

Name:

Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**End Semester Examination, December 2019**

**Program: M. Tech- HSE and HSE+DM**

**Subject (Course): Electrical Safety**

**Course Code : HSFS 7005**

**No. of page/s: 2**

**Semester – I**

**Max. Marks : 100**


**Duration : 3 Hrs**

**SECTION A**

S. No.	Answer all the questions:	20 Marks	CO
Q 1	Expand the following: a. AED b. <b>ELCB</b> c. HECF (29 CFR 1910.147) d. AFPB	[4]	CO 1- CO 3
Q 2	List the classification of equipment based on voltage levels.	[4]	CO 1- CO 2
Q 3	Define the following: a. Hazardous Area b. Type-p equipment c. Spontaneous Ignition d. MESH	[4]	CO 5
Q 4	Postulate the general preventive and protective measures to be taken against static accumulation	[4]	CO 4
Q 5	Brief the hazardous causes and consequences of an 'Arc Flash'	[4]	CO 2

**SECTION B**

	Answer all the questions:	40 Marks	CO
Q 5	Enlist and enumerate various factors that affect impact of shock.	[2+8]	CO 1
Q 6	Enumerate the causes of static accumulation and discharge in case of combustible/non-combustible solids.	[10]	CO 4
Q 7	Discuss the steps involved in HECF in both administrative and engineering perspectives. Quote relevant national (or) international standard/code for the same.	[4+6]	CO 3

Q 8	<p style="text-align: center;">Discuss the specifications mentioned in the label below:</p> <div style="text-align: center; background-color: red; color: black; padding: 5px;">  <span style="font-size: 2em; font-weight: bold; margin-left: 10px;">WARNING</span> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p style="margin: 0;"><b>Arc Flash and Shock Hazard</b></p> <p style="margin: 0;"><b>Appropriate PPE Required</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"><b>89 inch</b></td> <td><b>Flash Hazard Boundary</b></td> </tr> <tr> <td><b>16.4</b></td> <td><b>cal/cm<sup>2</sup> Flash Hazard at 18 inches</b></td> </tr> <tr> <td><b>Class 3</b></td> <td><b>Cotton Underwear + FR Shirt &amp; Pant + FR Coverall</b></td> </tr> <tr> <td><b>480 VAC</b></td> <td><b>Shock Hazard when cover is removed</b></td> </tr> <tr> <td><b>00</b></td> <td><b>Glove Class</b></td> </tr> <tr> <td><b>42 inch</b></td> <td><b>Limited Approach (Fixed Circuit)</b></td> </tr> <tr> <td><b>12 inch</b></td> <td><b>Restricted Approach</b></td> </tr> <tr> <td><b>1 inch</b></td> <td><b>Prohibited Approach</b></td> </tr> </table> <p style="text-align: center;">(OR)</p> <p>Read the following case study: <b>A worker in a street side bakery electrocuted while powering a toast maker with 230V, 1-phase outlet. The manager of bakery at the time of incident, saw the worker being attached to outlet and convulsing. He tried switching off the supply by MCB, but he was unable to locate the exact one which's associated with that outlet.</b></p> <p><b>Later on next day two electricians visited shop and reported that two plug sockets and necessary repairs were done. They reported that two outlets were old, cracked and loosely connected, in which the toast maker was connected to one of them.</b></p> <p>Then:</p> <ol style="list-style-type: none"> <li>a. List the possible initiating causes of such occurrence.</li> <li>b. Postulate any five proactive and reactive measures that could have avoided the incident</li> </ol> </div>	<b>89 inch</b>	<b>Flash Hazard Boundary</b>	<b>16.4</b>	<b>cal/cm<sup>2</sup> Flash Hazard at 18 inches</b>	<b>Class 3</b>	<b>Cotton Underwear + FR Shirt &amp; Pant + FR Coverall</b>	<b>480 VAC</b>	<b>Shock Hazard when cover is removed</b>	<b>00</b>	<b>Glove Class</b>	<b>42 inch</b>	<b>Limited Approach (Fixed Circuit)</b>	<b>12 inch</b>	<b>Restricted Approach</b>	<b>1 inch</b>	<b>Prohibited Approach</b>	[10]	CO 2
<b>89 inch</b>	<b>Flash Hazard Boundary</b>																		
<b>16.4</b>	<b>cal/cm<sup>2</sup> Flash Hazard at 18 inches</b>																		
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<b>SECTION-C</b>																			
	<b><u>Answer the following:</u></b>	<b>40 Marks</b>																	
Q 9	An electrical equipment has the following things on its nameplate: “Ex ib IIC T1 Z-1”. Name and explain the details of terms mentioned above.	[5+15]	CO5																
Q 10	<p>Explain various types, construction and working of leakage protection devices used mostly in construction sector, with the help of neat sketches.</p> <p style="text-align: center;">(OR)</p> <p>Define ‘fuse’(electric). With necessary sketches, discuss about various types of fuses along with their applications and limitations.</p>	[10+10]  [2+15+3]	CO 3																