AJ Institute of Engineering and Technology Mangaluru.

VTU Question Papers

Mechanical Engineering
Supplementary Exam

III to VIII Semester
2022 SCHEME

LIBRARY & INFORMATION CENTER

AJ Institute of Engineering and Technology, Mangaluru.

NH-66, Kottara Chowki, Mangaluru – 575 006

INDEX

CBCS SCHEME

USN | | | | | | | | | | |

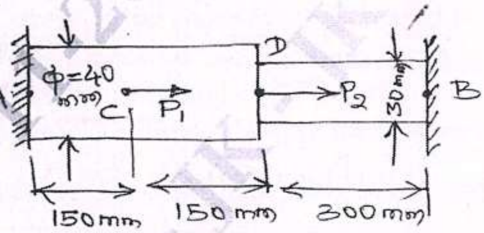
BME301

Third Semester B.E./B.Tech. Degree Supplementary Examination, June/July 2024

Mechanics of Materials

Time: 3 hrs. Max. Marks: 100

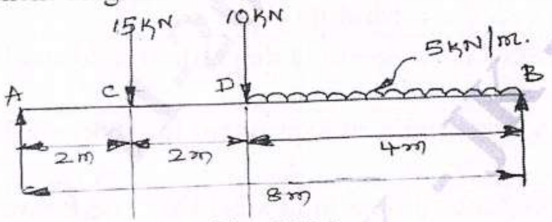
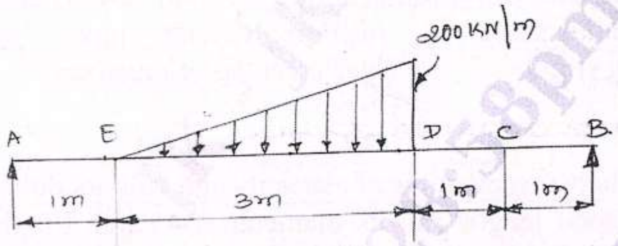
Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Describe with a neat sketch, stress-strain diagram of mild steel and cast iron indicating salient points.	05	L1	CO1
	b.	State Hooke's law and determine an expression for shortening/extension of bar.	05	L2	CO1
	c.	The tensile test was conducted on a mild steel bar. The following data was obtained from the test: diameter of the steel bar = 16 mm; gauge length of the bar = 80 mm, load at proportionality limit = 72 kN, extension at a load of 60 kN = 0.115 mm, load at failure = 80 kN, final gauge length of the bar = 104 mm, diameter of the rod at failure = 12 mm. Determine: (i) Young's modulus (ii) Proportionality limit (iii) True breaking stress (iv) Percentage elongation	10	L3	CO1
		OR			
Q.2	a.	Derive a relation between modulus of elasticity and bulk modulus.	04	L2	CO1
	b.	A member is of total length 2m, its diameter is 40 mm for the first 1m length. In the next 0.5 m length, its diameter gradually reduces from 40 mm to 'd' mm. For the remaining length of the member, the diameter remains 'd' mm uniform. When this member is subjected to an axial tensile force of 150 kN, the total elongation observed is 2.39 mm. Determine diameter 'd'. Assume Young's modulus = 2×10^5 MPa.	08	L3	CO1
	c.	A stepped bar of steel, held between two supports as shown in Fig.Q2(c) is subjected to loads P_1 = 80 kN and P_2 = 60 kN. Find the reaction developed at the ends A and B.  Fig.Q2(c)	08	L3	CO1
		Module – 2			
Q.3	a.	Derive an expression for normal and shear stress on a inclined plane of a member subjected to bi-axial stress system.	10	L2	CO2
	b.	A closed cylindrical vessel made of steel plates 4 mm thick with plane ends, carries fluid under a pressure of 3 N/mm^2. The diameter of the cylinder is 25 cms and the length is 75 cms. Calculate the longitudinal and hoop stresses in the cylinder wall and determine the change in diameter length and volume of the cylinder. Take E = 2.1×10^5 MPa and 1/m = 0.286.	10	L3	CO1

