

Question (1) (15 Marks)

- a) Explain with diagrams the different representation of the Euler rotation angles
- b) Mention (with diagrams) the types of reference frame attributed to robot manipulators?
- c) A robotic end-effector (EE) is positioned as shown in Fig. 1. The yaw of the end-effector is $(\pi/2)$. The pitch of the end-effector is (π) . The roll of the end-effector is $(-\pi/2)$. Find the composite rotation matrix.

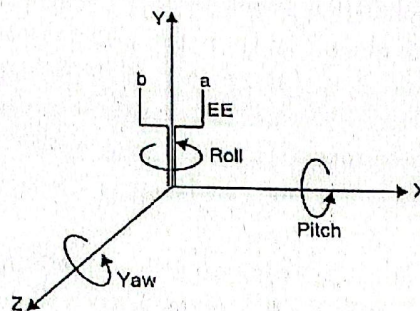


Fig. 1 Robotic end-effector

Question (2) (25 Marks)

- a) Consider the two-link manipulator of Fig. 2, which has joint 1 revolute and joint 2 prismatic. Derive the forward kinematic equations using the DH-convention.

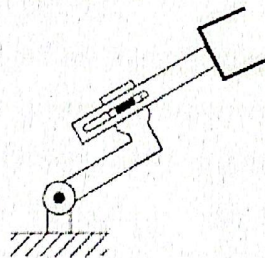


Fig. 2 Two-link planar arm

- b) Consider the three-link planar manipulator of Fig. 3. Derive the forward kinematic equations using the DH-convention

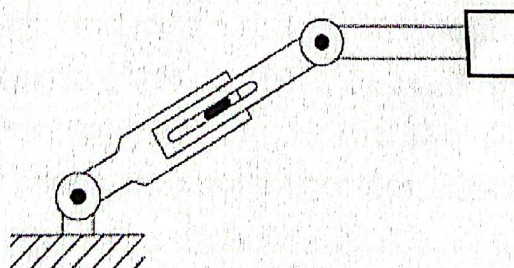


Fig. 3 Three-link planar arm



Course Title: Signals and Systems Course Code: CCE121 Level: ONE
Date: 19-6-2025 (End-of-Semester Exam) Time Allowed: 2 hours No. of Pages: (2)

Answer all the following questions.

Question (1) (20 Marks)

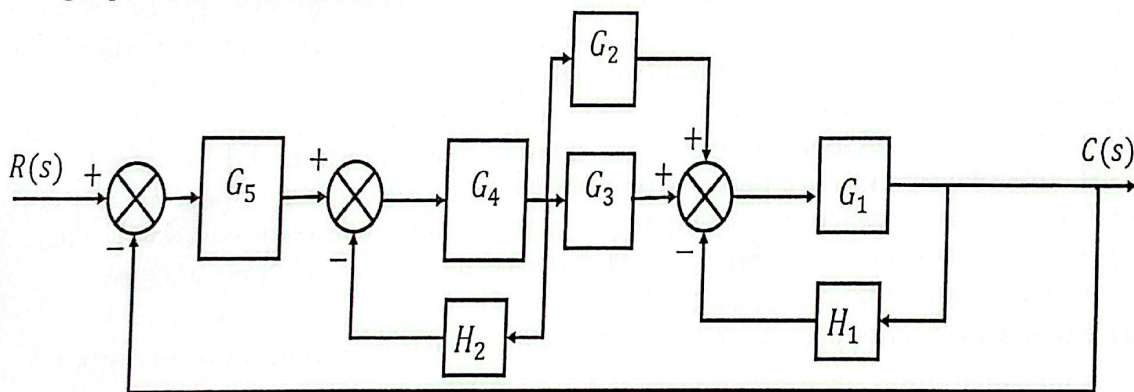
Shade the circle of the most appropriate answer in your electronic answer sheet:

- 1) A system is described by the relation: $y(t) = 2x(t) + 4$. This system is:
a) Linear b) Nonlinear c) None of these
- 2) Comment on the causality of $y(t) = 5t + x(t)$.
a) Causal b) Non causal c) None of these
- 3) In the closed loop control systems, control action is dependent of the
a) input only b) output only c) both input and output d) None of these
- 4)loop control systems are complex and hard to design than.....loop control systems.
a) Open, closed b) Closed, open c) None of these
- 5) Which mathematical operation is used to convert a Continuous-Time signal into a Discrete-Time signal?
a) Integration b) Convolution c) Sampling d) Modulation e) None of these
- 6) What happens when a discrete-time signal is multiplied by -1 in the time index?
a) It is delayed by 1 b) It is advanced by 1
c) It is reflected about the time axis d) None of these
- 7) What is the physical meaning of the convolution operation in an LTI system?
a) It adds two signals together. b) It measures the frequency components of the signal.
c) It finds the overlap between the input and impulse response as one slides over the other.
d) It determines the derivative of the impulse response. e) None of these
- 8) A system is said to be BIBO stable if:
a) The output is always zero b) The output grows without bound for any input
c) A bounded input produces a bounded output d) The system has memory
- 9) Which of the following transformations is equivalent to a flip around $t = 2$?
a) $x(2 - t)$ b) $x(t - 2)$ c) $(-t - 2)$ d) $x(t + 2)$ e) None of these
- 10) What is the result of first reflecting then shifting by 3?
a) $x(t + 3)$ b) $x(t - 3)$ c) $x(-(t - 3))$ d) $x(-t - 3)$ e) None of these
- 11) A system is described by the relation: $y(t) = 3x(t) + 7$. This system is
a) time-invariant b) time-varying c) None of these
- 12) In the representation of an electric circuit in the S-domain:
a) An inductance L change to $1/LS$ b) A capacitance C change to CS
c) A resistance Remains unchanged d) All the above e) None of these
- 13) Which of the following statements about transfer functions is TRUE?
a) They describe the system in the time domain b) They depend on initial conditions
c) They are only valid for nonlinear systems
d) They relate input to output in the Laplace domain e) None of these
- 14) In a translational mechanical system, which element resists motion and produces a force proportional to velocity?
a) Mass b) Spring c) Damper d) Pulley e) None of these

