Tanta University

Department: Computers and Control Eng.
Total Marks: 85 Marks

Faculty of Engineering

Course Title: **Elective Course (2) – Distributed Systems**	Course Code: **CCE4105**	Year: **4th Computers**
Date: **22/1/2023 (First term)**	Allowed time: **3 hr**	**No. of Pages: (3)**

Please make your answer specific for the question, extra answers will cause omitting the whole answer

Question 1 (30 marks):

(a)- Compare between the following pairs: **(6 Marks)**

i- Active and passive replica ii- Thin and thick clients

(b) What is the difference between "**execution time**" and "**response time**" of a process in a distributed system? What is the role of scheduler in reducing both of them? You must illustrate your answer with drawings in addition to your discussion. **(6 Marks)**

(c) "Mobile code and mobile agent can be **benefit** and **may cause serious problems**". Discuss. **(4 Marks)**

(d) Draw a diagram to present the idea of speedup the sequential portion of an algorithm and write down the equation used in computing the maximum possible speedup. **(5 Marks)**

From your presentation (or the presentation you have chosen) answer the following clearly:

1. Title 2. Importance to the community 3. Recent approaches used 4. Applications **(6 Marks)**

(f) How can you speed up SISD computer in at least 3 ways in details? **(6 Marks)**

Question 2 (25 marks):

(a) What is the Distributed File system and how it is different from traditional file systems Mention three important functions that are available in the traditional file systems and three in the distributed file systems. **(5 Marks)**

(b) In the caching system (upload/download service model) the cache consistency problem is raised. How can we handle this problem? **(4 Marks)**

(c) What are the differences between stateful and stateless server when dealing with clients? Then discuss how the failure is recovered in each case. **(4 Marks)**

(d) What are the characteristics of the best scheduler? **(4 Marks)**

(e) Task migration is one of the features that appears with distributed systems. What is the task migration? is it considered adaptive or non-adaptive scheduler and static or dynamic scheduler? What are the steps of using task migration? **(5 Marks)**

(f) What is the meaning of critical section (CS)? And how the critical region is accessed in distributed systems? Token-based approach for coordinating the access of CS has a major problem of how to determine the token holding time for the processes. Propose how to estimate this time in two different ways. **(5 Marks)**

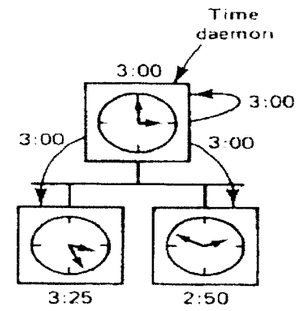
Question 3 (30 marks):

(a) Define transparency and mention two types and state how this will help the user? **(3 Marks)**

(b) What is the difference between logical clock and physical clock? Does the synchronization occur before or during the cooperation of processes in both Lambort and Berkeley algorithms? **(4 Marks)**

(c) In peer to peer model, we have two ideas for organizing the peers: directory based and flooding based. Explain how the peers are organized, how a new peer can join the system, how to search for a certain file in the system mentioning the cons and pros of both models (use figures too). **(5 Marks)**

(d) Use the **Berkeley UNIX** algorithm to synchronize the physical clocks which is given in the following figure, where the top clock is the time in the time server or the daemon time and the lower clocks are client clocks. You answer should indicated the solution steps. **(4 Marks)**



(e) Tanta University intends to build Tanta Cloud center (hoping it does not rain) and are asked to help in the process. To do so you are asked to: **(8 Marks)**

1- Mention the tangible and intangible benefits that can be gained by this cloud.
2- How to build such center from the point of view of the HW and SW.
3- If we are using IoT devices to monitor some parameters of the university like student attendance, temperature, control light to save energy, how to connect them and what layer you can add to help speeding its response.
4- Draw a schematic diagram of such system

Practical part (10 Marks)

A. True or false then correct the false **(5 marks)**

1) Go is a proprietary programming language that makes it easy to build simple, reliable, and efficient software.
2) The reason behind the high performance of go is its virtual machine (similar to java JVM).
3) RPC is mainly used to allow explicit message exchange between processes.
4) In the HTTP-based/REST communication model, the addressable units are procedures, and the entities of the problem domain are hidden behind the procedures.
5) Goroutines are fired using go keyword then the function name.
6) goroutines are multiplexed among multiple operating system threads. Which makes go capable of managing millions of goroutines.

B. Consider the following program that computes the elementwise product of two vectors (Corresponding entries in both vectors are multiplied together). Here we have vectors x and y consisting of twos and threes, receptively. When multiplied together we get a vector called prod which consists of sixes. **(5 marks)**

```
__global__
void task(float *x, float *y, float *prod, int n) {
   int index = blockIdx.x * blockDim.x + threadIdx.x;
   int stride = blockDim.x * gridDim.x;
   for (int i = index; i < n; i += stride)
      prod[i] = x[i] * y[i];
}

int main() {
   float *h_x, *h_y, *h_prod;          // declaring memory in host
   float *d_x, *d_y, *d_prod;          // declaring memory in device

   // allocating memory on host
   h_x = (float *) malloc(sizeof(float) * N);
   h_y = (float *) malloc(sizeof(float) * N);
   h_prod = (float *) malloc(sizeof(float) * N);
```

```
// initializing h_x and h_y
for (int i = 0; i < N; i++)
   h_x[i] = 2.0f,h_y[i] = 3.0f;

// allocating memory on device
cudaMalloc((void **) &d_x, sizeof(float) * N);
cudaMalloc((void **) &d_y, sizeof(float) * N);
cudaMalloc((void **) &d_prod, sizeof(float) * N);

cudaMemcpy(d_x, h_x, sizeof(float) * N, ...(1)... );
cudaMemcpy(d_y, h_y, sizeof(float) * N, ...(1)... );

task<<<32, 128 >> > (d_x, d_y, d_prod, N);

cudaMemcpy(h_prod, d_prod, sizeof(float) * N, ...(2)... );

...(3)...;  // Wait for GPU to finish before accessing on host

...(4)...(d_x);
...(4)...(d_y);
...(4)...(d_prod);
...(5)...(h_x);
...(5)...(h_y);
...(5)...(h_prod);
return 0;
}
```

Question 1) Choose the correct answer that replaces the underlined numbers in the code

...(1)... is
A. cudaMemcpyHostToDevice B. cudaMemcpyDeviceToHost
C. cudaMemcpyDeviceToDevice

...(2)... is
A. cudaMemcpyHostToDevice B. cudaMemcpyDeviceToHost
C. cudaMemcpyDeviceToDevice

...(5)... is
A. cudaDeviceSynchronize() B. cudaDeviceReset()
C. cudaMemcpy()

Question 2) Choose the correct answer

1. The kernel function in this code is
   A. task B. _global__ C. main
2. Considering the "task" function, gridDim.x value is
   A. 32 B. 128 C. 4
3. Considering the "task" function, blockDim.x value is,
   A. 32 B. 128 C. 4

Best of Luck My Dear Students

Course Coordinators: Prof. Dr. Amany Sarhan

Model (A)

Tanta University | **Department:** Computers and Control Eng. | **Faculty of Engineering**

Total Marks: 85 Marks

Academic Year: 2022/2023(First Semester)

Course Title: **Neural Networks**	Course Code: **CCE4129**	**Fourth Year Students**
Date: **24 -1-2023 (Final-Semester Exam)**	Time Allowed: **3 hours**	No. of Pages: (4)

Answer all the following questions.