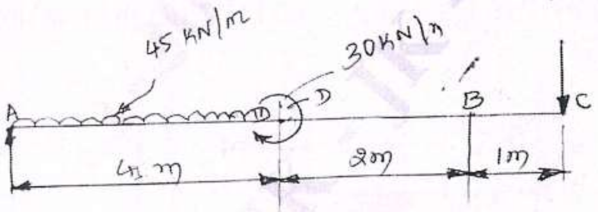
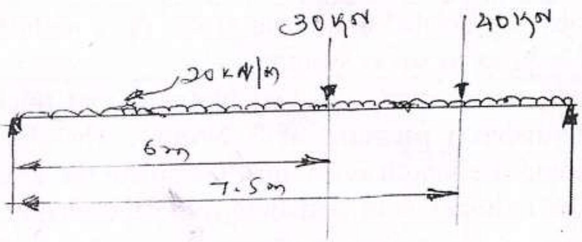
OR

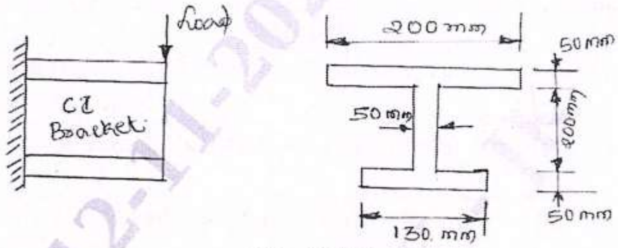
Q.4	**a.**	At a point in a loaded elastic member, there are normal stresses of 60 MPa and 40 MPa both tensile respectively, at right angles to each other with shearing stress of 20 MPa. Draw the Mohr's circle diagram and find out: (i) Principal stresses and their planes (ii) Maximum shear stress and its planes.	**10**	**L4**	**CO2**
	b.	Define thick and thin cylinders. Also derive an expression for circumferential stress in a thin cylinder.	**10**	**L2**	**CO2**

Module – 3

Q.5	**a.**	A simply supported beam of 10 m span as shown in the Fig.Q5(a) carries two concentrated loads and a uniformly distributed load. Draw shear force and bending moment diagram.  Fig.Q5(a)	**10**	**L4**	**CO4**
	b.	Draw the SFD and BMD for the beam loaded as shown in Fig.Q5(b). Also find the position of maximum bending moment and maximum bending moment.  Fig.Q5(b)	**10**	**L4**	**CO4**

OR

Q.6	**a.**	For a beam shown in Fig.Q6(a), determine the magnitude of the load acting at C, such that the reaction at support A and B are equal. Draw SFD and BMD indicating the values at the salient points. Locate point of contra flexure.  Fig.Q6(a)	**10**	**L4**	**CO4**
	b.	A simply supported beam is loaded as shown in Fig.Q6(b). Draw SFD and BMD for the beam and state the valves of maximum bending moment and maximum shear.  Fig.Q6(b)	**10**	**L4**	**CO3**