- 15) Unit ramp input is acceptable to Type '2' system. a) True b) False
- 16) The steady-state error due to unit step input to a type-1 system is:
 a) 0 b) Infinity c) $1/K_p$ d) 1 e) None of these
- 17) In state space, the dimension of matrix A in a system with 3 state variables is:
 a) 3×1 b) 3×3 c) 1×3 d) 2×2 e) None of these
- 18) The number of state variables required to describe a system equals:
 a) The order of the transfer function plus one b) The number of outputs
 c) The number of inputs d) The number of energy storage elements e) None of these
- 19) A system is said to be observable if:
 a) All poles are in the left-half s-plane b) The state matrix is diagonal
 c) All states can be determined by output measurements over time
 d) The output is equal to the input e) None of these
- 20) Which condition must be satisfied for a system to be completely controllable?
 a) Rank of controllability matrix = number of outputs
 b) Rank of controllability matrix = number of states
 c) Determinant of controllability matrix $\neq 0$ d) None of these

Question (2) (20 Marks)

- a) Find the transfer function $C(S)/R(S)$ for the following system using signal flow graph reduction method.



- b) Find the initial and final value of the following system response $Y(s)$:

$$Y(s) = \frac{2}{s(s+8)}$$

- c) Consider the following characteristic equations:

$$s^4 + 2s^3 + 4s^2 + 2s + 2 = 0$$

Using the Routh-Hurwitz criterion, determine the stability of the system.

- d) The closed loop T.F of a system is given as:

$$\frac{C(S)}{R(S)} = \frac{9}{s^2 + 3s + 9}$$

Find the natural frequency, damping ratio, peak time, maximum overshoot, settling time (2% error).

End of questions

BEST WISHES

Course Instructor: Dr. Mohamed Abdalla Attia

Answer ALL the following questions.

Question (1) Choose the correct answer (18 Marks)

- 1) In 8086 microprocessor one of the following statements is not true.
- a. Coprocessor is interfaced in MAX mode.
 - b. Coprocessor is interfaced in MIN mode.
 - c. I/O can be interfaced in MAX/MIN mode.
 - d. Memory can be interfaced in MAX/MIN mode.

Determine the address of the memory locations accessed by the following instructions (**Questions 2, and 3**), assume real-mode memory addressing.

Suppose that:

EAX		10	10
EBX		20	20
ESI			
EDI		00	20
ESP		00	30
		00	10

CS	0100
DS	0200
SS	0300
EX	0400

- 2) MOV AX, ARRAY[DI] [Note: ARRAY = 3000H]
- a. 5000 H, 5001 H
 - b. 5030 H, 5031 H
 - c. 1030 H, 1031 H
 - d. 5030 H
- 3) MOV EAX, [BX + SI + 200H]
- a. 4240 H, 4241 H
 - b. 4240 H, 4241 H, 4242 H, 4243 H
 - c. 2240 H, 2241 H, 2242 H, 2243 H
 - d. 2240 H, 2241 H
 - e. 2020 H

In the following program a Led is connected to pin 5 of Arduino Uno and switched on for one second and off for one second.

***** /

```
int led = 5; // LED
void setup () {
    pinMode(led, ..(1)..);
}
void loop () {
    digitalWrite(led, ..(2)..); //Switch on
    delay(..(3)..);
    digitalWrite(led, ..(4)..); //Switch off
    delay(..(3)..);
}
```

Complete the following Arduino code by answering questions 4, and 5

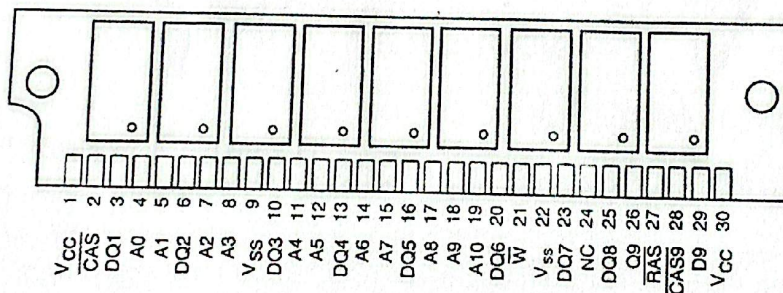
- 4) (1) is a) INPUT b) OUTPUT c) None Of Above
- 5) (2) is a) HIGH b) LOW c) None Of Above

- 6) Which of the following instructions does not change the FLAG register?
- a. ADD
 - b. SUB
 - c. MOV
 - d. RCL

- 8) Which of the following components should be connected to the Microprocessor to be able to connect its output pin to more than 10 loads?
- a. Latch b. Multiplexer c. Buffer d. Decoder
- 9) Intel 8086 microprocessor, READY signal used
- a. To indicate to user that the microprocessor is working and is ready for use.
b. To slow down a fast peripheral device so as to communicate at the microprocessor's device.
c. To provide proper WAIT states when the microprocessor is communicating with a slow peripheral device.
d. None of the above.
- 10) In Intel 8086 microprocessor ALE signal is made high to
- a. To latch address from data/address bus. b. To latch data D0-D7 from data/address bus.
c. To add WAIT state. d. To achieve all the functions listed above.
- 11) In protected mode, the descriptor is _____ in length.
- a. 1 MB b. 1 KB c. 8 Byte d. 8 MB
- 12) During the execution of an interrupt, which of the following registers are pushed into the *stack*
- 1) IP 2) Flag Register 3) DS 4) CS 5) SP
- a. 1 & 2 b. 1 & 2 & 3 c. 1 & 2 & 3 & 4 d. 1 & 2 & 4 e. 1 & 2 & 4 & 5

