SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – I	Session- July to Dec. 2021	Month - November
Sem- 3rd	Subject – MMM	
Code – B000311(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.

<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>Write down the name of instruments used for measuring following physical quantities –
1. Blood Pressure 2. Blast furnace temperature</td><td>4</td><td>Remembering</td><td>CO1</td></tr>
<tr><td>B</td><td>For given observations:-
<table>
<tr><td>Temp (x)</td><td>197</td><td>198</td><td>199</td><td>200</td><td>201</td><td>202</td><td>203</td><td>204</td><td>205</td></tr>
<tr><td>Frequency</td><td>2</td><td>4</td><td>10</td><td>24</td><td>36</td><td>14</td><td>5</td><td>3</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>Explain the construction and working of Bourdon tube pressure gauge on the basis of GMS.</td><td>8</td><td>Understanding</td><td>CO1</td></tr>
<tr><td>D</td><td>Explain the following terms-
(1) Accuracy
(2) Noise
(3) Linearity
(4) Dead time & Dead Zone</td><td>8</td><td>Understanding</td><td>CO1</td></tr>
<tr><td colspan="5">Unit – II</td></tr>
<tr><td>A</td><td>What do you mean by IR Sensor? Explain in brief.</td><td>4</td><td>Understanding</td><td>CO1</td></tr>
<tr><td>B</td><td>Define transducers. Explain the classification of transducers.</td><td>8</td><td>Understanding</td><td>CO1</td></tr>
<tr><td>C</td><td>Explain the functioning components of GMS with examples.</td><td>8</td><td>Understanding</td><td>CO1</td></tr>
<tr><td>D</td><td>Explain the dynamic characteristics of measuring instruments.</td><td>8</td><td>Understanding</td><td>CO1</td></tr>
</table>

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DEPARTMENT OF MECHANICAL ENGINEERING		
Class Test – I	Session- 2021-22	Month- November
Sem- 3rd	Subject- Materials Science	
Code –B037315(037)	Time Allowed: 2hours	Max Marks: 40

Note: - 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
	Part-A			
1.A	Explain a crystal structure, a crystal system, unit cell and space lattice?	**4**	Remembering	CO1
1.B	Write short notes on following: a) Face-centered cubic crystal structure b) Body-centered cubic crystal structure	**8**	Understanding	CO1
1.C	Write short notes on following: a) Simple cubic crystal structure b) Hexagonal close-packed crystal structure	**8**	Understanding	CO1
1.D	Draw a [110] [100], [110], [111], [120], [$0\bar{1}0$], [00 $\bar{1}$] and [1 $\bar{1}$ 1] direction within a cubic unit cell. Also construct a (001), (110), (111), ($0\bar{1}1$), and (0 $\bar{1}$ 2) plane within a cubic unit cell.	**8**	Creating	CO2
	Part-B			
2.A	Explain and write the difference between crystalline and non-crystalline solids?	**4**	Understanding	CO1
2.B	Explain in detail types of point defects.	**8**	Remembering	CO1
2.C	Explain in detail types of line defects.	**8**	Remembering	CO1
2.D	Write short notes on following: a) Grain boundary b) Stacking fault c) Tilt boundary d) Twin boundary	**8**	Understanding	CO1

