mm in diameter with 10 mm thickness is subjected to an internal pressure of 4 MPa. Calculate the changes in dimension as well as volume of the vessel, if E= 200 GPa and Poisson's ratio 0.3 for the vessel material.
   b) Draw SFD and BMD for the following beam as shown in the figure.



4. a) Calculate the maximum bending stress in a beam of rectangular cross-section subjected to maximum bending moment of 2KN-m. The width and depth of the beam are 20 mm and 40 mm respectively.
   b) Calculate the maximum shear stress induced in the beam of width 25 mm and depth 50 mm subjected to shear force of 60kN. Draw the shear stress distribution across its section.

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7. a) Draw Mohr's circle for given state of stress. Indicate the values of maximum and minimum principal stress and maximum stress. Also find the values of principal plane angles. σ_x=+20MPa; σ_y=+30MPa and τ_{xy}=+35MPa.

   b) State and Explain Moment area method.

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Code No: G-5084/N/BL/AICTE

FACULTY OF ENGINEERING

B.E. (EEE/EIE/M/P/AE) IV - Semester (AICTE) (Main & Backlog) (New) Examination, July/August 2025

Subject: Energy Sciences &Engineering

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

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. a) Define renewable energy sources with one example.
   b) State any two demerits of conventional energy sources.
   c) Name any two parts of a nuclear reactor core
   d) What is a Solar Photovoltaic Cell?
   e) Define co-generation
   f) What is a spillway in a hydroelectric power plant?
   g) Define power plant economics.

2. a) Compare conventional and renewable energy sources in terms of availability, cost, environmental impact, and sustainability.
   b) Explain the share of different conventional and renewable energy sources and explain their future prospects.

3. a) Describe the basic layout and working of a gas turbine power plant.
   b) Explain the working of a steam turbine power plant with a neat sketch.

4. a) Describe the different types of wind turbines and explain their working in detail.
   b) Explain the working of an ocean thermal energy conversion (OTEC) power plant

5. a) Explain various methods used to store thermal and electrical energy with suitable examples.
   b) Outline the concept of tri-generation — definition, applications, advantages, and energy-saving potential.

6. a) Describe different types of pollutants generated by power plants and the pollution standards applicable.
   b) Explain energy efficiency rating and BEE standards. Also, highlight the future energy needs and challenges.

7. a) List the various methods used to dispose of radioactive waste safely.
   b) Explain the classification of waste heat recovery systems and describe any two commercially viable waste heat recovery devices.

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Time: 3 Hours Max. Marks: 70

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may be suitably assumed.

1. a) What do you mean by ripple and hence define ripple factor.
   b) Define α and β of a transistor and write the relation between them.
   c) What are the advantages of negative feedback?
   d) Define an EX-OR Gate. Write its truth table and draw its circuit symbol.
   e) Name the different types of analog to Digital Converters (ADC).
   f) Draw the h-parameter model of CB Transistor configuration.
   g) Why FET is called voltage controlled device?

2. a) Explain the working of a pn junction diode in forward and reverse biased conditions
   b) Derive the expression for ripple factor and efficiency of a half wave rectifier.

3. a) Explain the input and output characteristics of a Common Emitter (CE) Configuration.
   b) Explain the construction of N-Channel and P-Channel JFET.

4. a) In a negative feedback amplifier, obtain the relation between gain with feedback and without feedback.
   b) Describe the working of RC Phase Shift Oscillator and write the expression for its frequency of oscillation.

5. a) Show that OP- AMP acts as an integrator and differentiator. Derive the necessary relations.
   b) What is half adder? Write its truth table and realize it using minimum number of NAND Gates.

6. a) With neat sketch, explain the working of Linear Variable Differential Transformer (LVDT).
   b) Explain the working of successive approximation type ADC.

7. a) Draw the neat diagram of Cathode Ray Oscilloscope (CRO) and explain the different blocks.
   b) What are universal gates? Realize basic logic gates using only NAND gates.

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FACULTY OF ENGINEERING

B.E. (Civil/M/P/AE) III - Semester (AICTE) (Main & Backlog) (New) Examination, February/ March 2025

Subject: Mathematics – III

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

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. (a) Solve $pq = k$, where k is a constant.
   (b) Classify the partial differential equation
   $$2\frac{\partial^2 u}{\partial x^2} + 4\frac{\partial^2 u}{\partial x \partial y} + 3\frac{\partial^2 u}{\partial y^2} = 10.$$
   (c) Explain briefly skewness of a distribution.
   (d) Test whether $x = 2y + 3$ and $2y = x + 12$ represent valid regression lines.
   (e) Write any two uses of Chi-square test.
   (f) Find a partial differential equation by eliminating the arbitrary constants a and b from $z = a(x + y) + b$.
   (g) If the variance of a Poisson variate is 3, then find $P(X = 1)$.