Question (2) (12 Marks)

A. For the illustrated 30-pin SIMM, answer the following questions: (5 Marks)



- a. Describe the pinout of the illustrated 30-pin SIMM. (2 Marks)
- b. Determine the capacity of the illustrated 30-pin SIMM in terms of (n locations × b bits). (2 Marks)
- c. What does DDR stand for? What does it technically mean? (1 Marks)

B. List three differences between Microprocessor (MP) and Microcontroller (MC). (3 Marks)

C. Explain the difference between the real mode and protected mode memory addressing. (4 Marks)

Question (3) (10 Marks)

- A. Design a memory interface for a 8088 MP to connect it to **eight** EPROMs, 64K × 8 memory devices to form a total memory of 512K × 8 bits of the physical address space of the microprocessor (Assume unused address pins to be 1). **Draw your design with illustrating the used electronic components, address and data bus connections and determine the address range for each EPROM.** (5 Marks)
- B. Write a 8086 assembly programs to perform the following task: (5 Marks)
- Transfer 10 bytes from a memory block (BlockA) starting at 0300H to another memory block (BlockB) starting at 0900H by using **string instruction**. (Note: Both blocks are located in the data segment which starts at 0000H, assume D = 0)

Course	Electronic circuits analysis	Level	2024/2025	Total Marks	40
Date	28/6/2025	(1)	No. of Pages (2)	Time	2 hrs

Assume diode practical model

Question Number (1)

(10 Points)

- a) Calculate the current through 48Ω resistor in the circuit shown in Fig 1.a
- b) Find the voltage V_A and the circuit current in the circuit shown in Fig 1.b

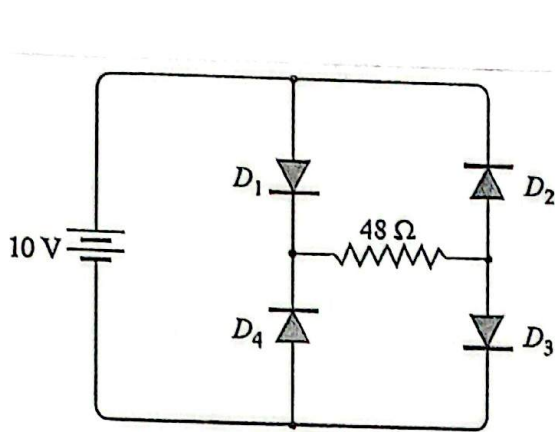


Fig1(a)

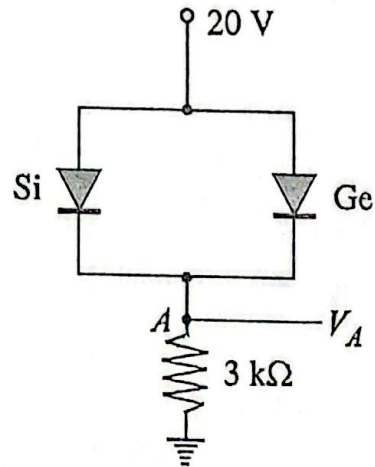
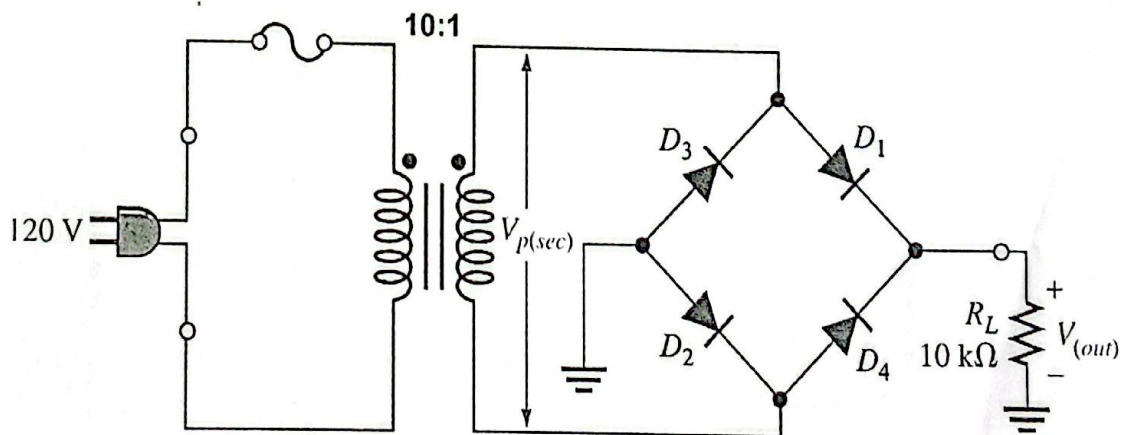


Fig1(b)

- c) For the circuit shown below Assume diode practical model
- i. Determine with diagram the o/p voltage
 - ii. The average value
 - iii. The peak current through R_L



Question Number (2)

(10 Points)

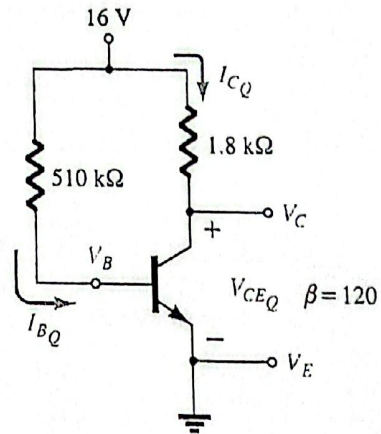
- (a) Draw the symbol and the internal structure of the N channel MOSFET transistor
- (b) Define the threshold voltage V_{th} and explain with diagram the channel formation
- (c) Determine the drain current (I_D) for an N- MOSFET , assume :
 $V_{GS} = 0.9V$, $V_D = 1.4 V$, $\mu_n C_{ox} = 100 \mu A/V^2$, $W/L = 50$, and $V_{TH} = 0.6 V$.
- (d) Repeat (b) for $V_{GS} = 0.3V$ and comment.