Question (1 - A) **(45 Marks)**

Hint:Round numbers to three decimal places (e.g. 5.7675→5.768 and 5.7673→5.767)

Shade the circle of the most appropriate answer in your electronic answer sheet:

A single input neuron has a weight of 1.3 and a bias of 3.0. Solve the questions from (**point 1**) to (**point 4**)

1) What possible kind of activation functions could this neuron have, if its output value S=1.6
   a) Tanh b) binary sigmoidal c) bipolar threshold d) linear e) None of these
2) What possible kind of activation functions could this neuron have, if its output value S=-1
   a) binary threshold b) binary sigmoidal c) bipolar threshold d) None of these
3) Consider the activation function in (**point 1**), what is the value of the input that would produce the output value S=1.6
   a) -1.077 b) -2.402 c) -3.701 d) -4.511 e) None of these
4) Consider the activation function in (**point 2**), what is the value of the input that would produce the output value S= -1
   a) -4.494 b) -6 c) -0.561 d) both a and b are correct e) None of these

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Design a neural network, with two inputs x_1 and x_2 and a single output s, that behaves as a two-class data classifier. The network is required to have the least possible number of neurons. On the x_1-x_2 plane, two separation lines are defined as : $x_1 + x_2 - 1 = 0$ and $x_1 - x_2 - 1 = 0$
All input patterns (x_1, x_2) inside the upper and lower areas enclosed by the separation lines are identified by an output value s = 1, whereas all input patterns outside these areas are identified by s = 0. Solve the questions from (**point 5**) to (**point 10**)

5) The number of hidden layers in the neural network are:
   a) 1 b) 2 c) 3 d) None of these
6) The number of neurons in the neural network (input, hidden and output layers) are:
   a) 5 b) 6 c) 7 d) None of these
7) The number of neurons in the second layer are:
   a) 0 b) 1 c) 2 d) 3 e) None of these
8) The number of neurons in the third layer are:
   a) 0 b) 1 c) 2 d) 3 e) None of these
9) How will your network classify the input pattern (2,1).
   a) s=1 b) s=0 c) s= -1 d) None of these
10) How will your network classify the input pattern (1,0).
   a) s=0 b) s=1 c) s= -1 d) None of these

---

11) If I am using all features of my dataset and I achieve ~50% accuracy on my training set, but ~60% on testing set, what should I look out for?
   a) Underfitting b) Nothing, the model is perfect
   c) Overfitting d) Both a and c are correct e) None of these

A three-layer neural network is being trained through a backpropagation learning algorithm with a learning rate of 0.8. The input layer has two neurons N1 and N2 with inputs 2 and -1.5, respectively. The hidden layer has two neurons N3 and N4 and the output layer has a single neuron N5. Neurons N3, N4 and N5 employ a hyperbolic tangent activation function each. The desired response of the network(d) is 0.5. At a particular iteration of the algorithm, the weights are set as :

$w_{13} = w_{14} = 0.7$, $w_{23} = w_{24} = 0.6$, $w_{35} = w_{45} = 1$, $w_{03} = 0.4$, $w_{04} = -1$, $w_{05} = 1.2$

Solve the questions from (**point 12**) to (**point 26**)

12) the neuron N3 has an activation value y_3 =.....
   a) 0.3 b) 0.9 c) 0.6 d) 0.7 e)None of these
13) the neuron N4 has an activation value y_4 =.....
   a) - 0.3 b) -0.2 c) -0.7 d) -0.5 e)None of these
14) the neuron N5 has an activation value y_5 =.....
   a) 1.854 b) 1.454 c) 2.462 d) 2.834 e)None of these
15) the neuron N5 has an output value $f(y_5)$=.....
   a) 0.586 b) 0.455 c) 0.897 d) 1.534 e)None of these
16) Calculate the gradient of w_{05} when the error value ($e=d-f(y_5)$) of the neuron N5 is (-0.396)
   a) 0.078 b) 0.019 c) 0.003 d) 0.316 e)None of these
17) Calculate the gradient of w_{35} when the neuron N3 has an output value $f(y_3) = 0.716$
   a) 0.228 b) 0.347 c) 0.056 d) 0.01 e)None of these
18) Calculate the gradient of w_{45} when the neuron N4 has an output value $f(y_4) = -0.462$
   a) -0.084 b) -0.011 c) -0.059 d) -0.036 e)None of these
19) Calculate the gradient of w_{13} when the gradient of $w_{03} = 0.038$
   a) 0.024 b) 0.076 c) 0.050 d) 0.046 e)None of these
20) Calculate the gradient of w_{23} when the gradient of $w_{03} = 0.038$
   a) -0.015 b) -0.036 c) -0.057 d) -0.077 e)None of these
21) Calculate the gradient of w_{14} when the gradient of $w_{04} = 0.061$
   a) 0.122 b) 0.045 c) 0.312 d) 0.376 e)None of these
22) Calculate the gradient of w_{24} when the gradient of $w_{04} = 0.061$
   a) -0.044 b) -0.024 c) -0.067 d) -0.092 e)None of these
23) Calculate the new weight value of w_{03} for the next iteration.
   a) 0.583 b) 0.370 c) 0.876 d) 0.501 e)None of these
24) Calculate the new weight value of w_{04} for the next iteration.
   a) -2.103 b) -0.470 c) -2.076 d) -1.049 e)None of these
25) Calculate the new weight value of w_{05} for the next iteration.
   a) 2.546 b) 2.143 c) 1.138 d) 1.954 e)None of these
26) Calculate the new weight value of w_{23} for the next iteration.
   a) 0.646 b) 0.345 c) 1.521 d) 0.831 e)None of these

---

27) Weighted sums in ANNs are referred to as _____?
   a) Input b) Output c) Activation d) Link e)None of these
28) What is shape of dendrites like
   a) oval b) round c) tree d) rectangular e)None of these
29) Which of the following autoencoder methods uses corrupted versions of the input?
   a) overcomplete b) undercomplete c) sparse d) denoising e)None of these

30) In perceptron learning, what happens when input vector is correctly classified?
a) small adjustments in weight is done b) large adjustments in weight is done
c) no adjustments in weight is done
d) weight adjustments doesn't depend on classification of input vector

31) With ..... learning, the learning algorithm's parameters are updated after learning from each individual training instance.
a) batch b) pattern-by-pattern c) epoch-based d) both a and c are correct e)None of these

32) Which of the following autoencoder methods uses a hidden layer with fewer units than the input layer?
a) overcomplete b) undercomplete c) sparse d)None of these

33) Regularization refers to techniques that are used to calibrate machine learning models in order to minimize the adjusted loss function and prevent .....
a) overfitting b) underfitting c) Both a and c are correct d)None of these

34) .....autoencoder isn't able to simply develop a mapping which memorizes the training data because the input and target output are no longer the same.
a) An undercomplete b) Denoising c) Sparse d) Contractive e) None of these

35) What is reinforcement learning?
a) learning is based on evaluative signal b) learning is based on desired output for an input
c) learning is based on both desired output & evaluative signal d) None of the these

36) For variational autoencoders, the encoder model is sometimes referred to as the .....model.
a) generative b) recognition c) randomization d) Both a and b are correct e) None of these

37) After training a neural network, you observe a large gap between the training accuracy (100%) and the test accuracy (42%). Which of the following methods is commonly used to reduce this gap?
a) Generative Adversarial Networks b) Dropout
c) Sigmoid activation d) RMSprop optimizer

