SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY		
DEPARTMENT OF MECHANICAL ENGINEERING		
Class Test – I	**Session- Jan-June, 2023**	**Month- April, 2023**
Semester 4th	**Subject- Applied Thermodynamics**	
Code – B037411(037)	**Time Allowed: 2 Hours**	**Max Marks: 40**

Note: - Part A(MCQ) of questions 1 and 2 is compulsory, from other parts B, C and D of questions 1 and 2, attempt any two parts.
Ignore the columns of Level of Bloom's taxonomy and CO.

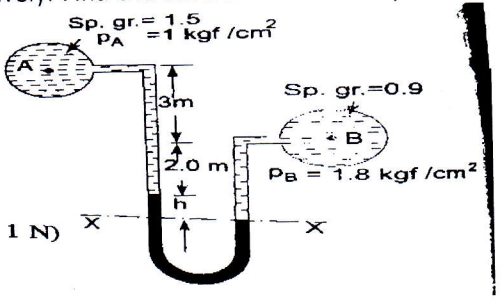
Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Question – 1			
1.A	*Define Air standard cycle. Explain the assumptions for the analysis of air standard cycles.*	**4**	**U**	**1**
1.B	*Derive the expression of Air Standard Efficiency and Mean Effective pressure for Diesel Cycle.*	**8**	**U**	**1**
1.C	*An air standard diesel cycle has compression ratio of 14:1. The cut off takes place at 6% of the stroke. The initial condition of the air used in the cycle is 1 bar, 292 K. Calculate -* *(i) Cut off Ratio* *(ii) Net work done per kg of air* *(iii) Thermal Efficiency of the cycle*	**8**	**A**	**1**
1.D	*The minimum pressure and temperature in an Otto cycle are 100 kPa and 27°C. The amount of heat added to the air per cycle is 1500 kJ/kg.* *(i) Determine the pressures and temperatures at all points of the air standard Otto cycle.* *(ii) Also calculate the thermal efficiency of the cycle for a compression ratio of 8 : 1.* *Take for air : c_v= 0.72 kJ/kg K, and γ = 1.4.*	**8**	**A**	**1**
	Question – 2			
2.A	*The efficiency of an Otto cycle is 50% and γ is 1.5. What is the compression ratio?*	**4**	**U**	**1**
2.B	*Derive the expression of Air Standard Efficiency and Mean Effective pressure for Otto Cycle.*	**8**	**U**	**1**

2.C	*An engine of 250 mm bore and 375 mm stroke works on Otto cycle. The clearance volume is 0.00263 m^3. 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*	**8**	**A**	**1**
2.D	*Analyse the comparison between Otto Cycle, Diesel Cycle and Dual cycle for same compression ratio.*	**8**	**A**	**1**

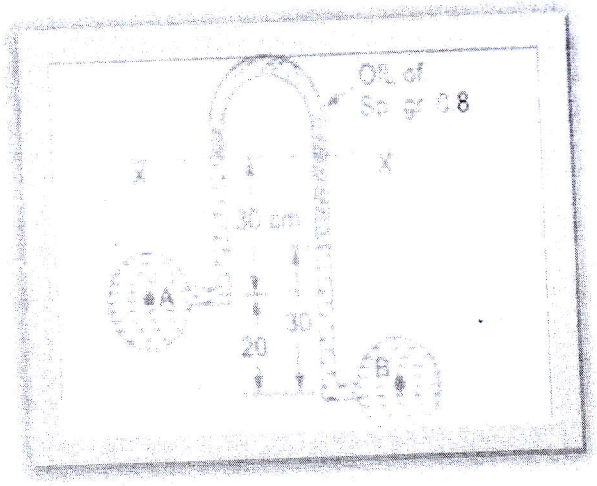
19/04/23/MECH/ATD/S-I/4th

SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY		
DEPARTMENT OF MECHANICAL ENGINEERING		
Class Test – I	Session- Jan-June 2023	Month-April
Sem- 4th	Subject- Fluid Mechanics	
Code - B037412(037)	Time Allowed: 2 hrs	Max Marks: 40

Note: - 1. Students are Required to focus on question and marks columns only.
2. In Unit I & II, Question A is compulsory and attempt any two from B, C & D.

