Shri Shankaracharya Institute of Professional Management & Technology

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – I

Session- July-Dec,2023 **Month-**Oct 2023

Sem- 3rd **Subject-**Mathematics-III **Code-**B000312(014)

Time Allowed:2 hrs. **Max Marks:** 40

Note: -First question is Compulsory from PART I & II. Solve any 2 questions from PART I & II

Q.N.	Questions	Marks	Levels of Bloom's taxonomy	Cos
	PART - A			
Q1	Form partial differential equation from $z = y^2+2f\left(\frac{1}{x}+logy\right)$	[4]	Apply	CO1
Q2	Solve $(x^2-y^2-z^2)p+2xyq = 2xz$	[8]	Apply	CO1
Q3	Solve Separation of variable $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$, where $u(x,0) = 6e^{-3x}$	[8]	Understanding	CO1
Q4	Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = ycosx$	[8]	Understanding	CO1
	PART - B			
Q1	Bessel's formula is most appropriate when p lies between .....and Write Bessel's formula.	[4]	Applying	CO2
Q2	From the following table, estimate the number of students who obtained marks between 40 and 45: Marks: 30-40 40-50 50-60 60-70 70-80 No. of st.: 31 42 51 35 31	[8]	Understanding	CO2
Q3	Given θ°: 0 5 10 15 20 25 30 $tan\theta$: 0 .0875 .1763 .2679 .3640 .4663 .5774 *Using* Stirling's formula estimate the value of tan 16°	[8]	Understanding	CO2
Q4	Apply Bessel's formula to obtain y_{25}, given $y_{20} = 2854$, $y_{24} = 3162$, $y_{28} = 3544$, $y_{32} = 3992$.	[8]	Understanding	CO2

SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – I	Session- July to December, 2023	Month- November
Semester- 3rd	Subject- Mechanical Measurement and Metrology	
Code- B037312(037)	Time Allowed: 2 hrs	Max Marks: 40

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

<table>
<tr><th>Q. No</th><th>Questions</th><th>Marks</th><th>Levels of Bloom's taxonomy</th><th>CO</th></tr>
<tr><td colspan="5">Unit – I</td></tr>
<tr><td>A</td><td>What is Mechanical Measurement? Classify measuring instruments.</td><td>4</td><td>Remember</td><td>CO1</td></tr>
<tr><td>B</td><td>For given observations: - Temperature was made 100 times with variation in apparatus and procedure.
<table>
<tr><td>Temp (x)</td><td>397</td><td>398</td><td>399</td><td>400</td><td>401</td><td>402</td><td>403</td><td>404</td><td>405</td></tr>
<tr><td>Frequency</td><td>1</td><td>3</td><td>12</td><td>23</td><td>37</td><td>16</td><td>4</td><td>2</td><td>2</td></tr>
</table>
Calculate all the statistical parameters.</td><td>8</td><td>Apply</td><td>CO1</td></tr>
<tr><td>C</td><td>Eight different students turned in the circuit for resonance and the value of resonant frequency in kHz was recorded as:
412,428,423,415,426,411,423,416

Calculate the following:
(i)Arithmetic mean
(ii)Average deviation
(iii) Standard deviation
(iv)Variance\</td><td>8</td><td>Apply</td><td>CO1</td></tr>
<tr><td>D</td><td>Explain the following terms-
(1) Hysteresis
(2) Noise
(3) Linearity
(4) Dead time and Dead Zone</td><td>8</td><td>Understand</td><td>CO1</td></tr>
<tr><td colspan="5">Unit – II</td></tr>
<tr><td>A</td><td>Differentiate between absolute pressure and gauge pressure.</td><td>4</td><td>Understand</td><td>CO2</td></tr>
<tr><td>B</td><td>Explain the working of Mc-Loed gauge with neat sketch.</td><td>8</td><td>Understand</td><td>CO2</td></tr>
<tr><td>C</td><td>Explain the construction and working of Bourdon tube pressure gauge on the basis of GMS.</td><td>8</td><td>Understand</td><td>CO2</td></tr>
<tr><td>D</td><td>Explain the working principle of Pirani gauge with the help of neat diagram.</td><td>8</td><td>Understand</td><td>CO2</td></tr>
</table>