		Module – 4			
Q.7	**a.**	A simply supported beam having cross section of 20 mm × 20 mm fails when a central point load of 400 N is applied span of beam is 2m. What UDL will break a cantilever of same material 40 mm wide, 60 mm deep and 3m long.	**10**	**L3** **L4**	**CO2** **CO3**
	b.	A cast iron bracket subject to bending has the cross-section of I-form with unequal flanges. The dimension of the section are shown in Fig.Q7(b). Find the position of the Neutral axis and moment of inertia of the section about the neutral axis. If the maximum bending moment on the section is 40 MN-mm. Determine the maximum bending stress. What is the nature of the stress?  Fig.Q7(b)	**10**	**L3** **L4**	**CO1** **CO2**
		OR			
Q.8	**a.**	Derive an expression for bending stresses in beams.	**10**	**L2**	**CO1**
	b.	A 5m cantilever beam of cross-section 150 mm × 300 mm fails when a load of 30 kN is applied at the free end. Find the stress at failure.	**05**	**L3**	**CO2**
	c.	List assumptions made in pure bending theory.	**05**	**L1**	**CO1**
		Module – 5			
Q.9	**a.**	A solid shaft has to transmit 150 KW of power at 180 rpm. If allowable shear stress is 70 MPa and allowable angle of twist is 1° in a length of 4m. Find the suitable diameter of solid circular shaft. Take G = 84 GPa.	**10**	**L4**	**CO2**
	b.	Derive Euler's crippling load for a column when both its ends are hinged.	**10**	**L2**	**CO1**
		OR			
Q.10	**a.**	A 150 mm diameter solid steel shaft is transmitting 450 KW power at 90 rpm, compute the maximum shearing stress. Find the change that would occur in the shearing stress, if the speed were increased to 360 rpm.	**10**	**L4**	**CO2**
	b.	A 1.5m long column has a circular cross-section of 50 mm diameter. One end of the column is fixed in direction and position and other end is free. Taking factor of safety as 3, calculate the safe load using : (i) Rankine's formula taking yield stress 560 N/mm^2 and $a = \frac{1}{600}$ (ii) Euler's formula taking $E = 1.2 \times 10^5$ MPa	**10**	**L4**	**CO2**

* * * * *

USN | | | | | | | | | | |

BME304

Third Semester B.E./B.Tech Degree Supplementary Examination, June/July 2024

Basic Thermodynamics

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Used of thermodynamic data hand book is permitted.

		Module – 1	M	L	C
Q.1	a.	Explain Zeroth law of thermodynamics.	4	L2	CO1
	b.	Define heat and work in thermodynamics. Show that work is a path function.	8	L1	CO1
	c.	The temperature 'T' on thermometric scale is defined in terms of property 'P' by the relation $T = a \log_e P + b$, where a and b are constants. The temperature at ice point and steam point are 0 and 100°C respectively. Instrument gives values of 'P' 1.86 and 6.81 at ice and stream point respectively. Evaluate temperature corresponding to a reading of P = 2.5.	8	L3	CO1
		OR			
Q.2	a.	Derive an expression for displacement work for : i) Isothermal process ii) Isentropic process.	10	L2	CO1
	b.	A cylinder contains $0.5 m^3$ of gas at 1 bar and 90°C. The gas compressed to a volume of $0.125 m^3$. The final pressure being 6 bar. Find : i) The mass of the gas ii) Value of 'n' iii) The heat transferred iv) Internal energy.	10	L3	CO1
		Module – 2			
Q.3	a.	State the first law of thermodynamics applied to cyclic process and non cyclic process.	6	L1	CO2
	b.	Show that internal energy is a property of system.	6	L2	CO2
	c.	A closed system undergoes a cycle. The energy transfer are as obtained : i) Complete the table ii) Determine rate of work in KW.	8	L3	CO2

Process	Q(kJ/min)	W(kJ/min)	DE(kJ/min)
AB	400	150	–
BC	200	–	300
CD	–200	–	–
DA	0	75	–