Question Number (3)

(10 Points)

(a) For the circuit shown determine :

- i. I_{Csat}
- ii. VCE cutoff
- iii. IC and VCE
- iv. V_C , V_B , and V_E
- v. Draw the load line and indicate the location of the Q point

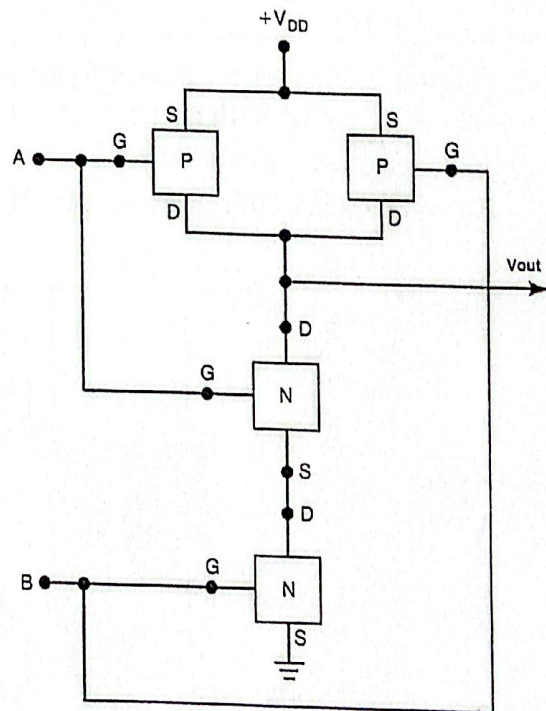


Question Number (4)

(10 Points)

Determine with diagram the state of each MOSFET transistor shown to determine the V_{out} when:

- a) V_{in} is High
- b) V_{in} is low



*With my best wishes
Dr / Nessim Mahmoud*



Course Title: Internet Technologies
Date: 31/05/2025 (Final Exam)
Allowed time: 2 Hours

Course Code: CCE213
Year: 2nd AI
No. of Pages (2)

Answer the following questions.

Q1. Choose the single best answer: (60×0.5=30 Marks)

1. What does MVC stand for?
a) Model-View-Controller
b) Module-View-Class
c) Manage-Validate-Compute
d) Main-Visual-Component
2. Which HTML tag is used to create hyperlinks?
a) <div>
b) <a>
c) <link>
d)
3. Which HTML tag is used to define a table row?
a) <tr>
b) <th>
c) <td>
d) <row>
4. Which HTML tag is used to add images?
a)
b) <media>
c) <image>
d) <pic>
5. Which tag is used for creating forms in HTML?
a) <form>
b) <input>
c) <textarea>
d) <submit>
6. What does the alt attribute in provide?
a) CSS styling
b) Alternative text
c) File size
d) Image compression
7. What does the title attribute in HTML do?
a) Displays a tooltip
b) Creates a heading
c) Adds styling
d) Defines layout
8. Which HTTP method is used to retrieve data?
a) POST
b) PUT
c) DELETE
d) GET
9. What does REST stand for?
a) Representational State Transfer
b) Real-time Event Stream Transfer
c) Remote Server Text
d) Recursive Entity Structure
10. Which HTTP status code means "Not Found"?
a) 200
b) 301
c) 403
d) 404
11. Which HTTP method is used to update a resource?
a) GET
b) PUT
c) DELETE
d) PATCH
12. Which method is used in REST for partial updates?
a) PATCH
b) POST
c) GET
d) PUT
13. Which status code means "Internal Server Error"?
a) 200
b) 301
c) 404
d) 500
14. Which HTTP method is idempotent?
a) POST
b) PUT
c) PATCH
d) CONNECT
15. Which HTTP method is safe and does not modify resources?
a) POST
b) DELETE
c) GET
d) PUT
16. What does git commit do?
a) Creates a new branch
b) Saves changes to the local repository
c) Uploads changes to GitHub
d) Checks out a branch
17. Which Git command shows commit history?
a) git log
b) git show
c) git diff
d) git list
18. Which command stages all modified files in Git?
a) git init
b) git commit
c) git add
d) git status
19. What does git clone do?
a) Initializes a repo
b) Commits changes
c) Downloads a repo
d) Merges branches
20. Which command syncs your local Git branch with the remote branch?
a) git upload
b) git sync
c) git pull
d) git share
21. Which command uploads commits to the remote Git repository?
a) git commit
b) git upload
c) git push
d) git send
22. What is a key benefit of Git branching?
a) Speeds up commits

- b) Separates changes for parallel work
c) Encrypts code
d) Installs packages
23. Which Git command is used to create a new branch?
a) git branch new
b) git create-branch
c) git branch
d) git checkout -b
24. What does the .gitignore file do?
a) Stores passwords
b) Lists files to be excluded from commits
c) Compiles CSS
d) Adds users to the repo
25. Which command lets you switch branches in Git?
a) git switch
b) git reset
c) git set-branch
d) git new
26. What is the use of git merge?
a) Create a new repo
b) Combine code from branches
c) Delete history
d) Reset a commit
27. Which command shows the working directory status in Git?
a) git commit
b) git show
c) git status
d) git diff
28. Which of these databases is NoSQL?
a) PostgreSQL
b) MongoDB
c) SQLite
d) MySQL
29. Which database uses document-based storage?
a) MongoDB
b) MySQL
c) Oracle
d) SQLite
30. Which database type is best for hierarchical document storage?
a) MongoDB
b) MySQL
c) SQLite
d) MariaDB
31. What is the primary goal of software engineering?
a) Fast development
b) Cost-effective, maintainable software
c) Graphic design
d) UI animation
32. Which of the following is a non-functional requirement?
a) User can register
b) System uptime must be 99.9%
c) Admin can add users
d) Display user profile
33. Which of the following is a functional requirement?
a) The system shall respond within 3 seconds
b) The server uptime shall be 99.99%
c) Users can log in with email
d) The interface shall be user-friendly
34. What is the purpose of input validation?
a) Create APIs
b) Prevent invalid/malicious input
c) Serve pages faster
d) Compress files