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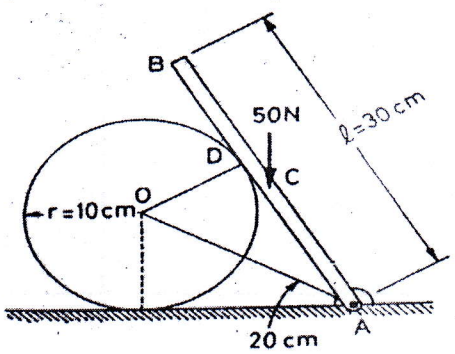
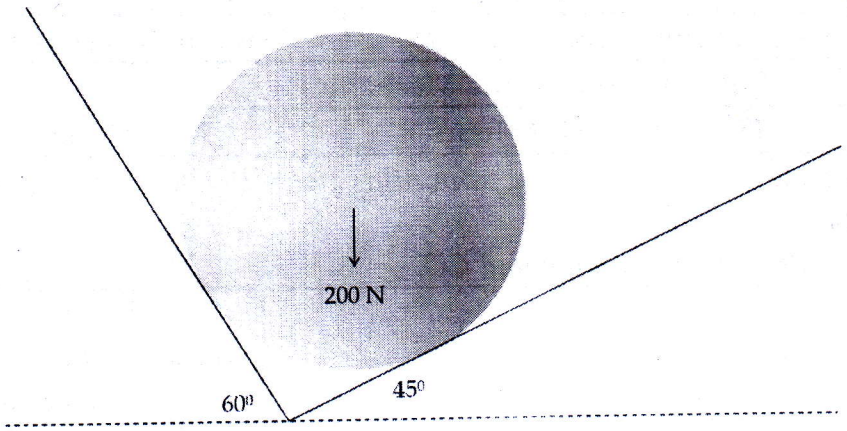
DEPARTMENT OF MECHANICAL ENGINEERING

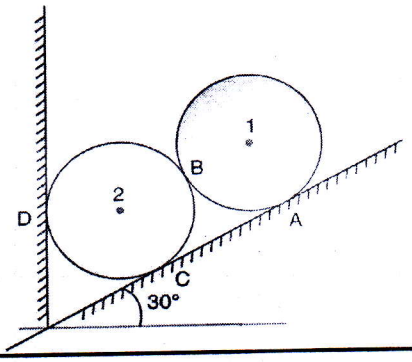
Class Test: I	**Session: July-December, 2023**	**Month: November, 2023**
Semester : 3rd	**Subject: Engineering Mechanics**	
Code: B000313(037)	**Time Allowed: 2 Hours**	**Max Marks: 40**

Note: - Part A 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.

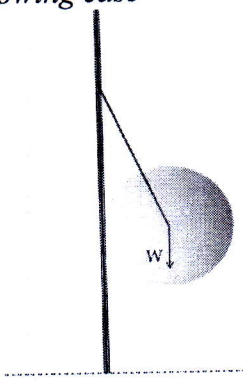
Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Question – 1			
1.A	*Choose Correct answer -* *(a) Friction is affected by _____.* *i. Wind* *ii. The angle of the object* *iii. Position of the object* *iv. Options b and c* *(b) Formula to find the frictional force is _____.* *i. $F = \mu + N$* *ii. $F = \mu - N$* *iii. $F = \mu N$* *iv. $F = \mu / N$*	*4*	*Understand*	*2*
1.B	*A smooth cylinder of radius 10 cm resting on a horizontal surface supports a bar AB of length 30cm which is hinged at A. The weight of the bars is 50N. The cylinder is kept from rolling away by a string AO of length 20cm, Assuming all surfaces to be frictionless, find the tension in the string.*  	*8*	*Apply*	*1*