2. (a) Find the general solution of $xzp + yzq = xy$.
   (b) Find a partial differential equation by eliminating a, b, c from $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.

3. Solve the wave equation $\frac{\partial^2 u}{\partial t^2} = 16\frac{\partial^2 u}{\partial x^2}$ under the conditions $u = 0$ when $x = 0$ and $= \pi$, $\frac{\partial u}{\partial t} = 0$ when $t = 0$ and $(x, 0) = x,\ 0 < x < \pi$.

4. (a) If X is a normal variate with mean 1 and standard deviation 3, then find $P(-1.43 \leq X \leq 6.19)$.
   (b) The first three moments of a distribution about the value 2 are 1, 16, -40. Find the mean and variance of the distribution.

5. Intelligence test of two groups of boys and girls gave the following results.

   Girls: 84; Standard deviation $s_1 = 10, \overline{x_1} = 121$
   Boys: 81; Standard deviation $s_2 = 12, \overline{x_2} = 81$

   Is the difference between the means significant? Test at 5% level of significance.

6. Time taken by the workers in performing a job by method 1 and method 2 is given below.

Method 1:	20	16	26	27	23	22	–
Method 2:	27	33	42	35	32	34	38

   Do the data show that the variances of time distribution from population from which these samples are drawn do not differ significantly? Test at 5% level.

7. (a) Find the mean and variance of uniform distribution.
   (b) Find the rank correlation coefficient for the following data.

x	68	64	75	50	62	78	72	44	50	68
y	64	59	68	44	70	50	64	42	40	70

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Subject: Finance & Accounting

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

Note: (i) **First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.**

(ii) **Answer to each question must be written at one place only and in the same order as they occur in the question paper.**

(iii) **Missing data, if any, may be suitably assumed.**

1. a) Define accounting.
   b) What is a Journal?
   c) What do you mean by money market?
   d) Differentiate between investors and issuers.
   e) What happens to a present value as you increase the discount rate?
   f) How interest rate can be determined?
   g) Define Liquidity ratios.

2. Record the following transactions in the journal of Chennai Furniture Mart and Post them to the ledger.
   a) Kailash started the business by investing cash of Rs. 25,000. He bought goods of Rs.2,000 and furniture of Rs.250
   b) Purchased building for cash Rs.5,000
   c) Purchased goods for cash Rs.1,300
   d) Paid carriage inward Rs. 20
   e) Sold goods for cash Rs.1,375
   f) Sold goods for cash to Shanker Rs. 120
   g) Sold goods to Shambhu on credit Rs.2,315
   h) Purchased goods on credit Rs. 1,200 from XYZ
   i) Paid freight Rs. 60
   j) Deposited cash into bank Rs.4,800
   k) Paid salary Rs. 230
   l) Withdraw from the bank for personal use Rs. 160
   m) Withdraw from the bank for office use Rs. 210
   n) Charged interest on capital Rs. 62

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3. The trial balance of A limited revealed the following balances on 31st March 2009. Prepare Trading Account, Profit & Loss Account and Balance Sheet for the year ending 31st March 2009. The value of stock on 31st March 2009 was valued at Rs. 3,50,000

Debit Balances	Amount (Rs.)	Credit Balances	Amount (Rs.)
Plant & Machinery	8,00,000	Capital Account	10,00,000
Purchases	6,80,000	Sales	12,70,000
Sales Return	10,000	Purchase Return	12,750
Opening Stock	3,00,000	Discount Received	8,000
Discount Allowed	3,500	Creditors	2,50,000
BankCharges	750		
Debtors	4,50,000		
Salaries	68,000		
Wages	1,00,000		
CarriageInward	7,500		
Carriage Outward	12,000		
Rent, Rates & Taxes	20,000		
Advertisement	20,000		
Cash at Bank	69,000		
Total	**25,40,750**	**Total**	**25,40,750**

1669000

4. a) Define financial system. Explain the main functions of the financial system?
   b) Briefly describe various components of the financial system.

5. a) What are the main features of the Money Market?
   b) Briefly tell about the functions of the financial market.

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6. From the following information of three proposals, calculate Payback and NPV at a discount rate of 10%. And suggest which project to be accepted for each method.