b) radius

35. Which software development model emphasizes iterations and feedback?
a) Waterfall
b) Agile
c) V-model
d) RAD
36. Which of the following is used to describe user interactions in agile?
a) Use cases
b) JSON files
c) Entity diagrams
d) User stories
37. Which protocol is used to secure HTTP?
a) FTP
b) SSH
c) TLS
d) DNS
38. What is a benefit of using HTTPS over HTTP?
a) Faster page loads
b) Encrypted data transmission
c) Better search ranking
d) Easier styling
39. Which of the following is a frontend framework?
a) Flask
b) Vue.js
c) Express.js
d) Laravel
40. Which language is primarily used to style web pages?
a) HTML
b) CSS
c) JavaScript
d) XML
41. Which language is not typically used in frontend development?
a) JavaScript
b) CSS
c) Python
d) HTML
42. Which of the following is a CSS framework?
a) Flask
b) Django
c) Tailwind
d) Express.js
43. Which CSS property controls element stacking?
a) float
b) margin
c) z-index
d) display
44. Which CSS property changes the text color?
a) background
b) font-size
c) color
d) visibility
45. Which of these is a valid semantic HTML tag?
a) <section>
b) <divs>
c) <bold>
d) <item>
46. Which frontend technology handles dynamic DOM updates?
a) HTML
b) CSS
c) JavaScript
d) SQL

47. What is a Progressive Web App (PWA)?
a) A single-page admin tool
b) A web app that behaves like a native app
c) A React component
d) A CMS plugin
48. Which of the following frameworks is backend-focused?
a) Angular
b) React
c) Express.js
d) Tailwind
49. What is the role of the controller in MVC?
a) Style content
b) Render views
c) Handle user input and logic
d) Manage databases directly
50. What is the primary role of the model in MVC?
a) Handle HTTP requests
b) Store and manage data
c) Define UI layout
d) Serve static files
51. What is JSON mainly used for?
a) Storing binary data
b) Transferring structured data
c) Defining CSS styles
d) Logging error messages
52. Which keyword is used to define variables in JavaScript?
a) var
b) def
c) int
d) str
53. Which of the following is a JavaScript package manager?
a) pip
b) composer
c) npm
d) flask
54. What is a key advantage of the SPA model?
a) Better SEO
b) Faster navigation
c) Easier server-side logic
d) Simplified backend
55. Which term best describes the ability to grow a system by adding more servers?
a) Coupling
b) Scalability
c) Agility
d) Normalization
56. Which of the following is a feature of microservices?
a) Centralized logic
b) Tight coupling
c) Modular independence
d) Single codebase
57. What is a benefit of using RESTful APIs?
a) Real-time video streaming
b) Platform-dependent services
c) Stateless communication
d) Built-in database encryption
58. Which statement best describes the role of an API gateway in microservices architecture?
a) It stores microservice logs
b) It manages user sessions
c) It routes and aggregates service requests
d) It renders frontend components

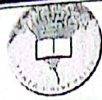
59. In requirements engineering, which of the following is a typical artifact created during the elicitation phase?
a) Source code
b) User manual
c) Use case diagram
d) Build script
60. What is the main advantage of using Git over manual file saving?
a) Adds syntax highlighting
b) Ensures version control
c) Speeds up network connections
d) Improves UI responsiveness

- Q2. Briefly answer these short-answer questions (5 x 1=5)
1. Define software engineering in your own words
 2. List three advantages of using the MVC architecture.
 3. Describe the difference between a web client and a web server.
 4. How does GraphQL differ from REST?
 5. Describe the purpose of version control systems like Git.

- Q3. Design/Situational Questions (5 x 1=5)
1. You're asked to build a blog app. Describe its basic data schema.
 2. Given a user story 'As a user, I want to reset my password', what steps are needed to implement it?
 3. Your app is slow because of too many database queries. What can be done to improve performance?
 4. Describe how you would validate inputs for a user registration form.
 5. A client wants offline access for their app. What would you suggest and why?

Best Wishes!

Assist. Prof. Hassan Eldeeb



Answer the following questions.

Problem number (1) (20 Marks)

- 1) The learner is trying to predict housing prices based on the size of each house. What type of regression is this?
 - a. Multivariate Logistic Regression
 - b. Logistic Regression
 - c. Linear Regression
 - d. Multivariate Linear Regression
- 2) Hypothesis h maps from x (independent variable) to y (dependent variable).
 - a. True
 - b. False
- 3) What kind of algorithm is logistic regression?
 - a. Cost function minimization
 - b. Ranking
 - c. Regression
 - d. Classification
- 4) The output in a logistic regression problem is yes (equivalent to 1 or true). What is its possible value?
 - a. Greater than 0.5
 - b. Depends on the algorithm's threshold value
 - c. Greater than 0.6
 - d. Equal to 1
- 5) A Support Vector Machine (SVM) is a discriminative classifier defined by a separating hyperplane.
 - a. True
 - b. False
- 6) Which of the following statements is not true about SVM?
 - a. It is memory efficient
 - b. It can address a large number of predictor variables