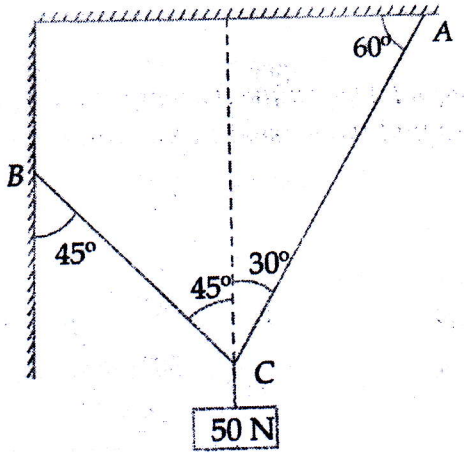
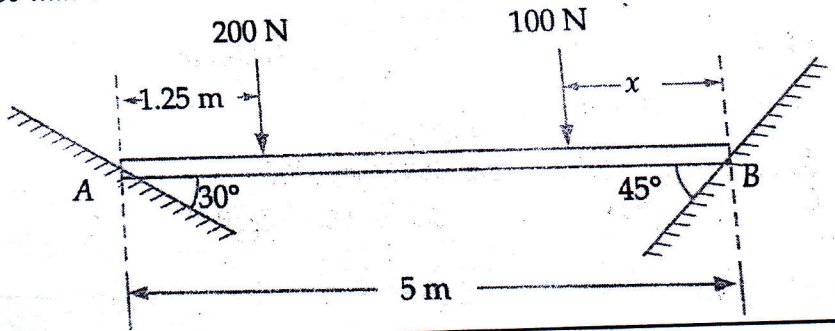
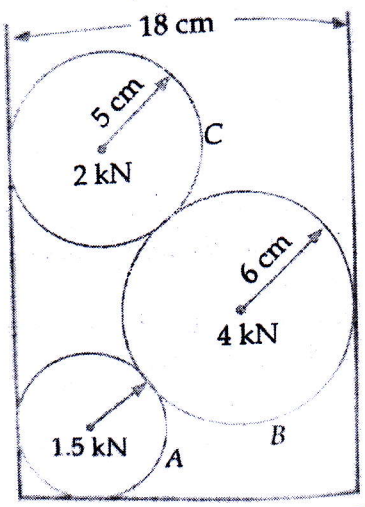
1.C	*A 200 N sphere is resting in a trough as shown in fig.Determine the reactions developed at contact surfaces.* 	8	Apply	1

P.T.O.

1.D	*Two identical cylinders each weighing 500N are placed in a trough as shown. Determine reactions developed at contact points A, B, C and D. Assume all points of contact are smooth.* 	8	Apply	1

Question – 2

2.A	*Draw a FBD for following case -* 	4	Analyze	1

2.B	*An electric light fixture weighing 50 N hangs from point C by two strings AC and BC as shown in Fig.The string AC is inclined at 60° to the horizontal and string BC is 45° to the vertical. determine the forces in the strings AC and BC.*  	8	Apply	1
2.C	*Calculate the distance x at which the 100 N load be placed from end B so that the bar remains horizontal.*  	8	Apply	1
2.D	*Three cylinders are piled in a rectangular ditch as shown in fig.Determine the reaction between cylinder A and the vertical wall.*  	8	Apply	1

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DEPARTMENT OF MECHANICAL ENGINEERING

Class Test-I	Session - July to December 2023	Month- November
Semester -3rd	Subject-Material Science	
Code-B037315(037)	Time Allowed: 2hours	Max Marks:40

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

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Part-A			
1.A	Explain and write the difference between crystalline and non-crystalline solids.	4	Remember	CO1
1.B	Write short notes on following: a) Face-centered cubic crystal structure b) Body-centered cubic crystal structure	8	Understand	CO1
1.C	Write short notes on following: a) Simple cubic crystal structure b) Hexagonal close-packed crystal structure	8	Understand	CO1
1.D	Draw a [110] [100], [110], [111], and [1$\bar{1}$ 1] direction within a cubic unit cell. Also construct a(101), (011), (111), (0$\bar{1}$1), and (0$\bar{1}$ 2) plane within a cubic unit cell.	8	Apply	CO1
	Part-B			
2.A	Explain a crystal structure, a crystal system, unit cell and space lattice.	4	Remember	CO1
2.B	Explain in detail types of point defects.	8	Remember	CO1
2.C	Explain in detail types of line defects.	8	Remember	CO1
2.D	Explain stress-strain diagram with neat sketch.	8	Understand	CO2