38) While applying a 3x3 convolution filter to an input feature map of height and width 28x28 with stride=2 and 1-pixel padding is applied, the output feature map height and width is?
a) 28x28 b) 26x26 c) 14x14 d) 13x13 e) None of these

39) For an image classification task, which of the following deep learning algorithm is best suited?
a) Recurrent Neural Network b) Multi-Layer Perceptron
c) Convolution Neural Network d) All of the above

40) Which strategy does not prevent a model from over-fitting to the training data?
a) Dropout b) Pooling c) Regularization d) Early stopping

41) Which of the following is a correct order for the Convolutional Neural Network operation?
a) Convolution -> max pooling -> flattening -> full connection
b) Max pooling -> convolution -> flattening -> full connection
c) Flattening -> max pooling -> convolution -> full connection d) None

42) What function is NOT used to make a pooling layer for a CNN?
a) max_pool() b) avg_pool() c) min_pool() d) all of these are used

43) _____ regularization technique involves each neuron having a probability p of being temporarily "dropped"
a) Dropout b) PCA c) Manifold learning d) Projection

44) Which architecture would be most likely to be used to identify objects in an image:
a) RNN b) CNN c) LSTM d) None of These

45) Training accuracy approaches 95%, but validation accuracy remains at 60%. Your model is likely...
a) Underfitting b) Overfitting c) Fit d) None of these

Question (1 - B) **(20 Marks)**

Shade the circle in your electronic answer sheet (choose True / False):

1) Autoencoders are a supervised learning technique
2) An undercomplete autoencoder has no explicit regularization term
3) In order to overcome constraint of nonlinearly separablity concept of multilayer feedforward net is proposed
4) In a sparse autoencoder, we'll construct the loss function such that we penalize activations within a layer.
5) The perceptron is the simplest form of a neural network used for the classification of patterns.
6) Variational autoencoders essentially makes the neurons ignore small fluctuations in the data.
7) A perceptron adds up all the weighted inputs it receives, and if it exceeds a certain value, it outputs a 0, otherwise it just outputs a 1.
8) Dendrites are the branches that receive information from other neurons
9) Batch learning allows network to incrementally adjust weights continuously
10) Delta rule learning is of a supervised type
11) Threshold activation function makes things easy for multi-class classification problems.
12) The network that involves only forward links from input to the output and hidden layers is called as Recurrent neural network
13) You have a dataset of different flowers containing their petal lengths and color. Your model has to predict the type of flower for given petal lengths and color. This is a classification task
14) Leaky ReLU is an improved version of ReLU function to solve the Dying ReLU problem as it has a large positive slope in the negative area.
15) A neural network with multiple hidden layers can form non-linear decision boundaries.
16) The threshold activation function only supports binary classification.
17) Back propagation is the transmission of error back through the network to adjust the inputs
18) It is possible to represent a NOR function with a neural network without a hidden layer.
19) Backpropagation will not work with the Threshold activation function
20) We may solve the 2-input XOR problem by using a single layer with two neurons

Question (2) **(20 Marks)**

1. Give two benefits of using convolutional layers instead of fully connected neural networks.
2. What is Overfitting and Underfitting, and How to Combat Them?
3. What are the Different CNN parameters?
4. What is Pooling on CNN, and How Does It Work?
5. What is the difference between batch gradient descent and stochastic gradient descent?
6. What is the difference between Empirical loss and Quantifying loss?
7. Explain briefly each of the following: a) Cost Function b) Convolution Operation
8. Given the following confusion matrix obtained from testing a trained binary classifier of two classes M and N. First, specify Tp, Tn, Fp, and Fn. Then, evaluate the classifier using the following metrics: (4 Marks)
   - Accuracy
   - Recall
   - Specificity
   - Success Error Rate

		Predicted	
		M	N
Actual	M	190	40
	N	25	215

End of questions **Good luck all**

Ass. Prof. Nada M. Elshennawy Dr. Mohamed Abdalla Attia

Model B

Tanta University — Computers and Control Eng. Department — Faculty of Engineering

Course Title	Pattern Recognition and Digital Image Processing	**Academic Year 2022/2023 First- Semester Exam**	**Course Code**	CCE4130
Year	Fourth			
Date	15-Jan- 2023	**No. of Pages** (6)	**Allowed time**	3:00 hrs

Questions **(Total points: 85 Marks)**

Shade the circle of the most appropriate answer in your electronic answer (bubble) sheet and write your justification in your answer notebook for computational questions:

1) .....is the amount of energy an observer perceives from a light source.
a) Brightness b) Radiance c) Luminance d) Intensity

2) What is the output of a smoothing linear spatial filter?
a) Median of pixels b) Maximum of pixels
c) Geometric mean of pixels. d) Mean of pixels

3) In ..... Image, we notice that the components of histogram are concentrated on the centre of intensity scale.
a) High contrast b) bright c) dark d) low contrast e) washed-out

4) The type of Histogram Processing in which pixels are modified based on the intensity distribution of specified image regions is called .....
a) Intensive b) Local c) Global d) Random e) None of the Mentioned

5) Cones are very sensitive to light more than rods due to its existence with large number.
a) True b) False

6) In spatial domain, which of the following operation is done on the pixels in sharpening the image?
a)Integration b)Average c)Median d) Differentiation

7) Which of the following is the valid response when we apply a first derivative?
a) Non-zero at flat segments b) Zero at the onset of gray level step
c) Zero in flat segments d) Zero along ramps

8) Suppose that a flat area with center at (x0,y0) is illuminated by a light source with intensity distribution:

$$i(x, y) = Ke^{-[(x-x_0)^2+(y-y_0)^2]}$$

Assume for simplicity that the reflectance of the area is constant and equal to1.0, and let K=255. If the resulting image is digitized with m bits of intensity resolution, and the eye can detect an abrupt change of 8 shades of intensity between adjacent pixels, what value of m will cause visible false contouring?
a) 5 b) 32 c) 64 d) 128 e) None of these

9) In a given application, an average mask is applied to input images to reduce noise and then a Laplacian mask is applied to enhance small details. We predict that if the order of the operations were reversed, then the result will be the same
a) True b) False

10) Suppose the intensities in an image can be described by the equation $I(x, y) = (x-10)^2 + (y-10)^2$. What is the gradient of the pixel at the position (8, 15)?
a) (-4, 10) b) (4, 10) c) (4, 25) d) (-4, 25) e) None of these

Model B

Tanta University — Computers and Control Eng. Department — Faculty of Engineering

11) To detect the edges of an image, which filter is most preferred?
a) Average b) Gaussian c) Max d) Laplacian e) None of these

12) A commercial use of Image Subtraction is .....
a) Mask mode radiography b) MRI scan c) CT scan d) None of these

13) The distance between pixels p and q, the pixels have a distance less than or equal to some value of radius r, form a diamond centred at (x,y) is called :
a) Euclidean distance b) Chessboard distance
c) City-Block distance d) None of the Mentioned

14) Which of the following transformations is particularly well suited for enhancing an image with white and gray detail embedded in dark regions of the image, especially when there is more black area in the image?
a) Log transformations b) Power-law transformations
c) Negative transformations d) None of the mentioned

15) Which of the following transformations expands the value of dark pixels while the higher-level values are being compressed?
a) Log transformations b) Inverse-log transformations
c) Negative transformations d) None of the mentioned

16) Although power-law transformations are considered more versatile than log transformations for compressing of gray-levels in an image, then, how is log transformations advantageous over power-law transformations?
a) The log transformation compresses the dynamic range of images
b) The log transformations reverse the intensity levels in the images
c) The log transformation stretches the dynamic range of images
d) None of the mentioned