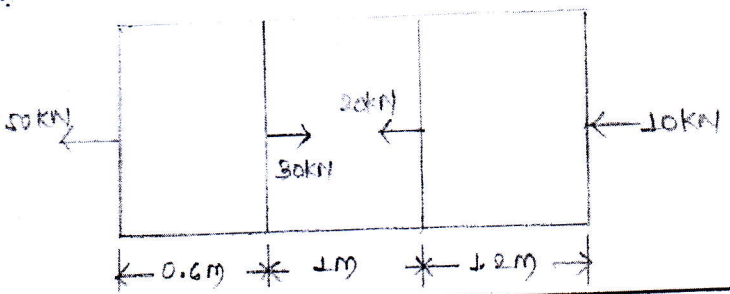
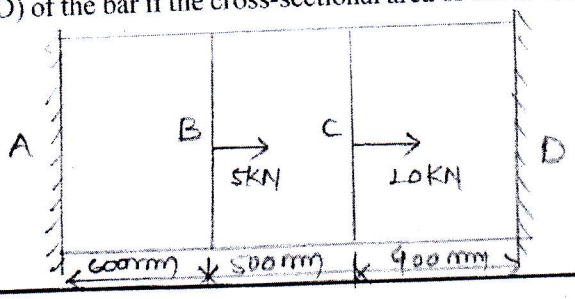
Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Unit – I			
1.A	Define the Newton's law of viscosity and Pascal's Law.	4	Understanding	1
1.B	The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 meters per sec requires a force of 98.1 N to maintain the speed. Determine: (i) the dynamic viscosity of the oil in poise, and (ii) the kinematic viscosity of the oil in stokes if the specific gravity of the oil is 0.95.	8	Applying	1
1.C	A vertical gap 2.2 cm wide of infinite extent contains a fluid of viscosity 2.0 N s/m² and specific gravity 0.9. A metallic plate 1.2 m x 1.2 m x 0.2 cm is to be lifted up with a constant velocity of 0.15 m/sec, through the gap. If the plate is in the middle of the gap, find the force required. Neglect weight of the plate.	8	Applying	1
1.D	A differential manometer connected at the two points A and B of two pipes as shown in fib. The pipe A contains a liquid of sp.gr. =1.5 while pipe B contains a liquid of sp.gr. =0.9. The pressure at A and B are 1 kgf/cm² and 1.80 kgf/cm² respectively. Find the difference in mercury level in the differential manometer. 	8	Applying	1

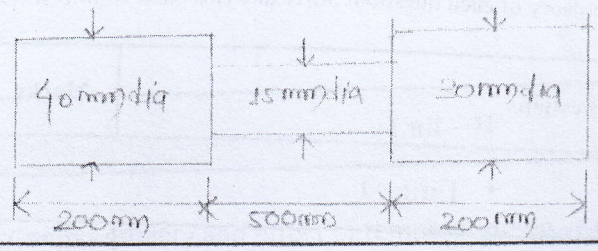
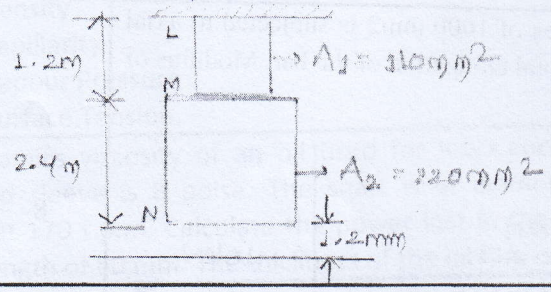
19/04/23/MECH/FM/S-II/4th