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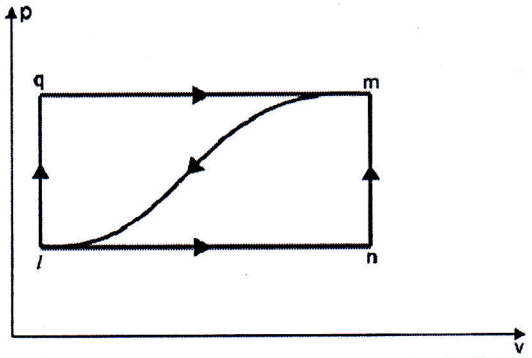
DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – I	**Session- July-December, 2023**	**Month- November, 2023**
Semester 3rd	**Subject- Engineering Thermodynamics**	
Code – B000314(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	*1. A definite area or space where some thermodynamic process takes place is known as* *(a) thermodynamic system (b) thermodynamic cycle* *(c) Thermodynamic process (d) thermodynamic law.* *2. As differentials, heat and work would be described mathematically as* *(a) inexact* *(b) exact* *(c) discontinuity* *(d) point function*	**4**	**R**	**1**
1.B	*A cylinder contains 1 kg of a certain fluid at an initial pressure of 20 bar. The fluid is allowed to expand reversibly behind a piston according to a law pv^2 = constant until the volume is doubled. The fluid is then cooled reversibly at constant pressure until the piston regains its original position; heat is then supplied reversibly with the piston firmly locked in Position until the pressure rises to the original value of 20 bar. Calculate the net work done by the Fluid, for an initial volume of 0.05 m3.*	**8**	**A**	**1**

1.C	*When a system is taken from state l to state m, in Fig. 4.18, along path lqm, 168 kJ of heat flows into the system, and the system does 64 kJ of work :* *(i) How much will be the heat that flows into the system along path lnm if the work doneis 21 kJ ?* *(ii) When the system is returned from m to l along the curved path, the work done on the system is 42 kJ. Does the system absorb or liberate heat, and how much of the heat is absorbed or liberated?* *(iii) If Ul = 0 and Un = 84 kJ, find the heat absorbed in the processes ln and nm.*  	**8**	**A**	**1**
1.D	*A fluid system, contained in a piston and cylinder machine, passes through a complete cycle of four processes. The sum of all heat transferred during a cycle is – 340 kJ. The System completes 200 cycles per min. Complete the following table showing the method for each item, and compute the net rate of work output in kW.* *Process — Q (kJ/min) — W (kJ/min) — ΔE (kJ/min)* *1—2 — 0 — 4340 — —* *2—3 — 42000 — 0 — —* *3—4 — – 4200 — — — – 73200* *4—1 — — — —*	**8**	**A**	**1**

	Question – 2			
2.A	*1. The processes or systems that do not involve heat are called -* *(a) isothermal processes* *(b) equilibrium processes* *(c) thermal processes* *(d) steady processes* *(e) Adiabatic processes.*	**4**	**R**	**2**

	2. *Internal energy of a perfect gas depends on -* *(a) temperature, specific heats and pressure* *(b) temperature, specific heats and enthalpy* *(c) Temperature, specific heats and entropy* *(d) temperature only.*			
2.B	*Show that the relation for a heat transfer during process 1-2 in polytrophic process is -* $Q_{1-2} = \frac{\gamma - n}{\gamma - 1} X$ *Polytropic Work Done*	**8**	**U**	**1**
2.C	*Derive Steady Flow Energy Equation (SFEE).*	**8**	**A**	**1**
2.D	*A cylinder contains 0.45 m^3 of a gas at 1 × 10^5 N/m^2 and 80°C. The gas is compressed to a volume of 0.13 m3, the final pressure being 5 × 10^5 N/m2. Determine :* *(i) The mass of gas ;* *(ii) The value of index 'n' for compression;* *(iii) The increase in internal energy of the gas ;* *(iv) The heat received or rejected by the gas during compression.* *Take γ = 1.4, R = 294.2 J/kg°C.*	**8**	**A**	**1**