

G. S. Mandal's

## Maharashtra Institute of Technology, Aurangabad

(An Autonomous Institute)

END SEMESTER EXAMINATION

First Year B.Tech (All) -April/May 2022

Course Code : HSM101

Course Name : Engineering Exploration

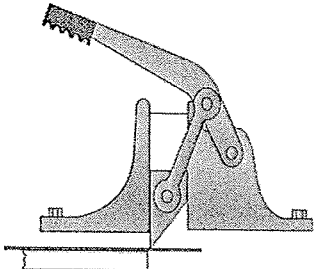
Duration : 2 Hrs

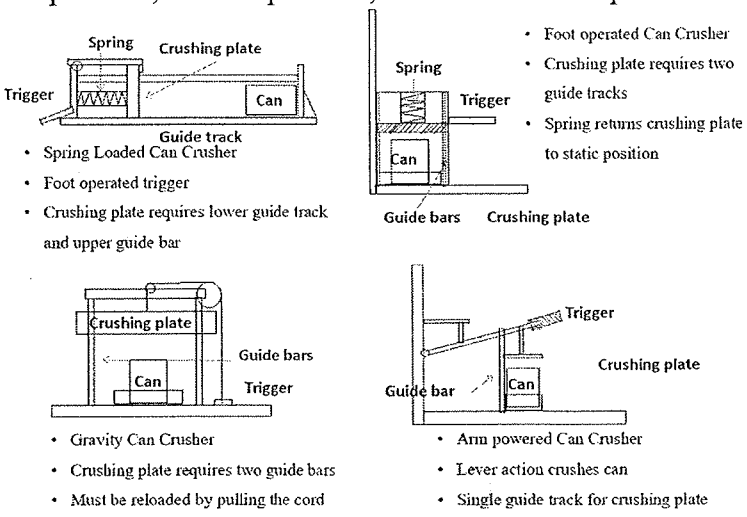
Max. Marks : 30

Date : 07/04/2022

Instructions :

- i) All questions are compulsory
- ii) Assume suitable data wherever necessary and clearly state it
- iii) Figures to the right indicate full marks

Q. 1 Solve/Answer Any Five. ( Marks : 5)																												
	Questions	Marks	CO	BL																								
a)	List any two 21 <sup>st</sup> century grand challenges of engineering.	1	CO1	1																								
b)	What is project management?	1	CO2	1																								
c)	List types of design functions.	1	CO3	1																								
d)	List various types of gears.	1	CO4	1																								
e)	What are good practices for writing an email?	1	CO6	2																								
f)	Which are the types of communication?	1	CO6	2																								
Q. 2	Examine application of industry 4.0 with the help of case study.	5	CO1	3																								
Q. 3	What is Gantt chart? Prepare Gantt chart for given data. In the following table there are seven tasks, labeled A through G. Some tasks can be done concurrently (A and B) while others cannot be done until their predecessor task is complete (C and D cannot begin until a is complete).	5	CO2	3																								
	<table border="1"> <thead> <tr> <th>Activity</th> <th>Predecessor</th> <th>Expected time (days)</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>-</td> <td>4</td> </tr> <tr> <td>B</td> <td>-</td> <td>5</td> </tr> <tr> <td>C</td> <td>A</td> <td>5</td> </tr> <tr> <td>D</td> <td>A</td> <td>6</td> </tr> <tr> <td>E</td> <td>B,C</td> <td>5</td> </tr> <tr> <td>F</td> <td>D</td> <td>4</td> </tr> <tr> <td>G</td> <td>E</td> <td>5</td> </tr> </tbody> </table>	Activity	Predecessor	Expected time (days)	A	-	4	B	-	5	C	A	5	D	A	6	E	B,C	5	F	D	4	G	E	5			
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Q.4	What is kinematic diagram? How it is useful for engineers? Analyze following mechanical equipment and draw its kinematic diagram.	5	CO4	4																								
																												

<p><b>Q.5</b></p>	<p>Consider following design for an aluminium can crusher. Evaluate the designs using following objectives and Pugh chart. Safety: 30 percent , Ease of use: 20 percent, Portability: 20 percent, Durability and strength:10 percent, Speed of operation :10 percent ,Cost:20 percent , size of device : 5 percent</p>  <ul style="list-style-type: none"> <li>• Spring Loaded Can Crusher</li> <li>• Foot operated trigger</li> <li>• Crushing plate requires lower guide track and upper guide bar</li> <li>• Foot operated Can Crusher</li> <li>• Crushing plate requires two guide tracks</li> <li>• Spring returns crushing plate to static position</li> <li>• Gravity Can Crusher</li> <li>• Crushing plate requires two guide bars</li> <li>• Must be reloaded by pulling the cord</li> <li>• Finger trigger</li> <li>• Arm powered Can Crusher</li> <li>• Lever action crushes can</li> <li>• Single guide track for crushing plate</li> </ul>	5	CO3	5
<b>(OR)</b>				
<p><b>Q.5</b></p>	<p>A mars rover is to be designed with four-wheel drive. The total load on the robot including self-weight, payload is 15 Kg. The robot also consists of a pick and place mechanism as shown in figure. The robot is supposed to lift a weight on 5 Kg. Determine Motors which are to be used in drive system of robot and in lifting mechanism. Also determine the battery requirement if the robot is to be operated for 3 days .The wheel diameter is 1 m. The robot is supposed to have a speed of 20m/s. The lifting mechanism is supposed to have maximum speed of 0.5m/s at pulley. The diameter of pulley in lifting mechanism is 0.25 m. Gravity on mars is 0.375 of that on the earth.</p>	5	CO3	3
<p><b>Q.6</b></p>	<p>An application requires temperature monitoring. Select suitable sensor, Arduino, draw interfacing diagram and write down the program, flow chart.</p>	5	CO5	6
<b>(OR)</b>				
<p><b>Q.6</b></p>	<p>An ultrasonic sensor is attached to Arduino mega. Intensity of LED on pin 13 is to be controlled based on the distance from ultrasonic sensor. More the distance more intensity of LED. Write a program for the task. Also draw flow chart.</p>	5	CO5	6