	Unit – II			
2.A	. Explain Compressibility and effect of temperature on viscosity.	**4**	Remember	1
2.B	Explain the following. (a) Density (b) Capillarity (c) Vapour Pressure (d) Surface Tension.	**8**	Remember	1
2.C	The dynamics viscosity of an oil used for lubrication between a shaft and sleeve is 8 poise. The shaft is of diameter 0.5m and rotates at 170 r.p.m. Calculate the power lost in the bearing for a sleeve length of 80 mm. The thickness of the oil film is 2 mm.	**8**	Applying	1
2.D	An inverted differential manometer is connected at the two points A and B which convey water as shown in fig. The fluid in the manometer is oil of sp. gr. 0.8 for the manometer reading . Find the pressure difference between A and B. 	**8**	Applying	1

SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY		
DEPARTMENT OF MECHANICAL ENGINEERING		
Class Test: I	Session: January-June 2023	Month: April
Sem- 4th sem	Subject: Strength of Materials	
Code – B037413(037)	Time Allowed: 2 hrs	Max Marks: 40

Note: - Attempt all question. Parts (a) are compulsory of each question. Solve any two parts from (b), (c) and (d) of each question.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Unit – I			
1.A	Analyse and explain tensile, compressive, shear and volumetric strain.	**4**	Analyzing	CO1
1.B	A brass bar having cross-sectional area of 1000 mm2 is subjected to axial forces shown in the Figure. Find the total elongation of the bar. Modulus of elasticity of brass = 100 GN/m² 	**8**	Creating	CO2
1.C	A straight uniform bar AD is clamped at both ends and loaded as shown in Figure. Initially the bar is stress free. Determine the stresses in all the three parts (AB, BC, CD) of the bar if the cross-sectional area of bar is 1000 mm². 	**8**	Creating	CO1
1.D	Derive an expression for stress and elongation produced in a bar due to its self-weight.	**8**	Creating	CO2
	Unit – II			
2.A	Analyse and describe the stress-strain plot of ductile material. Also write short notes on Young's modulus, modulus of rigidity and bulk modulus.	**4**	Analyzing	CO2

2.B	A steel bar is 900 mm long; its two ends are 40 mm and 30 mm in diameter and the length of each rod is 200 mm. The middle portion of the bar is 15 mm in diameter and 500 mm long. If the bar is subjected to an axial tensile load of 15 kN, find its total extension. Take E = 200 GN/m^2 	8	Creating	CO1
2.C	For the bar shown in Figure, calculate the reaction produced by the lower support on the bar. Take E = 200 GN/m. Find also the stresses in the bars. 	8	Creating	CO1
2.D	Derive an expression for elongation in case of a taper rod.	8	Creating	CO2

20/4/23/MECH/5TM/5-I/4K

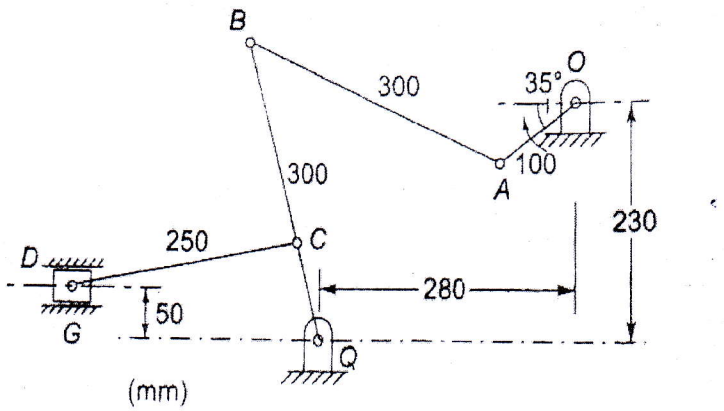
SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY		
DEPARTMENT OF MECHANICAL ENGINEERING		
Class Test – I	Session- Jan – June 2023	Month- April
Sem-4th	Subject- Manufacturing Process	
Code - B037414(037)	Time Allowed: 2 hrs	Max Marks: 40