		OR			
Q.4	**a.**	Starting the assumptions, derive steady flow energy equation.	**6**	**L2**	**CO2**
	b.	A nozzle is a device for increasing the velocity of steadily flowing steam. Enthalpy of the fluid at inlet is 3000kJ/kg and velocity is 60m/s. Enthalpy at discharge end is 2762 kJ/kg. The nozzle is horizontal and there is negligible heat loss from it : i) Find velocity at exit of nozzle ii) If inlet area is $0.1m^2$ and specific volume is 0.187 m^3/kg, find mass flow rate. iii) If specific volume at exit is $0.498m^3/kg$ find diameter at exit of nozzle.	**8**	**L3**	**CO2**
	c.	The power capacity of a system is 3000KW for the following data determine the fluid flow rate in kg/hour. The heat rejection from fluid = 100 kJ/s Inlet velocity = 300 m/s Inlet pressure = 600 KPa Inlet internal energy = 2000 kJ/kg Inlet volume = 0.2 m^3/kg Outlet velocity = 120 m/s Outlet pressure = 150 Kpa Outlet internal energy = 1500 kJ/kg Final volume = 1.2 m^3/kg The fluid enters and leaves the system at same elevation.	**6**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Give the Kelvin plank and Clausius statements of second law of thermodynamics and prove their equivalence.	**10**	**L1**	**CO3**
	b.	Explain PMMK – 1 and PMMK – 2.	**4**	**L1**	**CO3**
	c.	A series combination of two Carnot engines operate between temperature of 180°C and 20°C. Calculate the intermediate temperature, if engine produces : i) Equal amount of work ii) Engines having same efficiency.	**6**	**L3**	**CO3**
		OR			
Q.6	**a.**	State and prove Clausius inequality.	**8**	**L1**	**CO3**
	b.	Show that entropy is a property of a system.	**6**	**L2**	**CO3**
	c.	5 kg of copper block of 200°C is dropped to an insulated tank with 100kg of oil at 30°C. Find the increase in entropy of the universe. Take C_p(copper) = 0.4kJ/kg-k, C_p(oil) = 2.1kJ/kg-k .	**6**	**L3**	**CO3**

Module – 4					
Q.7	**a.**	With T – S diagram briefly explain the available energy and unavailable energy.	**6**	**L1**	**CO4**
	b.	Obtain an expression for maximum work available in steady flow system.	**6**	**L2**	**CO4**
	c.	Define the following with respect to the pure substance : i) Latent heat of vapourisation ii) Sensible heat iii) Saturation temperature iv) Triple point v) Dryness fraction vi) Wet steam.	**8**	**L1**	**CO4**
OR					
Q.8	**a.**	With a neat sketch explain the working of a separating and throttling calorimeter.	**10**	**L1**	**CO4**
	b.	In a test to find the quality of the steam in a pipe using a combined separating and throttling calorimeter, the following data was obtained : Pressure of steam in steam mains = 14 bar Pressure of steam after throttling = 1.19 bar Temperature after throttling = 120°C Water collected in separator = 0.45 kg Steam condensed after throttling = 6.75 kg Describe the condition of the steam in the mains. Take SP heat of superheated steam as 2.1 kJ/kg-k.	**10**	**L3**	**CO4**
Module – 5					
Q.9	**a.**	Clearly distinguish between ideal and real gases.	**6**	**L1**	**CO5**
	b.	Explain briefly Dalton's law and Amagat's law.	**6**	**L1**	**CO5**
	c.	Derive an expression for specific heat at constant pressure and constant volume for mixture of gases.	**8**	**L2**	**CO5**
OR					
Q.10	**a.**	Explain reduced properties and compressibility chart.	**6**	**L1**	**CO5**
	b.	Write Maxwell relations and explain the terms involved.	**6**	**L1**	**CO5**
	c.	Determine the pressure exerted by carbon-dioxide in a container of $1.5m^3$ capacity when it contains 5kg at 27°c using. i) Ideal gas equation ii) Vander walls equation Take a = 364.3 $kN/m^4/kg\ mol^2$ b = 0.0427 m^3/kg mol.	**8**	**L3**	**CO5**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

