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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES End Semester Examination, Dec 2022																																							
Program Name : MCA		Semester : 3 rd																																					
Course Name : Deep Learning and ANN		Time : 3 hour																																					
Course Code : CSAI8003		Max. Marks : 100																																					
No. of Page(s) : 3																																							
Instructions : Attempt all																																							
SECTION-A																																							
S. No.		Marks	CO																																				
Q.1	<p>Convolution</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>183</td><td>182</td><td>186</td><td>189</td><td>191</td><td>191</td></tr> <tr><td>186</td><td>185</td><td>191</td><td>184</td><td>132</td><td>85</td></tr> <tr><td>187</td><td>192</td><td>150</td><td>44</td><td>16</td><td>16</td></tr> <tr><td>189</td><td>155</td><td>27</td><td>13</td><td>12</td><td>12</td></tr> <tr><td>181</td><td>37</td><td>14</td><td>14</td><td>15</td><td>15</td></tr> <tr><td>96</td><td>16</td><td>14</td><td>14</td><td>15</td><td>14</td></tr> </table> <p style="text-align: center;">Figure 1: Image image for Question 1 Consider the following 6X6 image for convolution operation.</p> <p>(a) Is this a colour image, grayscale image or a black and white image? Give reason for your answer. (2)</p> <p>(b) We have to convolve the image with 3x3 and 5X5 kernels. What will be the size of the image after convolution? State any assumption you are making. (4)</p> <p>(c) State two 3X3 convolution kernel which will compute the gradient of the image in x and y directions. (4)</p> <p>(d) What are symmetric and non-symmetric kernels? What are the types of your kernels? (4)</p> <p>(e) How are convolution and correlation operations different and how are they similar? (4)</p> <p>(f) Compute and state the results of convolution and correlation for the above image with your two kernels. (14)</p>	183	182	186	189	191	191	186	185	191	184	132	85	187	192	150	44	16	16	189	155	27	13	12	12	181	37	14	14	15	15	96	16	14	14	15	14	32	CO2 CO3
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Q.2	<p>Neural networks (MLP) and Activation functions</p> <p>(a) What are activation functions? What is their role in Neural networks? State three activation functions you are familer with. (7)</p> <p>(b) Give the formulas for your activation functions and their derivatives. (9)</p> <p>(c) What are the range of values your activation functions can take? What are their values and the values of their derivatives when the input is zero? (12)</p> <p>(d) What are vanishing gradient and exploding gradient problems in neural networks? (4)</p> <p>(e) Give three design consideration in chosing an activation function. (3)</p>	35	CO1 CO3																																				
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SECTION-B			
S. No.		Marks	CO
Q.3	<p>Non-linear regression MLP We have a problem of multi-variate non-linear regression. There are 100 input features for the problem and we need to predict three output variables. We have to construct a two hidden layer MLP for this problem.</p> <p>(a) What will be the number of nodes in the input and output layer?</p> <p>(b) Let there be two hidden layers with 10 nodes each. Construct a computational graph representation of this MLP.</p> <p>(c) Compute the total number of trainable parameters for this MLP. Please do show the intermediate steps for your computation for each layer.</p> <p>(d) What will be your choice of activation functions in the hidden and output layers of your MLP? Give reasons for your choice.</p> <p>(e) What are loss functions in neural network models? Give three examples of loss functions? What is the difference between loss function and objective function?</p> <p>(f) Give your choice for a loss function for this problem and state two reasons for this choice.</p>	<p>33</p> <p>(2)</p> <p>(6)</p> <p>(10)</p> <p>(6)</p> <p>(6)</p> <p>(3)</p>	CO 2