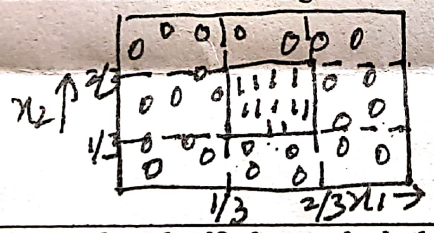
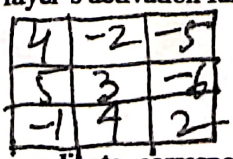
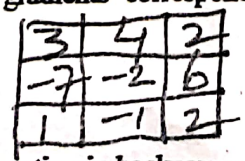
NATIONAL INSTITUTE OF TECHNOLGY PATNA
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
END SEMESTER EXAMINATION – JULY-DEC, 2022
B. Tech (Computer Science and Engineering) 7th Semester
CS7447 – Computer Vision
Full marks:70

Answer *any five* questions

Q. no.	Question	Marks	CO	BL
1	a. What do you mean by "low-pass" and "high-pass" filters? Name a few filters from both categories. Discuss the situations in which low-pass filters and high-pass filters are used? Justify your answer.	07	CO1	Knowledge, Analysis
	b. What is the relation between image frequency and image gradient? Explain with suitable example. Which filter should be used to remove the *short noise*? Justify your answer.	07	CO1	Knowledge, Analysis
2	a. Discuss the SIFT feature descriptor along with the diagram of its functioning.	07	CO2	Knowledge
	b. Discuss the technique of updating the kernel weights in CNN using backpropagation algorithm. Why generally more than one kernels are used in each convolutional layer?	07	CO3	Comprehension
3	a. Make a comparative analysis between VGG-16 and ResNet architectures along with the diagrams of both architectures.	09	CO3	Knowledge
	b. What is the use of class activation mapping (CAM) in CNN? Discuss the method in details.	05	CO4	Knowledge
4	a. Design a neural network for the following situation: 	06	CO3	Application
	b. Design a neural network to classify the samples in their proper classes in the following training set: Class -1: (1,1), (1.5,1) and (2,1.5) Class 1: (5,6), (5.5,6) and (6,6)	08	CO3	Application
5	a. In a layer of CNN, assume the input size to be 256x256x3. What are the size of output feature map and number of parameters if the following values for hyper parameters are used: Stride =2, Filter size=5x5, Number of filters=64?	03	CO3	Application
	b. What is global average pooling (GAP)? Explain with an example.	03	CO4	Knowledge
	c. Discuss in details the object detection technique using Faster R-CNN. Also draw its architecture.	08	CO4	Knowledge
6	a. Consider the input to a CNN layer's activation function (use ReLU) as  and while backpropagation, gradients corresponding to the previous input is  What is the result of backpropagation in backpropagation algorithm?	06	CO3	Application

	b. Discuss in details the object detection technique using YOLO architecture. Make a comparative analysis between Faster R-CNN and YOLO.	08	CO4	Knowledge
7	a. Why vanishing gradient problem occurs in recurrent neural network (RNN)? Discuss with suitable equations. How this problem can be solved in the variants of RNN?	04	CO5	Comprehension
	b. Discuss the properties and cell architectures of LSTM and BLSTM variants of RNN along with the diagram of cell architectures.	10	CO5	Knowledge