

# Nirma University

Institute of Technology  
Semester End Examination, May 2021

BTech CE Sem. VI  
2CSDE61 Deep Learning

Roll /  
Exam  
No.

Supervisor's  
initial with  
date

Time: 1.5 Hours

Max. Marks: 40

- Instructions:
1. Attempt all questions.
  2. Figures to right indicate full marks.
  3. Draw neat sketches wherever necessary.
  4. Assume suitable data wherever applicable and clearly mention them.
  5. CLO\_ and BL\_ have been mentioned against each question to map it as per Course Learning Objective and Bloom's taxonomy.

Q 1 What is a degradation problem in very deep neural [5]  
CLO1 networks? Explain the problem. How can this problem be  
BL1,2 addressed? Discuss the solution.

Q 2 What is fractionally strided convolution? Take a suitable [6]  
CLO2 example and discuss it in detail. Where this type of  
BL1,2 convolution is typically used?

**OR**

Q 2 What are regularized autoencoders? Discuss different types [6]  
CLO2 of regularized autoencoders with their pseudocode.

Q 3 Draw and describe UNET architecture. What are the special [7]  
CLO2,3 characteristics or contributions in the architecture?  
BL1,2

Q 4 Critically compare transfer learning with domain [8]  
CLO2,3 adaptation. If one wish to perform unsupervised domain  
BL3,4,6 adaptation using backpropagation, how is it possible?  
Discuss possible architecture and details regarding the loss  
function and backpropagation.

Q 5 Analyse the need of non-max suppression algorithm in [4]  
CLO2 YOLO. Also write the algorithm.  
BL4

**OR**

Q 5 Analyse the need of batch normalization. How can it be [4]  
CLO2 performed?  
BL4

Q 6 Assume a many-to-many simple RNN (e.g. similar to the one [10]  
CLO2 which is typically used for named-entity recognition).  
BL3,4 Assume that there is only 1 hidden layer and the network  
has been unrolled for 3 time-steps before backpropagating  
error gradients. Write equation for error gradients with  
respect to weights between (i) output and hidden neurons  
(e.g.  $W_{ya}$ ) (i) hidden neurons of time-step 't' and 't-1' (e.g.  $W_{aa}$ )  
(obviously t=3) and (ii) hidden and input neurons (e.g.  $W_{ax}$ )