17) ROI operation is an application of image .....
a) addition b) subtraction c) registration d) multiplication e) division

18) The power-law transformation is given as: $s = cr^{\gamma}$, c and γ are positive constants, and r is the gray-level of image before processing and s after processing. What happens if we increase the gamma value from 0.3 to 0.7?
a) The contrast increases and the detail increases
b) The contrast decreases and the detail decreases
c) The contrast increases and the detail decreases
d) The contrast decreases and the detail increases

19) If the image is undersampled, then a phenomenon called____corrupts the sampled image.
a) Zooming b) Aliasing c) Pixel replicating d) Duplicating e) None of these

20) In Histogram Matching r and z are gray level of input and output image and p stands for PDF, then, what does pz(z) stands for?
a) Specific probability density function b) Specified pixel distribution function
c) Specific pixel density function d) Specified probability density function

21) Inverse transformation plays an important role in which of the following Histogram processing Techniques?
a) Histogram Linearization b) Histogram Equalization
c) Histogram Matching d) None of the mentioned

22) How is sampling been done when an image is generated by a strip sensing element combined with mechanical motion?

a) The direction of sensors on the strip establishes the limits of sampling in one direction and Mechanical motion in the other direction.

b)The number of sensors in the strip defines the sampling limitations in one direction and Mechanical motion in the other direction.

c) The number of mechanical movement increments when the strip is activated

d) None of the mentioned.

23) For a local enhancement using mean and variance, there is one condition: $\sigma s(x, y) \leq k_2 D_G$, where, M_{DG} is global standard deviation, k_2 a positive constant and $\sigma s(x, y)$ a measure of contrast at point (x, y). Then, which fact is true for k_2 if its values is less than 1.0?

a) Enhancement is being done on light areas

b) Enhancement is being done on dark areas

c) Enhancement is being done independent of value of k_0

d) None of the mentioned

24) The achromatic light is ……..?

a) Chromatic light b) Monochromatic light c) Infrared light d) Invisible light

Given the following image f(x,y) shown below. Let the input and output gray levels are in the range of [0, 7]. Apply histogram equalization on this image to answer questions from **25** to **32**.

1	1	5	5	0	0	1	0
1	1	2	2	0	1	0	1
1	7	6	6	5	5	0	0
0	7	6	7	5	5	5	5
4	7	6	7	3	5	7	0
1	1	4	1	6	5	6	1
2	2	4	1	1	5	1	1
1	2	2	0	0	0	0	5

25) The pixels of intensity=3 in the input image will be replaced by …….in the specified image.

a) intensity=2 b) intensity=3 c) intensity=4 d) intensity=5 e) None of these

26) The pixels of intensity=0 in the input image will be replaced by …….in the specified image.

a) intensity=1 b) intensity=2 c) intensity=3 d) intensity=0 e) None of these

27) The pixels of intensity=1 in the input image will be replaced by …….in the specified image.

a) intensity=6 b) intensity=3 c) intensity=4 d) intensity=5 e) None of these

28) The pixels of intensity=4 in the input image will be replaced by …….in the specified image.

a) intensity=6 b) intensity=3 c) intensity=4 d) intensity=5 e) None of these

29) The pixels of intensity=7 in the input image will be replaced by …….in the specified image.

a) intensity=6 b) intensity=7 c) intensity=4 d) intensity=5 e) None of these

30) The pixels of intensity=6 in the input image will be replaced by …….in the specified image.

a) intensity=6 b) intensity=7 c) intensity=4 d) intensity=5 e) None of these

31) The pixels of intensity=2 in the input image will be replaced by …….in the specified image.

a) intensity=6 b) intensity=7 c) intensity=4 d) intensity=5 e) None of these

32) The pixels of intensity=5 in the input image will be replaced by …….in the specified image.

a) intensity=2 b) intensity=7 c) intensity=6 d) intensity=5 e) None of these

33) Applying Laplacian has which of the following result(s)?

a) Produces image having greyish edge lines

b) Produces image having obvious background

c) All of the mentioned

d) None of the mentioned

34) A mask of size 3x3 is formed using Laplacian including diagonal neighbours that has central coefficient as 9. Then, what would be the central coefficient of same mask if it is made without diagonal neighbours?

a) -5 b) 5 c) 8 d) -8

35) The Laplacian is which of the following operator?

a) Nonlinear operator b) Order-Statistic operator

c) Linear operator d) None of the mentioned

36) In Histogram Matching or Specification, $z = G^{-1}[T(r)]$, r and z are gray level of input and output image and T & G are transformations, to confirm the single value and monotonous of G^{-1} what of the following is/are required?

a) G must be monotonic b) G must be strictly decreasing

c) G must be strictly monotonic d) G must be strictly decreasing

37) For what value of constant, a high boost filtering becomes the standard Laplacian sharpening filter?

a) 0 b) 1 c) -1 d) ∞

38) A First derivative in image processing is implemented using which of the following given operator(s)?

a) The Laplacian b) Magnitude of Gradient vector

c) Phase of Gradient vector d) None of the mentioned

39) An image whose gray-levels span a significant portion of gray scale have …… dynamic range while an image with dull, washed out gray look have ……. dynamic range.

a) Low and High respectively b) High and Low respectively

c) Both have High dynamic range, irrespective of gray levels span significance on gray scale

d) Both have Low dynamic range, irrespective of gray levels span significance on gray scale

40) The type of Interpolation used in commercial graphic applications.....
a) cubic interpolation b) nearest neighbour interpolation
c) bilinear interpolation d) bicubic interpolation

41) In washed out image, histogram components are concentrated on ..... . grey scale?
a) High side of b) Medium side of c) Low side of d) Evenly distributed on

42) In high contrast image, histogram components are concentrated on ..... grey scale?
a) High side of b) Medium side of c) Low side of d) Evenly distributed on

43) In linear spatial filtering, what is the pixel of the image under mask corresponding to the mask coefficient w (-1, -1), assuming a 3*3 mask?
a) f (x-1, -y) b) f (x + 1, y) c) f (x-1, y – 1) d) f (x + 1, y – 1)

44) In neighborhood operation for spatial filtering using square mask of n*n, which of the following approach is/are used to obtain a perfectly filtered result irrespective of the size?
a) By padding the image
b) By filtering all the pixels only with the mask section that is fully contained in the image
c) By ensuring that center of mask must be at a distance ≥ (n – 1)/2 pixels from border of image.
d) None of the mentioned

45) To compute intersection operation between two corresponding pixels, ...is taken.
a) any one of them b) the sum of them c) the max d) the min e)None of these

46) Piecewise Linear Transformation function involves which of the following?
a) Bit-plane slicing b) Intensity level slicing
c) Contrast stretching d) All of the Mentioned

47) Ultraviolet light incident on fluorescent material emits light in .....
a) Ultraviolet band b) Blue-Visible band c) Infrared band d) Red-visible band.