- c. It is versatile
 - d. It doesn't require feature scaling
- 7) Which of the following statements is not true about SVM?
- a. It has regularization capabilities
 - b. It handles non-linear data efficiently
 - c. It has much improved stability
 - d. Choosing an appropriate kernel function is easy
- 8) Minimizing a quadratic objective function (w^2_i) subject to certain constraints where $i= 1$ to n , in SVM is known as primal formulation of linear SVMs.
- a. True
 - b. False
- 9) The goal of a support vector machine is to find the optimal separating hyperplane which minimizes the margin of the training data.
- a. True
 - b. False
- 10) Which of the following statements is not true about large margin intuition classifier?
- a. It has a hyperplane with the maximum margin
 - b. The hyperplane divides the data properly and is as far as possible from your data points
 - c. The hyperplane is close to your data points
 - d. When new data comes in, even if it is a little closer to the wrong class than the training points, it will still lie on the right side of the hyperplane

Problem number (2) (10 Marks)

Suppose you have the following training samples

$$x_1 = \begin{pmatrix} 1 \\ 2 \end{pmatrix}, y_1 = c_1$$

$$x_2 = \begin{pmatrix} 2 \\ 1 \end{pmatrix}, y_2 = c_1$$

$$x_3 = \begin{pmatrix} 6 \\ 6 \end{pmatrix}, y_3 = c_2$$

$$\text{initial } w = \begin{pmatrix} 3 \\ 2 \\ -2 \end{pmatrix}$$

Learning rate = 2

Where c_1, c_2 are positive and negative classes, respectively. Zero is unaccepted.

Find the following after 2 iterations using stochastic gradient descent with batch size =1 :

1. Find the weight values
2. Find the model equation
3. Find the value of output for this test data $x_4 = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$
4. Repeat the same problem using gradient descent.

Problem number (3) (5 Marks)

Apply K-means algorithm for number of clusters =2 over the data (40,20), (97, 65) , (160,72), (78,22), (154, 96), and (133, 88) up to two iterations.

Initially choose first two objects as initial centroids.

Find the following:

1. Show the clusters using Euclidean Distance.
2. Plot the dataset and the output centroids after 2 iterations.

Problem number (4) (5 Marks)

As shown in the above table, the dataset has 6 points. Solve the L_{dual} quadratic program yields the following nonzero values for the lagrangian multipliers.

Find the following if $C=10$:

1. Find the values of weights
2. Plot the SVM decision boundary with margins.

i	Data Points (x)	Label (l)	α
0	(1,2)	+1	3
1	(2,1)	+1	3
2	(0,0)	+1	10
3	(2,3)	+1	0
4	(-1,-2)	+1	10
5	(-2,-2)	-1	6
6	(1,0)	-1	10

Good luck

Dr. Marwa Reda



Course Title: Database Systems Design Course Code: CCE 212 Level One Students
 Date: 24-5-2025 (End-Semester Exam) Time Allowed: 2 hour No. of Pages: (4)

Answer the following questions.

Question 1 (10 marks): Consider the following relations:

Occupation		City	
OccupationId	OccupationName	CityId	CityName
1	Software Engineer	1	Halifax
2	Accountant	2	Calgary
3	Pharmacist	3	Boston
4	Library Assistant	4	New York
		5	Toronto

User					
Id	Name	Age	Gender	OccupationId	CityId
1	John	25	Male	1	3
2	Sara	20	Female	3	4
3	Victor	31	Male	2	5
4	Jane	27	Female	1	3

Solve the following relational expressions for above relations (show the resulting relation (as a table)), and write SQL statements for each relational expression.

- π Name (σ Age > 25 (User))
- σ Id > 2 \vee Age != 31 (User)
- σ User.OccupationId = Occupation.OccupationId (User X Occupation)
- User \bowtie Occupation \bowtie City
- π Name, Gender (σ CityName = " Boston " (User \bowtie City))

Question 2 : Choose the correct answer: (Use the Electronic Sheet) (30 marks)

- 1) What happens if a foreign key column in the referencing table is defined with the ON DELETE CASCADE option and a row is deleted from the referenced table?
 - a) The delete will only affect the referencing table's row, and the referenced row will stay intact

- b) The row in the referencing table will be deleted automatically
- c) The foreign key column in the referencing table will be set to NULL automatically
- d) The row in the referenced table will be updated automatically
- 2) In a relation schema with 4 attributes and one of the attributes is a primary key, how many superkeys can exist?
- a) 4 b) 8 c) 10 d) 12 e) None of these
- 3) What does the 'Isolation' property of a transaction ensure?
- a) The transaction is executed entirely or not at all
- b) The data in the database remains consistent
- c) Transactions are executed independently of each other
- d) The database is not corrupted during the transaction
- 4) A system is in a _____ state if there exists a set of transactions such that every transaction in the set is waiting for another transaction in the set.
- a) Idle b) Waiting c) Deadlock d) Ready
- 5) What is a view?
- a) A view is a special stored procedure executed when certain event occurs
- b) A view is a virtual table which results of executing a query
- c) A view is a database diagram d) None of the Mentioned
- 6) The _____ clause allows us to select only those rows in the result relation of the _____ clause that satisfy a specified predicate.
- a) Where, from b) From, select c) Select, from d) From, where
- 7) Which of the following statements is true about triggers in SQL?
- a) A trigger can be executed manually using a SQL statement.
- b) A trigger is automatically executed when an event occurs.
- c) A trigger can only be associated with one table at a time.
- d) A trigger can only be used in MySQL databases
- 8) In the relational models, degree is termed as:
- a) Number of tuples. b) Number of attributes.
- c) Number of tables. d) Number of constraints.
- 9) What happens if a transaction fails before it is committed?
- a) The changes made by the transaction are saved permanently.
- b) The changes made by the transaction are discarded and the system returns to its initial state.
- c) The system keeps a record of the changes for future reference.
- d) The transaction is automatically committed