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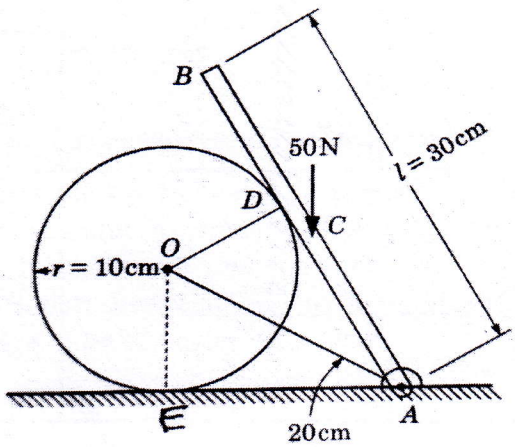
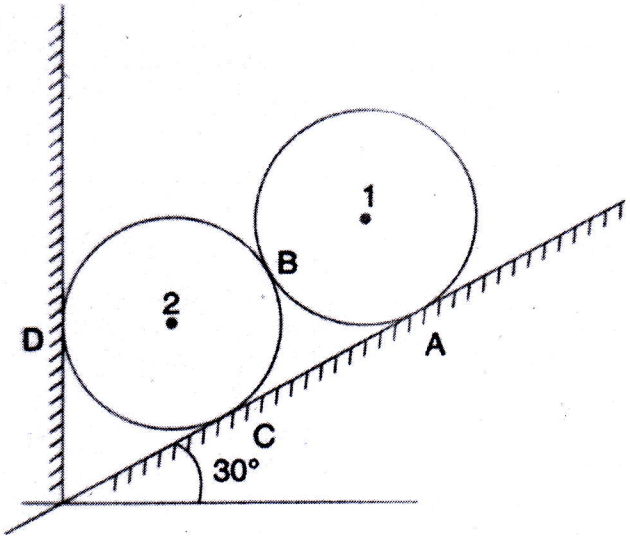
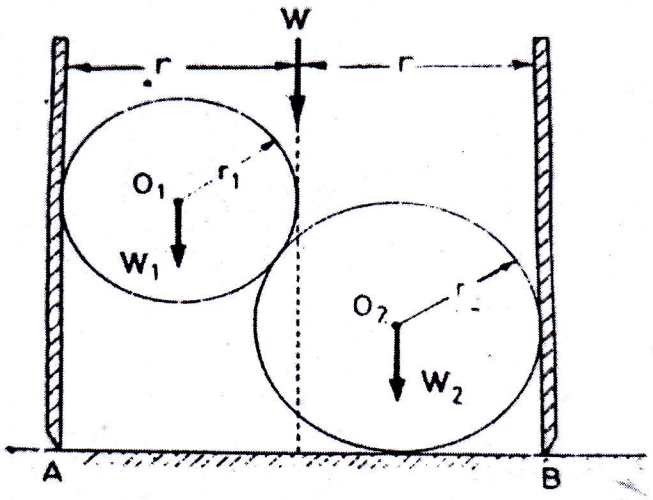
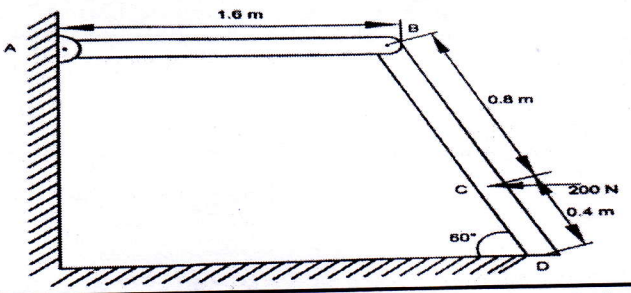
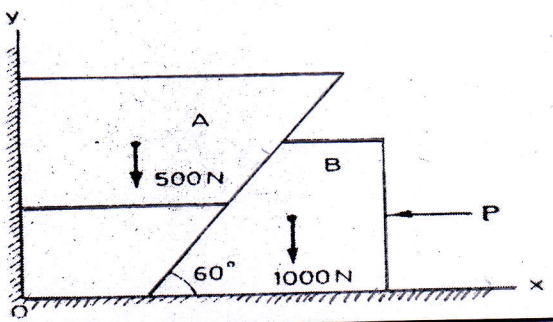
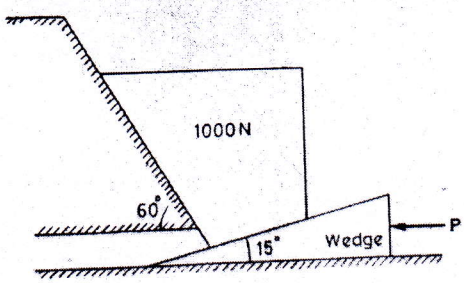
DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – I	**Session- July-December, 2021**	**Month- December, 2021**
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	**(i) Define Force (ii) What are the characteristics of a force? (iii) What are the possible effects of application of force(s) on a body?**	**(i) 1 mark (ii) 1 mark (iii) 2 marks**	**R**	**1**
1.B	**A smooth cylinder of radius r=10cm resting on a horizontal surface supports a bar AB of length 30cm which is hinged at A. The weight of the bar 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**	**U**	**1**