48) .....imaging is used in mineral and oil exploration.
a) Ultraviolet b) Infrared c) Ultrasound d) Infrasound e) Microwave

49) In terms of Sampling and Quantization, Shrinking and Zooming may be viewed as.....
a) Oversampling for both b) Oversampling and Undersampling respectively
c) Undersampling and Oversampling respectively d) Undersampling for both

50) ..... are used for short-term storage of images.
a) Hard disks b) Buffers c) Optical disks d) Magnetic tapes

51) For a noise reduction in a camera, a pre-processing ..... filter is used at image acquisition.
a) high-pass b) antialiasing c) false contouring d) bandpass e) None of these

52) An image has significant edge details. Which of the following fact(s) is/are true for the gradient image and the Laplacian image of the same?
a) The gradient image is brighter than the Laplacian image.
b) The Laplacian image is brighter than the gradient image.
c) Both the gradient image and the Laplacian image has equal values.
d) None of the mentioned

53) One of the famous algorithms for dimensionality reduction is .....
a) SVM b) KNN c) Bayesian c)PCA d)CNN

54) The first moment (μ_1) of a random variable (z) equals .....
a) 0 b) 1 c)$\dot{\Sigma}_i$ $p(z_i)$ c) 1-σ d) Σ_i (z_i-mean)

55) A filter is applied to an image whose response is independent of the direction of discontinuities in the image. The filter is/are .....
a) Isotriple filters b) Isotropic filters c) Isopreference filter d) Isotopes filters

56) In Geometric Spatial Transformation, points whose locations are known precisely in input and reference images.
a) Key points b) control points c) known points d) Tied-points

57) The distance measures the path between the pixels based on an 8-connected neighbourhood, is called:
a) Euclidean distance b) Chessboard distance
c) City-Block distance d) Manhattan distance

58) Weather observation and prediction are major applications of .....band.
a) Microwave b) Ultraviolet c) Multispectral d) Radio e) Ultrasound

59)..... contains cones and rods for vision in human eyes.
a) Choroid b) Retina c) Sclera d) Iris

60) Mach bands experiment is used to illustrate .....
a) Contrast manipulation b) optical illusion
c) intensity resolution d) Brightness discrimination

End of Questions.

Good Luck

Examination Committee

Tanta University

Department: Computers and Control Eng.
Total Marks: 90 Marks

Faculty of Engineering

Course Title: **Computer Networks**	Course Code: **CSE4126**	Year: **4th Computers**
Date: **1/2023 (First term)**	Allowed time: **3 hr**	No. of Pages: **(8)**

Model (A)

In this exam, there is only one question in two parts (a and b). The first part (a) consists of sixty Multiple Choice Questions (60 marks) and the second part is composed of thirty True/False questions (30 marks).

Question 1 (a): Choose the Correct Answer(s) (60 Marks)

1. A receiving host has failed to receive all of the segments that it should acknowledge. What can the host do to improve the reliability of this communication session?
   A. Send a different source port number. **B.** Restart the virtual circuit.
   C. Decrease the sequence number. **D.** Decrease the window size.
2. Which fields are contained within an IEEE Ethernet frame header?
   A. Source and destination MAC address
   B. Source and destination network address
   C. Source and destination MAC address and source and destination network address
   D. Nothing
3. Which layer 1 devices can be used to enlarge the area covered by a single LAN segment?
   A. Switch B. NIC
   C. Hub D. RJ45 transceiver
4. Segmentation of a data stream happens at which layer of the OSI model?
   A. Physical B. Data Link
   C. Network D. Transport
5. Which of the following describe router functions?
   A. Collision prevention B. Broadcast domain enlargement
   C. Broadcast forwarding D. Path selection
6. Routers operate at layer __. LAN switches operate at layer __. Ethernet hubs operate at layer __. Word processing operates at layer __.
   A. 3, 3, 1, 7 B. 3, 2, 1, none
   C. 3, 2, 1, 7 D. 2, 3, 1, 7
7. When data is encapsulated, which is the correct order?
   A. Data, frame, packet, segment, bit B. Segment, data, packet, frame, bit
   C. Data, segment, packet, frame, bit D. Data, segment, frame, packet, bit
8. Why does the data communication industry use the layered OSI reference model?
   A. It divides the network communication process into smaller and simpler components, thus aiding component development, design, and troubleshooting.
   B. It enables equipment from different vendors to use the same electronic components, thus saving research and development funds.

C. It supports the evolution of multiple competing standards and thus provides business opportunities for equipment manufacturers.
D. It provides a framework by which changes in functionality in one layer require changes in other layers.

9. Which of the following services use TCP?
   A. DHCP B. SNMP C. FTP D. TFTP
10. If you use either Telnet or FTP, which is the highest layer you are using to transmit data?
    A. Application B. Presentation C. Session D. Transport
11. The DoD model (also called the TCP/IP stack) has four layers. Which layer of the DoD model is equivalent to the Network layer of the OSI model?
    A. Application B. Host-to-Host C. Internet D. Network Access
12. What is the address range of a Class B network address in binary?
    A. 01xxxxxx B. 0xxxxxxx C. 10xxxxxx D. 110xxxxx
13. Which of the following protocols uses both TCP and UDP?
    A. FTP B. SMTP C. Telnet D. DNS
14. What is the maximum number of IP addresses that can be assigned to hosts on a local subnet that uses the 255.255.255.224 subnet mask?
    A. 14 B. 15 C. 16 D. 30
15. You have a network that needs 29 subnets while maximizing the number of host addresses available on each subnet. How many bits must you borrow from the host field to provide the correct subnet mask?
    A. 2 B. 3 C. 4 D. 5
16. What is the subnetwork address for a host with the IP address 200.10.5.68/28?
    A. 200.10.5.56 B. 200.10.5.32 C. 200.10.5.64 D. 200.10.5.0
17. The network address of 172.16.0.0/19 provides how many subnets and hosts?
    A. 7 subnets, 30 hosts each B. 7 subnets, 2,046 hosts each
    C. 7 subnets, 8,190 hosts each D. 8 subnets, 8,190 hosts each
18. Which two statements describe the IP address 10.16.3.65/23? (Choose two.)
    A. The subnet address is 10.16.3.0 255.255.254.0.
    B. The lowest host address in the subnet is 10.16.2.1 255.255.254.0.
    C. The last valid host address in the subnet is 10.16.2.254 255.255.254.0.
    D. The network is not subnetted.
19. If a host on a network has the address 172.16.45.14/30, what is the subnetwork this host belongs to?
    A. 172.16.45.0 B. 172.16.45.4
    C. 172.16.45.8 D. 172.16.45.12
20. On a VLSM network, which mask should you use on point-to-point WAN links in order to reduce the waste of IP addresses?
    A. /27 B. /28 C. /29 D. /30
21. What is the subnetwork number of a host with an IP address of 172.16.66.0/21?
    A. 172.16.36.0 B. 172.16.48.0
    C. 172.16.64.0 D. 172.16.0.0

22. On a VLSM network, which mask should you use on point-to-point WAN links in order to reduce the waste of IP addresses?
A. /27 B. /28 C. /29 D. /30
23. What is the subnetwork number of a host with an IP address of 172.16.66.0/21?
A. 172.16.36.0 B. 172.16.48.0
C. 172.16.64.0 D. 172.16.0.0
24. You have an interface on a router with the IP address of 192.168.192.10/29. Including the router interface, how many hosts can have IP addresses on the LAN attached to the router interface?
A. 6 B. 8 C. 30 D. 62
25. Acknowledgments, sequencing, and flow control are characteristics of which OSI layer?
A. Layer 2 B. Layer 3
C. Layer 4 D. Layer 7
26. Which of the following is type of flow control?
A. Acknowledgment B. Cut-through
C. Windowing D. VLANs
27. Which of the following types of connections can use full duplex?
A. Hub to hub B. Switch to switch
C. Hub to host D. Switch to hub