- 10) What does the SQL Full Outer Join do?
- Combines rows from two or more tables based on a condition
 - Combines all rows from two tables, including unmatched rows
 - Combines rows based on primary keys
 - None of these
- 11) Which of the following is used to manipulate and retrieve data from the database?
- DDL
 - DML
 - TCL
 - XML
- 12) What does the % character do in an SQL LIKE clause?
- It matches a single character in a string.
 - It matches any substring of any length.
 - It matches exactly one character.
 - It matches a specific character in a string
- 13) How many levels of DBMS schemas are defined in the three-schema architecture?
- One
 - Two
 - Three
 - Four
- 14) Which SQL clause is used to sort the result set?
- ORDER BY
 - GROUP BY
 - WHERE
 - HAVING
- 15) Which of the following commands is used to remove a relation from an SQL database?
- REMOVE
 - DELETE
 - DROP
 - ERASE
- 16) In the context of a conceptual model, what is an "attribute"?
- A unique identifier for an entity
 - A property or characteristic of an entity
 - A type of relationship between entities
 - A physical storage location for data
- 17) What do database model operations primarily specify?
- Security policies
 - Methods for indexing data
 - Database retrievals and updates
 - Networking protocols
- 18) Which of the following clauses is mandatory in an SQL query?
- SELECT and FROM
 - SELECT and WHERE
 - FROM and GROUP BY
 - HAVING and ORDER BY
- 19) A database schema defines:
- Only the relationships between tables
 - Only the physical storage of data
 - The structure, data types, and constraints of a database
 - How users interact with the database
- 20) Which of the following is an example of an entity set?
- A single employee record
 - The set of all employees in a company

used on a condition
g unmatched rows
d) None of these
and retrieve data from the database?
d) XML

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ree d) Four

d) HAVING
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d) ERASE
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n a company

- c) A query fetching employee names. d) A database index on employee names
- 21) Which of the following is an example of total participation?
a) A student must enroll in at least one course
b) A professor may or may not advise students
c) A customer may have zero or more orders
d) A library book may or may not be checked out
- 22) Consider a relation with the attributes {ID, Name, Date_of_Birth}. If the superkey is {ID, Name, Date_of_Birth}, which of the following is a minimal superkey?
a) {ID, Name} b) {Name, Date_of_Birth} c) {ID} d) {ID, Name, Date_of_Birth}
- 23) Which of the following is true about a minimal superkey?
a) There can be only one. b) The default superkey is always a minimal superkey.
c) Every minimal superkey is a primary key.
d) Every superkey contains a minimal superkey as a subset.
- 24) Which type of entity cannot exist in the database unless another type of entity also exists in the database?
a) Weak entity b) Strong entity c) ID-dependent entity d) ID-independent entity
- 25) Consider a possible interleaving Schedule :
T1: BEGIN A=A+100, B=B-100 C1
T2: BEGIN A=1.06*A, B=1.06*B C2
Is this schedule serializable?
a) Yes b) No c) none of these
- 26) The statement in SQL which allows to change the definition of a table is
a) Alter b) Update c) Create d) select
- 27) What is an Instance of a Database?
a) The logical design of the database system
b) The entire set of attributes of the Database put together in a single relation
c) The state of the database system at any given point of time
d) The initial values inserted into the Database immediately after its creation
- 28) Which of the following has "all-or-none" property?
a) Atomicity b) Durability c) Isolation d) All of the mentioned
- 29) DML triggers in SQL Server is applicable to _____
a) Insert b) Update c) Delete d) All of the mentioned
- 30) A table joined with itself is called
a) Join b) Self Join c) Outer Join d) Equi Join

BEST WISHES

Dr.Faten Elshwemy.

Page 4 of 4



Course Title	Data Mining	Academic Year 2024/2025 Spring Semester Final Exam	Course Code	CCE461
Year/ Level	All levels		Allowed time	2 hrs
Date	27/5/ 2025	No. of Pages (4)	Total Assessment Marks: 40	

Question No. 1: Choose the correct answer from the following choices. (15 Points)

- Which of the following is a ratio-scaled attribute?
 - Student ID
 - Temperature in Fahrenheit
 - Weight in kilograms
 - Education level (High School, Bachelor's)
- Jaccard Similarity is preferred over SMC when:
 - All binary attribute matches (0-0 and 1-1) are equally important
 - Negative matches (0-0) are considered irrelevant
 - The data is numeric
 - The distance measure must be Euclidean
- Detecting unusual data points that do not conform to expected patterns is called:
 - Classification
 - Clustering
 - Outlier
 - Regression
- What is the entropy of a pure node (all samples in one class)?
 - 0
 - 1
 - 0.5
 - Undefined
- Which of the following is NOT a common method for expressing test conditions in decision trees?
 - Binary split
 - Multi-way split
 - Discretization of continuous attributes
 - Linear regression split
- For a continuous attribute like "Age," how is the best split point determined?
 - By selecting the median value
 - By evaluating all possible thresholds and choosing the one with the highest information gain
 - By always splitting at the mean value
 - By ignoring the attribute
- What is the role of the root node in a decision tree?
 - It contains the final class labels
 - It represents the first feature split based on Hunt's algorithm
 - It is always a leaf node
 - It is excluded during training
- Which metric requires equal-length strings?
 - Edit Distance
 - Entropy
 - Cosine Similarity
 - Hamming Distance