BME401

Fourth Semester B.E./B.Tech. Degree Supplementary Examination, June/July 2024

Applied Thermodynamics

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Derive an expression for the thermal efficiency of an air standard diesel cycle with assumptions made.	10	L3	CO1
	b.	In CI engine working on dual combustion cycle, the pressure and temperature at the start of compression 1 bar and 27°C respectively at the end of compression the pressure reaches a value of 30 bar. 500 kJ of heat supplied per kg of air during constant volume heating and pressure become 2.8 bar at the end of adiabatic expansion. Find the ideal thermal efficiency. Take C_p = 1.003 kJ/kg-°K and C_v = 0.713 kJ/kg-°K.	10	L3	CO1
		OR			
Q.2	a.	Explain the phenomenon of combustion in SI engines.	05	L2	CO1
	b.	What are the factors affecting detonation?	05	L2	CO1
	c.	The following data were recorded in a test one hour duration on single cylinder oil engine working on 4 stroke cycle bore = 300 mm, stroke = 450 mm, fuel used = 8.8 kg, CV = 41800 kJ/kg, average speed = 200 rpm, m.e.p. = 5.8 bar, brake friction load = 1860 N, quantity of cooling water = 650 kg, temperature rise = 22°C. Diameter of the brake wheel = 1.22 m. Calculate: (i) Mechanical efficiency (ii) Brake thermal efficiency (iii) Draw heat balance sheet on hour basis	10	L3	CO1
		Module – 2			
Q.3	a.	With a neat P-V and T-S diagram, derive an expression for the efficiency of a Brayton cycle.	07	L3	CO2
	b.	With neat sketch, explain inter cooling in gas turbine.	06	L2	CO2
	c.	In a gas turbine plant working on Brayton cycle the air enters to the compressor at 0.1 MPa and 30°C. The pressure ratio is 6 and maximum cycle temperature is 900°C. If the turbine and compressor efficiency of 80% each, find the cycle efficiency. Assume C_p = 1.005 kJ/kg-°K, γ = 1.4.	07	L3	CO2
		OR			
Q.4	a.	With a neat sketch, explain the working of Ramjet and Turbopropeller engines.	10	L2	CO2
	b.	In an open gas turbine plant, air enters the compressor at 1 bar and 27°C. The pressure after compression is 4 bar. The isentropic efficiencies of the turbine and compressor are 85% and 80% respectively. Air fuel ratio is 80:1. The calorific value of the fuel used is 42000 kJ/kg. Mass flow rate of air is 2.5 kg/sec. Determine the power output from the plant and the cycle efficiency. Assume the value of C_p = 1.005 kJ/kg-K and γ = 1.14.	10	L3	CO2

		Module – 3			
Q.5	**a.**	Draw the comparisons between Carnot and Rankine vapour power cycles.	**06**	**L2**	**CO3**
	b.	With a sketch explain effect of boiler pressure and condenser pressure on the Rankine cycle performance.	**06**	**L2**	**CO3**
	c.	A steam power plant operating on Rankine cycle, receives steam at 3.5 MPa and 350°C. It is exhausted at condenser at 0.1 bar. Calculate: (i) Heat supplied per kg of steam generated in boiler. (ii) Quality of steam entering the condenser (iii) Rankine cycle efficiency (iv) Specific steam consumption	**08**	**L3**	**CO3**
		OR			
Q.6	**a.**	Sketch the flow diagram and corresponding T-S diagram of a reheat vapour power cycle and derive expression for reheat cycle efficiency.	**08**	**L2**	**CO3**
	b.	In a single feed water heater, regenerative cycle, the steam enters the turbine at a pressure of 30 bar and 400°C. The exhaust pressure of the steam is 0.1 bar. The feed water heater is open type which operates at a pressure of 5 bar, find the thermal efficiency of the cycle and specific steam consumption. Show the flow diagram; the regenerative cycle on h-s and T-S diagram.	**12**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Define refrigerant. What are the desirable properties of good refrigerant?	**06**	**L2**	**CO4**
	b.	Explain the effect of superheating and sub-cooling with aid of T-S diagram and p-h diagrams.	**06**	**L3**	**CO4**
	c.	A 5 ton R-12 refrigeration plant has saturated suction temperature of –5°C. The condensation take place of 32°C. Assuming isentropic compression, find: (i) COP of the plant (ii) Mass flow rate of refrigerant (iii) Power required to run compressor in kW Take following properties of R-12.	**08**	**L3**	**CO1**

Pressure	Temperature	h_f kJ/kg	h_g kJ/kg	S_g kJ/kg
7.85	32°C	130.5	264.5	1.542
2.61	–5°C	-	249.3	1.557