28. Which of the following allows a router to respond to an ARP request that is intended for a remote host?
A. Gateway DP B. Reverse ARP (RARP)
C. Proxy ARP D. Inverse ARP (IARP)
29. You want to implement a mechanism that automates the IP configuration, including IP address, subnet mask, default gateway, and DNS information. Which protocol will you use to accomplish this?
A. SMTP B. SNMP C. DHCP D. ARP
30. What protocol is used to find the hardware address of a local device?
A. RARP B. ARP C. IP D. ICMP
31. Which class of IP address provides a maximum of only 254 host addresses per network ID?
A. Class A B. Class B C. Class C D. Class D

32. Which layer 4 protocol is used for a Telnet connection?
A. IP B. TCP C. TCP/IP D. UDP

33. Which statements are true regarding ICMP packets? (Choose two.)
A. They acknowledge receipt of a TCP segment.
B. They guarantee datagram delivery.
C. They can provide hosts with information about network problems.
D. They are encapsulated within UDP datagrams.
34. If an Ethernet port on a router were assigned an IP address of 172.16.112.1/25, what would be the valid subnet address of this host?
A. 172.16.112.0 B. 172.16.0.0
C. 172.16.96.0 D. 172.16.255.0
35. How many simultaneous Telnet sessions does a Cisco router support by default?
A. 1 B. 2 C. 3 D. 5
36. What command do you type to save the configuration stored in RAM to NVRAM?
A. Router(config)#copy current to starting B. Router#copy starting to running

C. Router(config)#copy running-config startup-config
D. Router#copy run startup
37. What command is used to stop RIP routing updates from exiting out an interface but still allow the interface to receive RIP route updates?
A. Router(config-if)#no routing
B. Router(config-if)#passive-interface
C. Router(config-router)#passive-interface s0
D. Router(config-router)#no routing updates
38. Which of the following statements are true regarding the command ip route 172.16.4.0 255.255.255.0 192.168.4.2?
A. The command is used to establish a static route.
B. The command is used to configure the default route.
C. The subnet mask for the source address is 255.255.255.0.
D. The command is used to establish a stub network.
39. What is split horizon?
A. Information about a route should not be sent back in the direction from which the original update came.
B. It splits the traffic when you have a large bus (horizon) physical network.
C. It holds the regular updates from broadcasting to a downed link.
D. It prevents regular update messages from reinstating a route that has gone down.
40. Which statement is true regarding classless routing protocols?
A. The use of discontiguous networks is not allowed.
B. The use of variable length subnet masks is permitted.
C. RIPv1 is a classless routing protocol.
D. IGRP supports classless routing within the same autonomous system.

41. Which of the following are true regarding the distance-vector and link-state routing protocols?
A. Link state sends its complete routing table out all active interfaces on periodic time intervals.
B. Distance vector sends its complete routing table out all active interfaces on periodic time intervals.
C. Link state sends its complete routing table out all active interface only once
D. Distance vector sends updates containing the state of its own links to all routers in the internetwork.

42. What does RIPv2 use to prevent routing loops?
A. CIDR B. Split horizon
C. Authentication D. Classless masking
43. If your routing table has a static, a RIP, and an IGRP route to the same network, which route will be used to route packets by default?
A. Any available route B. RIP route
C. Static route D. IGRP route
44. What is route poisoning?
A. It sends back the protocol received from a router as a poison pill, which stops the regular updates.
B. It is information received from a router that can't be sent back to the originating router.

C. It prevents regular update messages from reinstating a route that has just come up.
D. It describes when a router sets the metric for a downed link to infinity

45. You get a call from a network administrator who tells you that he typed the following into his router:
Router(config)#router ospf 1
Router(config-router)#network 10.0.0.0 255.0.0.0 area 0
He tells you he still can't see any routes in the routing table. What configuration error did the administrator make?
A. The wildcard mask is incorrect. B. The OSPF area is wrong.
C. The OSPF Process ID is incorrect. D. The AS configuration is wrong.

46. A network administrator needs to configure a router with a distance-vector protocol that allows classless routing. Which of the following satisfies those requirements?
A. IGRP B. OSPF
C. RIPv1 D. EIGRP

47. Which of the following is a layer 2 protocol used to maintain a loop-free network?
A. VTP B. STP
C. RIP D. CDP

48. What command will display the forward/filter table?
A. show mac filter B. show run
C. show mac address-table D. show mac filter-table

49. Which statement describes a spanning-tree network that has converged?
A. All switch and bridge ports are in the forwarding state.
B. All switch and bridge ports are assigned as either root or designated ports.
C. All switch and bridge ports are in either the forwarding or blocking state.
D. All switch and bridge ports are either blocking or looping.

50. If a switch receives a frame and the source MAC address is not in the MAC address table but the destination address is, what will the switch do with the frame?
A. Discard it and send an error message back to the originating host
B. Flood the network with the frame
C. Add the source address and port to the MAC address table and forward the frame out the destination port
D. Add the destination to the MAC address table and then forward the frame

51. What does a switch do when a frame is received on an interface and the destination hardware address is unknown or not in the filter table?
A. Forwards the switch to the first available link
B. Drops the frame
C. Floods the network with the frame looking for the device
D. Sends back a message to the originating station asking for a name resolution

52. You need to configure a Catalyst switch so it can be managed remotely. Which of the following would you use to accomplish this task?
A. Switch(configs)#int fa0/1
Switch(configs-if)#ip address 192.168.10.252 255.255.255.0
Switch(configs-if)#no shut
B. Switch(configs)#ip default-gateway 192.168.10.254
Switch(configs)#int vlan 1

Switch(configs-if)#ip address 192.168.10.252 255.255.255.0
Switch(configs-if)#no shut
C. Switch(configs)#int vlan 1
Switch(configs-if)#ip address 192.168.10.252 255.255.255.0
Switch(configs-if)#ip default-gateway 192.168.10.254 255.255.255.0

D. Switch(configs)#ip default-network 192.168.10.254
Switch(configs)#int vlan 1
Switch(configs-if)#ip address 192.168.10.252 255.255.255.0
Switch(configs-if)#no shut

53. What command will permit SMTP mail to only host 1.1.1.1?
A. access-list 10 permit smtp host 1.1.1.1
B. access-list 110 permit ip smtp host 1.1.1.1
C. access-list 10 permit tcp any host 1.1.1.1 eq smtp
D. access-list 110 permit tcp any host 1.1.1.1 eq smtp

54. Which configuration command must be in effect to allow the use of 8 subnets if the Class C subnet mask is 255.255.255.224?
A. Router(config)#ip classless B. Router(config)#ip version 6
C. Router(config)#no ip classful D. Router(config)#ip subnet-zero

55. You have a network with a subnet of 172.16.16.0/22. Which is the valid host address?
A. 172.16.17.1 255.255.255.252 B. 172.16.0.1 255.255.240.0
C. 172.16.20.1 255.255.254.0 D. 172.16.18.255 255.255.252.0

56. Your router has the following IP address on Ethernet0: 172.16.2.1/23. Which of the following can be valid host IDs on the LAN interface attached to the router?
A. 172.16.0.5 B. 172.16.1.100 C. 172.16.1.198 D. 172.16.2.255

57. To test the IP stack on your local host, which IP address would you ping?
A. 127.0.0.0 B. 1.0.0.127 C. 127.0.0.1 D. 127.0.0.255

58. Which of the following commands sets the secret password to Cisco?
A. enable secret password Cisco B. enable secret cisco
C. enable secret Cisco D. enable password Cisco

59. If you wanted administrators to see a message when logging into the router, which command would you use?
A. message banner motd B. banner message motd
C. banner motd D. message motd