The initial cost for Proposal-1= Rs.1,40,000

Proposal-2= Rs.2,60,000

Proposal-3= Rs. 1,00,000

Year	Proposal-1	Proposal-2	Proposal-3
1	70,000	1,30,000	75,000
2	70,000	1,30,000	60,000
3	70,000	1,30,000	60,000

7. a) Discuss the significance of financial statement analysis.

b) Classify various types of ratios and its usefulness.

FACULTY OF ENGINEERING

B.E. (Mech/Prod/AE) IV – Semester (AICTE) (Main & Backlog) (New) Examination, July / August 2025

Subject: Engineering Mechanics-II

Time: 3 Hours

Max. Marks: 70

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. (a) Define the terms: (i) Rectilinear Motion and (ii) Curvilinear Motion.
(b) Differentiate between direct impact and oblique impact.
(c) State the principle of work and energy.
(d) What do you understand by instantaneous centre?
(e) Differentiate between free and forced vibrations
(f) What is dynamic equilibrium?
(g) Explain Simple Harmonic Motion.

2. A shot-put event is conducted and the following data collected:
Mass of the ball = 6 kg
Inclination of throw = 45°
Height of throw = 2m and
Horizontal range covered on ground = 21m;
Determine: (i) Kinetic energy of the ball at the instant of projection
(ii) Total time elapsed during the event and (iii) Maximum height attained.

3. A body of 20 kg mass moving towards right with a speed of 10 m/s strikes with another body of 40 kg mass moving towards left with 25 m/s. Determine:
(i) Final velocity of the two bodies,
(ii) Loss in kinetic energy due to impact and
(iii) Impulse acting on each body during impact.
Take the coefficient of friction between the bodies as 0.6

4. Two bodies 250 N and 400 N are hung to the ends of a rope passing over an ideal pulley as shown in figue-1. Use the principle of work-energy and determine:
(i) Acceleration of the heavier body while coming down.
(ii) Tension in the rope.

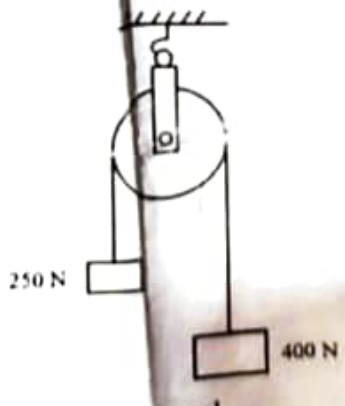

Figure-1

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B.E. (Mech.) III Semester (Old) (

Subject: Thermodynamics

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

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may be suitably assumed.

1. a) Distinguish between macroscopic and microscopic approach of thermodynamics.
   b) Explain quasi-static process.
   c) Define thermodynamic equilibrium.
   d) What is first law of thermodynamics?
   e) Give statement of Claussius inequality
   f) What is Mollier diagram?
   g) Draw diesel cycle on P-V and T-S diagram.

2. a) Explain working principle of constant volume gas thermometer.
   b) Differentiate between closed system, open system and isolated system.

3. a) Explain Perpetual Motion Machine of first kind, PMM1.
   b) 10 kg of fluid per minute goes through a reversible steady flow process. The properties of fluid at the inlet are : p_1 = 1.5 bar, ρ_1 = 26 kg/m3, C_1 = 110 m/s and u_1 = 910 kJ/kg and at the exit are p_2 = 5.5 bar, ρ_2 = 5.5 kg/m3, C_2 = 190 m/s and u_2 = 710 kJ/kg. During the passage, the fluid rejects 55 kJ/s and rises through 55 metres. Determine : (i) The change in enthalpy (Δ h) ; (ii) Work done during the process (W).

4. a) Derive an expression for the change in entropy for a reversible isobaric process.
   b) A rigid cylinder containing 0.004 m3 of nitrogen at 1 bar and 300 K is heated reversibly until temperature becomes 400 K. Determine heat supplied and entropy change. Assume nitrogen to be perfect gas (molecular mass = 28) and take γ = 1.4.

5. a) Explain P-V-T surface diagram.
   b) Find enthalpy and entropy of steam where the pressure is 2MPa and specific volume is 0.09m^3/Kg.

6. a) What is an air-standard efficiency ?What are the assumptions considered in air standard efficiency.
   b) An engine worked on Otto cycle is supplied with air at 0.1MPa, 35^{0}C the compression ratio is 8, heat supplied is 2100 KJ/Kg. Calculate the maximum pressure and the maximum temperature of the cycle, the cycle efficiency and mean effective pressure.

7. a) Define triple point and critical point of water.
   b) State limitations of first law of thermodynamics.

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