Take C_p super heated vapour = 0.615 kJ/kg-K

		OR			
Q.8	**a.**	Explain the following processes by showing them as the psychrometric chart: (i) Sensible cooling (ii) Humidification (iii) Cooling and dehumidification (iv) Heating and humidifying (v) Adiabatic mixing of two streams of air	**10**	**L3**	**CO4**
	b.	For a hall to be air conditional, outdoor conditions = 40°C DBT, 20°C WBT, required conditions = 20°C DBT and 60% RH. Seating capacity of the hall = 1500, amount of outdoor air supplied = 0.3 m^3/min/person. If required conditions are achieved first by adiabatic humidification and then by cooling. Estimate: (i) Capacity of cooling coil in TR (ii) Capacity of humidifier in kg/hr.	**10**	**L3**	**CO4**

		Module – 5			
Q.9	**a.**	Derive an expression for minimum work input by two stage compressor with intercooling between the two stages.	**10**	**L2**	**CO5**
	b.	A single stage, double acting air compressor, required to deliver 14 m^3 of air per minute measured at 1.013 bar and 15°C. The delivery pressure is 7 bar and speed is 300 rpm. Take the clearance volume as 5% of swept volume with compression and expansion index n = 1.3. Calculate: (i) The swept volume of the cylinder (ii) Delivery temperature (iii) Indicated power	**10**	**L3**	**CO5**
		OR			
Q.10	**a.**	Explain with neat sketch convergent nozzle and convergent-divergent nozzle.	**06**	**L2**	**CO5**
	b.	Derive an expression for condition of maximum discharge through a nozzle.	**06**	**L3**	**CO5**
	c.	Dry saturated steam enters a steam nozzle at a pressure of 15 bar and is discharged at a pressure of 2 bar. If dryness fraction of steam is 0.96 dry, what will be final velocity of stem? Neglect initial velocity of steam. If 15% of heat drop is lost in friction, find the percentage reduction in final velocity.	**08**	**L3**	**CO5**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

BME403

Fourth Semester B.E./B.Tech. Degree Supplementary Examination, June/July 2024

Fluid Mechanics

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Draw the sketches wherever necessary.

		Module – 1	M	L	C
Q.1	a.	Define the following fluid properties: i) Mass Density ii) Specific Gravity iii) Surface tension.	6	L2	CO1
	b.	State and prove the Pascal's law for the intensity of pressure in a static fluid.	6	L2	CO1
	c.	Calculate the dynamic viscosity of an oil, which is used for lubrication between a square plate of size 0.8m × 0.8m and an inclined plane with angle of inclination 30°. The weight of the square plate is 300 N and it slides down the inclined plane with a uniform velocity of 0.3 m/s. The thickness of oil film is 1.5 mm. Also, determine the kinematic viscosity of oil if the specific gravity of oil is 0.85.	8	L3	CO1
		OR			
Q.2	a.	Derive an expression for "Total Pressure" and "Center of Pressure" acting on vertical plane surface submerged in a static liquid.	10	L2	CO1
	b.	A differential manometer using mercury as manometric fluid is connected to two pipes A and B. Water flows through pipe A and a liquid of specific gravity 0.9 flows through pipe B. Pipe B is 1.5 m above the level of pipe A. Meniscus of mercury in the left limb connected to A is 3m below the center of pipe A and Meniscus on the right limb connected to pipe B is 10 cm above that in the left limb. If the pressure in pipe A is 10 bar, determine the pressure in pipe B. Sketch the manometer arrangement.	10	L3	CO1
		Module – 2			
Q.3	a.	Write a note on the following types of fluid flow: i) Steady and unsteady flow ii) Uniform and Non uniform flow iii) Laminar and turbulent flow.	6	L2	CO2
	b.	Obtain an expression for continuity equation in Cartesian coordinate system for a 3-dimensional fluid flow.	8	L2	CO2
	c.	A fluid flow field is given by $V = x^2yi + y^2zj - (2xyz + yz^2)k$. Prove that it is a case of possible steady incompressible fluid flow. Calculate the velocity of the fluid at the print (2, 1, 3).	6	L3	CO2

