Manarat International University (MIU)
Department of Computer Science and Engineering
Final Examination (Spring 2019)
Computer Vision and Robotics (CSE-437)

Full Marks: 50   Time: 2.5 Hour
Section-A

Answer any 6 (Six) questions for section-A. All questions are of equal value.

1   a. Write a code snippet using any programming language for feed-forward computation during   4 + 3
     forward pass of a 3-layer neural network

     b. Draw the analogy between a biological neuron and an artificial neuron.

2   a. What is the problem of using Xavier initialization while using **ReLU** non-linearity. What's the   4 + 3
     solution.

     b. Explain **1x1 convolution** in a CNN network.

3   a. Why do we need zero-mean and unit-variance activations in a deep neural network. Write a   4 + 3
     technique to achieve this.

     b. What problem(s) will result from using a learning rate that's too high or too low.

4   a. What is a saddle point? What is the advantage/disadvantage of Stochastic Gradient Descent (SGD)   4 + 3
     in dealing with saddle points?

     b. Why **Sigmoid** kills the gradient. Why do we use pooling layer in convolutional neural networks?

5   a. What problems do non zero-centered activation functions causes during back propagation of a   4 + 3
     neural network.

     b. How to initialize weights in a neural net so it performs well ?

6   a. Write a function using any language to implement **Adam** optimization algorithm.   4 + 3

     b. Explain why **Dropout** in a neural network acts as a regularizer.

7   a. Why second order optimization method impractical for training neural network?   4 + 3

     b. How **Model Ensembles** improve the performance of deep learning.

Answer the following questions for Section-B

8   Consider the convolutional network defined by the layers in the left column below. Fill in the size of   8
the activation volumes at each layer, and the number of parameters at each layer.

You can write your answer as a multiplication (e.g. 128 x128x3).

- CONV5-N denotes a convolutional layer with N neurons, each having 5x5xD filters, where D is the depth of the activation volume at the previous layer. Padding is 2, and stride is 1.
- POOL2 denotes a 2x2 max-pooling layer with stride 2 (pad 0)
- FC-N denotes a fully-connected layer with N neurons.

Layer	Activation Volume Dimensions (memory)	Number of parameters
INPUT	32x32x1	0
CONV5-10		
POOL2		
CONV5-10		
POOL2		
FC-10		