1.C	**Two identical cylinders, each weighing 500N are placed in a trough as shown in figure. Determine the reactions developed at contact points A, B, C and D. Assume all points of contacts are smooth.**  	8	U	1
1.D	**A hollow cylinder of radius r is open at both ends and rests on a smooth horizontal plane. Two spheres having weights W_1 and W_2 and radii r_1 and r_2 respectively are placed inside the cylinder as shown. Find the minimum weight W of the cylinder in order that it will not tip over. Neglect friction.**  	8	A	1

Question – 2				
2.A	(i) What is Limiting friction? (ii) What is angle of repose?	(i) 2 marks (ii) 2 marks	R	2
2.B	A horizontal force of 200 N is applied to a sloping bar BCD whose bottom rests on a horizontal plane as shown in figure. Its upper end is pinned at B to the horizontal bar AB which has a pinned support at A. What couple 'M' must be applied to AB to hold the system in equilibrium? What is the magnitude of pin reaction at B? Assume the bars are weightless and the pins at A and B are smooth. 	8	A	1
2.C	Two blocks A and B are resting against a wall and the floor as shown in figure. Find the value of horizontal force P applied to the lower block that will hold the system in equilibrium. Coefficients of friction are: 0.25 at the floor, 0.3 at the wall and 0.2 between the blocks. 	8	A	2
2.D	A block weighing 1000N is to be raised against a surface inclined at 60^0 to the horizontal by means of a 15^0 wedge. Find the horizontal force P which will just start the block to move if the coefficient of friction between all surfaces of contact is 0.2. Assume the wedge to be of negligible weight. 	8	A	2

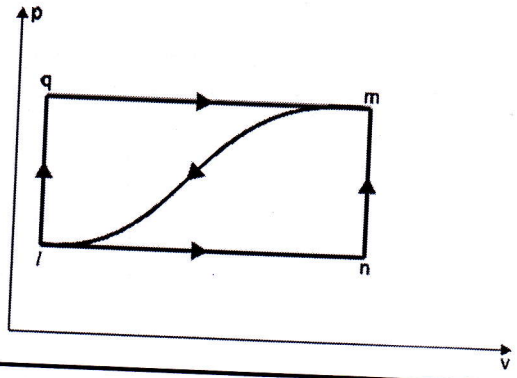
SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – I	**Session- July-December, 2021**	**Month- December, 2021**
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. An open system is one in which -* *(a) heat and work cross the boundary of the system, but the mass of the working substance does not* *(b) Mass of working substance crosses the boundary of the system but the heat and work do not* *(c) both the heat and work as well as mass of the working substances cross the boundary of the system* *(d) Neither the heat and work nor the mass of the working substances cross the boundary of the system.*	**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**	**1**

	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 -* $Q_{1\text{-}2} = \frac{\gamma - n}{\gamma - 1}$ *X Polytropic Work Done*	**8**	**U**	**1**
2.C	*A cylinder contains 0.45 m3 of a gas at 1 × 10⁵ N/m2 and 80°C. The gas is compressed to a volume of 0.13 m3, the final pressure being 5 × 10⁵ 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**	**R**	**1**
2.D	*A turbo compressor delivers 2.33 m3/s of air at 0.276 MPa, 43°C which is heated at this pressure to 430°C and finally expanded in a turbine which delivers 860 kW. During expansion there is a heat transfer of 0.09 MJ/s to the surroundings. Calculate the turbine exhaust temperature if changes in kinetic and potential energy are negligible.*	**8**	**R**	**2**