60. Which two of the following are private IP addresses?
A. 12.0.0.1 B. 168.172.19.39 C. 172.20.14.36 D. 172.33.194.30

Question 1(b)True / False Questions (30 marks)

1. Switches configured with VLANs improves network performance by increasing the bandwidth available to hosts and limit the size of the broadcast domains. ( )
2. By default, all VLANs are allowed on the trunk. ( )
3. STP is a switching technology which reduces the size of a broadcast domain. ( )
4. **Switch(config)#switchport trunk encapsulation dot1q** is the true command to configure a switch port to use the IEEE standard method of inserting VLAN membership information into Ethernet frames ( )
5. **switchport trunk on** is the command which used to sets a trunk port on a 2960 switch ( )
6. access-list 110 permit host 1.1.1.1 is a correct example of standard access list ( )
7. access-list 1 deny 172.16.10.1 0.0.0.0 is a correct example of extended access list ( )
8. if you need to create an access list that will prevent hosts in the network range of 192.168.160.0 to 192.168.191.0. You will use the command **access-list 10 deny 192.168.160.0 0.0.191.255** ( )
9. The command **access-list 100 permit 196.15.7.0 0.0.0.255 eq www** will allow only HTTP traffic into network 196.15.7.0. ( )

10. If you wanted to deny all Telnet connections to only network 192.168.10.0 but allow everything else, the following command strings is invalid. ( )
    access-list 198 deny tcp 200.200.10.0 0.0.0.255 200.199.11.0 0.0.0.255 eq ftp
    access-list 198 permit ip any 0.0.0.0 255.255.255.255
11. RIPv1 and IGRP are true distance-vector routing protocols and can't do much, really—except build and maintain routing tables and use a lot of bandwidth. RIPv2, EIGRP, and OSPF build and maintain routing tables, but they also provide classless routing, which allows for VLSM, summarization, and discontiguous networking. ( )
12. EIGRP is an "advanced" distance-vector routing protocol, sometimes called a hybrid routing protocol because it uses the characteristics of both distance-vector and link-state routing protocols. ( )
13. The application layer chooses and determines the availability of communicating partners along with the resources necessary to make the connection, coordinates partnering applications, and forms a consensus on procedures for controlling data integrity and error recovery ( )
14. The Network Layer is the layer where the routing implemented, enabling connections and path selection between two end systems. ( )
15. The Presentation layer is the layer where the data is formatted, presented, encoded, and converted for use on the network. ( )
16. The session layer is responsible for creating, managing, and terminating sessions between applications. ( )
17. The Data link layer ensures the trustworthy transmission of data across a physical link and is primarily concerned with physical addressing, line discipline, network topology, error notification, ordered delivery of frames, and flow control. ( )
18. The Transport layer is used for reliable communication between end nodes over the network and provides mechanisms for establishing, maintaining, and terminating virtual circuits; transport-fault detection and recovery; and controlling the flow of information. ( )
19. VLSM is used to save the IP address by assigning only the needed IP's to the subnet instead of equal number of hosts in the subnetting. ( )
20. The OSPF protocol is link state protocol while the EIGRP is distance vector protocol. ( )

21. **The command access-list 10 deny 172.16.48.0 0.0.15.255** can be used to create a standard access list that denies the subnet of the following host: 172.16.50.172/20. ( )
22. The command **access-list 10 deny 172.16.64.0 0.0.31.255** is used to create a standard access list that denies the subnet of the following host: 172.16.144.17/21. ( )
23. A split horizon will not advertise a route back to the same router it learned the route from. ( )
24. The distance-vector routing protocol sends its complete routing table out all active interfaces at periodic time intervals. Link-state routing protocols send updates containing the state of its own links to all routers in the internetwork. ( )
25. You cannot have 16 hops on a RIP network by default. If you receive a route advertised with a metric of 16, this means it is inaccessible. ( )
26. IGRP uses bandwidth and delay of the line, by default, to determine the best path to a remote network. Delay of the line can sometimes be called the cumulative interface delay. ()
27. When a routing update is received by a router, the router first checks the administrative distance (AD) and always chooses the route with the lowest AD. However, if two routes are received and they both have the same AD, then the router will choose the one route with the lowest metrics, or in RIP's case, hop count. ( )
28. DR and BDR are elected on broadcast and non-broadcast multi-access networks. Frame Relay is a non-broadcast multi-access (NBMA) network by default. No DR is assigned on any type of point-to-point link. No DR/BDR is assigned on the NBMA point-to-multipoint due to the hub/spoke topology ( )

29. To enable OSPF, you must first start OSPF using a Process ID. The number is irrelevant; just choose a number from 1 to 65,535 and you're good to go. After you start the OSPF process, you must configure any network that you want advertised via OSPF using wildcards and the area command. ( )

30. At the moment of OSPF process startup, the highest IP address on any active interface will be the Router ID (RID) of the router. If you have a loopback interface configured (logical interface), then that will override the interface IP address and become the RID of the router automatically. ( )

Good Luck all,

Course Coordinator: Dr. Hany Aly El-Ghaish

Tanta University

Computers & Control Engineering Department

Faculty of Engineering

Course Title	Fuzzy Control	Academic Year 2022/2023 First Semester Exam	Course Code	CCE4128
Year/ Level	Fourth		Total Marks	75
Date	12-1- 2023	No. of Pages (2)	Allowed time	3 hrs
Remarks: Answer all the following questions ممنوع استخدام القلم الرصاص في الإجابة إلا بغرض الرسم فقط				

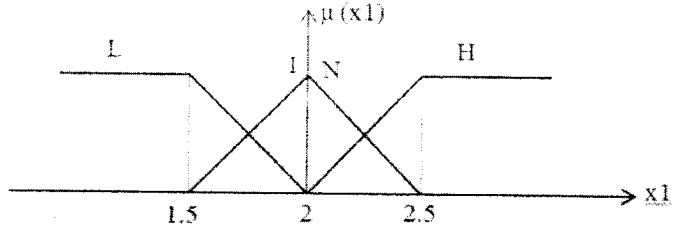
Question Number (1) (23 Points)

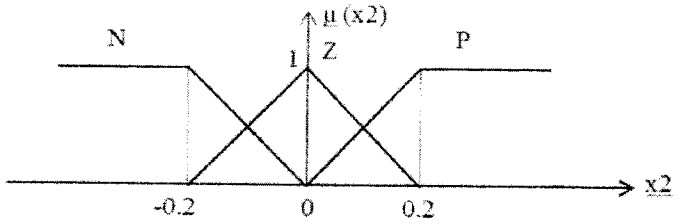
a) Explain briefly the advantages of Fuzzy Controllers. **(4 points)**

b) What are the design steps of the fuzzy controller? **(3 points)**

c) There are three types of fuzzy inference systems (controllers), explain with examples the operation of these types. **(6 points)**

d) A TSK fuzzy controller is designed for a level control process, with two inputs: **(10 points)** x1 (represent the level) and x2 (represent the rate of change in level). The output of the controller is y (represent the valve position). The MFs for the inputs x1 and x2 are in the following graph:





The rules of the controller are:

X1 \ X2	N	Z	P
L	Y1	Y1	Y1
N	Y2	Y2	Y3
H	Y4	Y4	Y4

Where:

- $y1 = 4\,x1 - 0.25\,x2 + 0.05$
- $y2 = x1 - 0.1\,x2$
- $y3 = 0.5\,x1 - 0.1\,x2$
- $y4 = 0.2\,x1 - x2$

Find the controller crisp output (ycrisp) when X1=2.2 and X2=0.15.