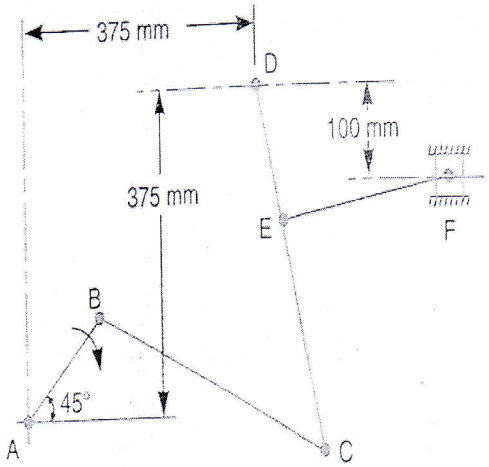
Note: - 1. Students are Required to focus on question and marks columns only.
2. Support your answers with neat sketches.
3. In Unit I & II, Question A is compulsory and attempt any two from B, C & D.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Unit – I			
1.A	What is Gate Ratio?	**4**	Understanding	CO1
1.B	Explain investment casting process	**8**	Understanding	CO1
1.C	Write short notes on a. Core b. Core print c. Gate d. Riser e. Chaplets	**8**	Understanding	CO1
1.D	List different types of patterns. Briefly write about any four types of patterns?	**8**	Understanding	CO1
	Unit – I			
2.A	Define pattern and casting?	**4**	Understanding	CO2
2.B	Write the advantages, disadvantages and product applications of shell moulding method?	**8**	Applying	CO2
2.C	What are the materials from which patterns can be made? Explain any five types of patterns with neat sketches?	**8**	Applying	CO2
2.D	What are the various properties of moulding sand? Discusss?	**8**	Applying	CO2

SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT & TECHNOLOGY, Raipur		
DEPARTMENT OF MECHANICAL ENGINEERING		
Class Test: I	Session: January- June, 2023	Month: April, 2023
Semester: IV	Subject: Kinematics of Machines	
Code: B037415(037)	Time Allowed: 2 Hours	Max Marks: 40

Note: - Part A of Question 1 and Question 2 is compulsory. Attempt any Two Parts out of B, C and D in Question 1 and Question 2.

Q. No	Questions	Marks	Levels of Bloom's Taxonomy	CO
	Question 1			
1.A	Analyze the difference between absolute velocity and relative velocity with suitable examples.	4	Analyzing	CO1
1.B	Figure shows a mechanism in which OA=QC=100mm, AB=QB=300mm and CD=250mm. The crank OA rotates at 150rpm in the clockwise direction. Determine the (i) velocity of slider at D (ii) angular velocity of link QB. 	8	Applying	CO1

1.C	The mechanism shown has dimensions of links as follows: AB=DE=150mm, BC=CD=450mm, EF=375mm.Crank AB makes an angle of 45^0 with the horizontal and rotates about A in clockwise direction at a uniform speed of 120rpm. Lever DC oscillates about fixed point D which is connected to AB by a coupler BC. The block F moves in horizontal guides, being driven by link EF. Draw velocity diagram and find: (i) Velocity of block F (ii) Angular velocity of DC. 	8	Applying	CO1
1.D	A simple band brake operates on a drum of 600mm diameter that is running at 200rpm. Coefficient of friction is 0.25. Brake band has a contact of 270^0 one end is fastened to a fixed pin and other end to the brake arm 125mm from the fixed pin. The straight brake arm is 750mm long and placed perpendicular to the diameter that bisects the angle of contact. (i) What is the pull necessary at the end of the brake arm to stop the wheel if 35kW is being absorbed? What is the direction for this minimum pull? (ii) What width of steel band of 2.5mm thickness is required for this brake if maximum tensile stress is not to exceed $50N/mm^2$?	8	Applying	CO5

Question 2				
2.A	Explain meaning of self energizing brake with suitable example.	4	Remembering	CO5
2.B	Derive an expression of frictional torque in conical pivot bearing with the help of suitable diagram.	8	Understanding	CO5
2.C	Derive an expression for ratio of belt (band) tensions in tight and slack side of band for band and block brake.	8	Applying	CO5
2.D	Explain Prony Brake Dynamometer with suitable diagram.	8	Remembering	CO5