		OR			
Q.4	**a.**	Derive an expression for the velocity distribution and shear stress distribution for the viscous flow through a circular pipe. Show the velocity and shear-stress distribution across the circular pipe.	**10**	L2	**CO2**
	b.	Calculate : i) Pressure gradient along flow ii) The average velocity iii) The discharge for an oil of. Viscosity 0.02 Ns/m^2 flowing between two stationary parallel plates 1 m wide maintained 10 mm apart. The velocity midway between the plates is 2m/s.	**10**	L3	**CO2**
		Module – 3			
Q.5	**a.**	Derive the Euler's equation of motion for the fluid flowing along a stream line. Obtain Bernoullis equation of motion and mention the assumptions made.	**10**	L2	**CO3**
	b.	A 30 cm × 15 cm venturimeter is provided in a vertical pipe line carrying oil of specific gravity 0.9, the flow being upwards. The difference in elevation of the throat section and entrance section of the ventirumeter is 30 cm. The differential U-tube mercury manometer shows a deflection of 25 cm. Determine: i) The discharge of oil ii) The pressure difference between the entrance section and the throat section. Take C_d of venturimeter as 0.98 and specific gravity of mercury as 13.6.	**10**	L3	**CO3**
		OR			
Q.6	**a.**	Derive the Daray-Weisbach equation for the loss of head due to friction in a pipe.	**10**	L2	**CO3**
	b.	The rate of flow of water through a horizontal pipe is 0.25 m^3/s. The diameter of the pipe which is 200 mm is suddenly enlarged to 400 mm. The pressure intensity in the smaller pipe is 11.772 N/cm^2. Determine: i) Loss of head due to sudden enlargement. ii) Pressure intensity in the large pipe. iii) Power lost due to enlargement.	**10**	L3	**CO3**
		Module – 4			
Q.7	**a.**	Explain the following terms: i) Drag ii) Lift iii) Friction drag iv) Pressure drag.	**8**	L2	**CO4**
	b.	What do you mean by boundary layer? Explain the following with a boundary layer diagram. i) Boundary layer thickness ii) Displacement thickness.	**6**	L2	**CO4**
	c.	A man weighing 90 kgf descends to the ground from an aeroplane with the help of a parachute against the resistance of air. The velocity with which the parachute which is hemispherical in shape, come down is 20 m/s. Find the diameter of the parachute. Assume C_b = 0.5 and density of air = 1.25 kg/m^3.	**6**	L3	**CO4**

		OR			
Q.8	**a.**	Write the dimensions of the following quantities: i) Kinematic viscosity ii) Dynamic viscosity iii) Discharge/Rate of flow iv) Specific weight.	**4**	**L2**	**CO4**
	b.	Explain the following dimensionless numbers: i) Reynold's number ii) Mach number iii) Weber number.	**6**	**L2**	**CO4**
	c.	Using Buckingham's π-theorem, prove that the frictional torque T of a disc of diameter D rotating at a speed N in a fluid of viscosity μ and density ρ in a turbulent flow is given by. $T = D^5N^2\rho\ \phi\left[\frac{\mu}{D^2N\rho}\right]$	**10**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Derive an expression for the velocity of sound wave in terms of change of pressure and change of density.	**8**	**L2**	**CO5**
	b.	Define Mach number. Explain its significance in compressible fluid flow.	**6**	**L2**	**CO5**
	c.	Calculate the speed of the aeroplane flying at an height of 15 km where the temperature is -50°C. The speed of the plane is corresponding to mach number equal to 2. Assume K = 1.4 and R = 287 J/kg K.	**6**	**L3**	**CO5**
		OR			
Q.10	**a.**	Derive an expression for velocity of sound in compressible fluid medium undergoing. i) An isothermal processes ii) An adiabatic process.	**8**	**L2**	**CO5**
	b.	Mention the advantages and disadvantages of CFD.	**6**	**L2**	**CO5**
	c.	Discuss the applications of CFD in various domain of industry and academia.	**6**	**L2**	**CO5**

* * * * *