Question Number (2) (26 Points)

a) Explain with example the main differences between: **(6 Marks)**

1. A binary set and a fuzzy set.
2. The antecedent part and the consequent part of a rule.

b) Explain with drawing two common methods of designing fuzzy PID controller that overcome the long reasoning time problem and explain the reason of choosing inputs and output of the controller for each method. **(6 points)**

c) Using the error signal (e) and the change of error (Δe), design a fuzzy-PID controller with the following specs: **(14 points)**

- No. of MFs for the inputs (e and Δe) is 5.
- No. of MFs for the output ($\bar{u}$) is 7.
- Use (NM , NS , Z , PS , PM) as the labels of MFs for the inputs.
- Use (NL , NM , NS , Z , PS , PM , PL) as the labels of MFs for the output.
- The universe of discourse :
  - e $\longrightarrow$ from -4 to 4
  - Δe $\longrightarrow$ from -1 to 1
  - u $\longrightarrow$ from -9 to 9

(1) Draw the MFs for the inputs and output.

(2) Write the suitable table of rules.

(3) Find the controller crisp output (u^{crisp}) at $e = -1.5$ and $\Delta e = -0.25$

Question Number (3) (26 Points)

a) Explain the basic elements of the optimization problem and the different types of the optimization problems. **(6 points)**

b) Explain the main stages of DE optimization algorithm. **(6 points)**

c) Explain the exploration and exploitation in the optimization process. **(4 points)**

d) Consider an ANFIS model with 3 inputs (labelled as x1, x2 and x3), the first input (x1) has one trapezoidal MF (labelled as A), the second input (x2) has two triangular MFs (labelled as B1and B2) and the third input (x3) has three trapezoidal MFs (labelled as C1, C2 and C3). **(10 points)**

1. Write the possible rules for this ANFIS model.
2. Draw the ANFIS structure and show the name of each layer.
3. Calculate the number of premise parameters and the number of consequent parameters for this ANFIS model.

End of questions.....

Ass. Prof. Dr. Wael Elawady & Dr. Marwa Badr

Tanta University

Department: Computers & Control Engineering

Faculty of Engineering

Total Marks: 70 Marks

Course Title: Microcontroller Systems	**Course Code:** CCE4127	**Year:** 4th Comp
Date: 17/1/2023 (First term, Year 22/23)	**Allowed time:** 3 Hours	**No. of Pages:** (2)

Answer all the following questions

Question No.1: (20 points divided as a = 15, b = 5, and c = 5 points)

a— Choose the right answer (True or False) for each statement in the following table:

1- All the ports of 8051 upon RESET are configured as output ports by default.	(True /False)
2- The JNB and JB instructions are widely used single-bit operations.	(True /False)
3- The 8052 is considered a subset of the 8051 and the 8031 is a RAM-less 8051.	(True /False)
4- All conditional jumps are short jumps.	(True /False)
5- 8051 microcontrollers have only one data type (8 bits).	(True /False)
6- The ORG directive is used to indicate the beginning of the address.	(True /False)
7- Registers store information which could be values to be processed or address of values to be fetched from memory.	(True /False)
8- The vast majority registers in 8051 are 32-bit registers.	(True /False)
9-The program counter is 16 bits wide, and it points to the address of the next instruction to be executed.	(True /False)
10-Register bank 0 is the default bank when 8051 is powered up.	(True /False)
11- A microprocessor is an expensive chip as compared with microcontroller.	(True /False)
12-The 8051 supports 2 bytes by 2 bytes multiplication.	(True /False)
13- Moving values from 0 to F into an 8-bit register is not allowed.	(True /False)
14- All ports in 8051 can be accessed either the entire 8 bits or any single bit without altering the rest bits.	(True /False)
15-Stack Pointer Register (SP) is modified by the user when using some instructions such as RET.	(True /False)
16-The flag bits of Program Counter Register indicate some conditions that resulted after an instruction was executed.	(True /False)
17- C- code is portable to various microcontrollers with little/no modifications.	(True /False)
18- For every interrupt, there must be an interrupt service routine or interrupt handler	(True /False)
19-The ADD instruction tells the CPU to add the source byte to register A and put the result in register A.	(True /False)
20-When R0 and R1 hold the addresses of RAM locations, they must be preceded by the "@" sign.	(True /False)

b— Show the status of the CY, AC and P flag after the addition of 37H and 2FH.

c— Write a program to clear 16 RAM locations starting at RAM address 60H.

Question No.2: (20 points divided as a = 5, b = 5, c = 5, d = 5 points)

a— Write a program to read the temperature from Port 1and test its value. According to the test results, place the temperature value into the registers indicated by the following: If T = 75 then A = 75, If T < 75 then R1 = T, If T > 75 then R2 = T.

b— Write a program that receives a hex data in the range of 00 –FFH from port 1 and converts it to decimal. Save it in R7, R6, and R5.

c— By examining the stack, show the contents of the registers and SP after the execution of the following instructions.

```
MOV R3, #25H
MOV R2, #12H
MOV R1, #0F3H
PUSH 2
PUSH 1
PUSH 3
```

d— Write an 8051 program to find the sum of the values FEH, C1H, B5H, where the low byte of the sum is saved in register R6 (low byte) while the high byte is moved into R7.

Please turn the page over ...

Question No.3: (15 points divided as a = 5, b = 5, c = 5 points)

a— Choose the correct answer among the choices given below:

i. In 8051 an assembly language instruction consists of: …	
1. Label and operands	2. Operands and comment
3. Label, Mnemonic, and operands	4. Label, operands and comment
ii. Value (proceeded with #) can be loaded directly to registers …	
1. A	2. B
3. R0 – R7	4. All of them
iii. Moving a value that is too big into a register will cause …	
1. An Error	2. A carry
3. An overflow	4. None of the above
iv. The SWAP instruction works on …	
1. A	2. B
3. R0-R7	4. All of them
v. The … register is referred to as the flag register and it is an 8 bit register only 6 bits are used.	
1. PC	2. A
3. PSW	4. OV
vi. The flag bits affected by the ADD instruction are …	
1. AC and CY	2. P
3. OV	4. All of them
vii. The 8051 has … external hardware interrupts.	
1. Two	2. Four
3. Six	4. None
viii. Timers in 8051 use the same register to set the various timer operation modes, called …	
1. TIMER0	2. XTALL
3. TMOD	4. SCON
ix. The 8051 has … timers/counters, they can be used either as timers or as event counters.	
1. Two	2. Three
3. Four	4. Five
x. The file which contains all the opcodes and addresses as well as errors that the assembler detected is called … file.	
1. obj	2. asm
3. lst	4. hex

b— In 8051, write a machine code that receives a byte from port 1and finds the number of 1's in the received byte.

c— Write an 8051 C program that receives a byte of data serially one bit at a time via P1.0. The LSB should come in first.

Question No.4: (15 points divided as a = 5, b = 5 and c = 5 points)

a— For 8051 system of 11.0592 MHz crystal frequency, find the size of the delay in following program if the crystal frequency is 11.0592 MHz.

		Machine Cycle
OUTER:	**MOV R5,#40**	**1**
INNER:	**MOV R6,#20**	**1**
	DJNZ R6,INNER	**2**
	DJNZ R5,OUTER	**2**
	RET	**2**

b— Write an 8051 C program to send values of –2 to +2 to port P2.

c— In 8051, write a machine code that will create a square wave of 30% duty cycle on bit2 of port 2 using hardware delay.

End of questions

Good Luck

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Dr. Basma Elkilany