9. For ordinal attributes (e.g., "Low," "Medium," "High"), the best way to split is:
- Binary Split to (\leq Medium vs. $>$ Medium)
 - Binary Split to (Low and High) vs. Medium)
 - Ignore the order and treat them as nominal
 - Group categories randomly
10. Which of the following is a disadvantage of Hunt's algorithm?
- It only works for binary classification
 - It tends to create over-complex trees
 - It cannot handle categorical features
 - It requires normalized data
11. What is the primary goal of data mining?
- Storing large datasets
 - Encrypting sensitive data
 - Extracting meaningful patterns from data
 - Deleting redundant data
12. Which metric evaluates classification models?
- Confidence
 - RMSE (Root Mean Squared Error)
 - Accuracy
 - Support
13. What is outlier detection used for?
- Finding data errors
 - Identifying rare or fraud events
 - Reducing dataset size
 - Both A and B
14. What is the "curse of dimensionality" in data mining?
- Too few features
 - High computational cost with many features
 - Lack of training data
 - Overfitting due to small datasets
15. What is the purpose of a confusion matrix?
- To visualize clustering results
 - To evaluate classification performance
 - To reduce data dimensions
 - To clean noisy data

Question No. 2:

(15 Points)

a. Classify the following attributes as Nominal, Ordinal, Interval, or Ratio: **(5 Points)**

- Shirt Size (S, M, L)
- Phone Numbers
- Income in Dollars
- Pass/Fail (True/False)
- Education Level (High School, Bachelor's, PhD)



- b. Compute the Minkowski distance ($r=3$) between vectors $A(1,4,6)$ and $B(3,1,2)$. (2 Points)
- c. Compare Jaccard and SMC for $X=[1,0,0,1]$ and $Y=[0,0,1,1]$. (2 Points)
- d. For a node with 5 instances of Class P and 5 instances of Class Q, compute: (6 points)
 - 1. Gini Index
 - 2. Entropy
 - 3. Misclassification Error

Question No. 3:

- a. What is the difference between classification and clustering? (10 Points)
- b. Given this Transaction Dataset: (2 Points)
(3 Points)

TID	Items
1	{Bread, Milk, Eggs}
2	{Bread, Diaper, Beer}
3	{Milk, Diaper, Eggs}
4	{Bread, Milk, Diaper}
5	{Bread, Milk, Eggs}

- i. Find the support and confidence for the rule: $\{Milk, Bread\} \rightarrow \{Eggs\}$
- ii. Find the support and confidence for the rule: $\{Bread, Diaper\} \rightarrow \{Beer\}$
- c. Given this confusion matrix for a cancer detection model: (5 Points)

	Predicted Cancer	Predicted No Cancer
Actual Cancer	30	20
Actual No Cancer	5	45



Tanta University

Computers and Automatic Control Engineering Department
Artificial Intelligence Program Students



Faculty of Engineering

Compute:

1. Accuracy
2. False Positive Rate
3. Recall
4. Specificity
5. Error Rate

End of questions.....

Best of Luck,

Dr. Mai Zaki

Course Title: OOP
Date: 2025

Course Code:
Allowed time: 2 hours

Year: 1st
No. of Pages: (4)

Model A

Complete the following code in Python: (NOA= None of Above)

```
def dec2bin(decimal):
    binary = ...(1)...
    while ...(2)... :
        remainder = ...(3)...
        binary = ...(4)... ...(5)... ...(6)...
        decimal = ...(7)...
    return ...(8)...
```

1) (1) is:

- a) 0 b) "" c) 1 d) NOA

2) (2) is:

- a) decimal > 0 b) decimal = 0 c) NOA

3) (3) is:

- a) decimal // 2 b) decimal / 2 c) decimal % 2

4) (4) is:

- a) remainder b) str(remainder) c) eval(remainder) d) NOA

5) (5) is:

- a) + b) - c) -= d) NOA

6) (6) is:

- a) dec2bin b) decimal c) binary d) NOA

7) (7) is:

- a) decimal // 2 b) decimal / 2 c) decimal % 2

8) (8) is:

- a) decimal b) binary c) remainder d) NOA

Complete the following code:

```
class Shape:
    def __init__(self, name):
        self.__(1)__ = name
        self.__(2)__ = 0 # private attribute

    def __(3)__ (self):
        pass # No operation executed

    def get_area(self):
        return self.__area
```

```

class Circle(__(4)__):
    def __init__(self, name, radius):
        __(5)__( ).__init__(name)
        self.__(6)__ = radius

    def get_radius(self):
        return self.__radius

    def set_radius(self, value):
        if value __(7)__ 0 :
            raise ValueError("Radius must be positive")
        self.__radius = value

    def __(8)__(self): # __(9)__
        self.__area = 3.14 * self.radius ** 2
        return self.__area

class Rectangle(Shape):
    def __init__(self, name, width, height):
        __(5)__( ).__init__(name)
        self.width = width
        self.height = height

    def calculate_area(self):
        self.__area = __(10)__
        return self.__area

# Polymorphism demonstration
def print_shape_info(shape):
    print(f"{{shape.name}}: {{shape.__(11)__(0)}}")

shapes = [Circle("My Circle", 5), Rectangle("My Rectangle", 4, 6)]
for shape in shapes:
    __(12)__(shape)

```

9) (1) is:

a) self._name b) name c) __name d) self.name

10) (2) is:

a) area b) _area c) __area d) private_area

11) (3) is:

a) area b) calculate_area c) get_area d) find_area

12) (4) is:

a) object b) Shape c) BaseShape d) Parent

13) (5) is:

a) Shape b) super c) parent d) Super

14) (6) is:

- a) radius b) `_radius` c) `__radius` d) `self.radius`
- 15) (7) is:
 a) `<=` b) `>=` c) `>` d) `==`
- 16) (8) is:
 a) `area` b) `calculate_area` c) `override_area` d) `circle_area`
- 17) (9) is:
 a) Operator overloading b) method overloading
 c) method overriding d) NOA
- 18) (10) is:
 a) `self.width*self.height` b) `width*height` c) `self.width*height` d) NOA
- 19) (11) is:
 a) `area` b) `calculate_area` c) `get_shape` d) `shape_area`
- 20) (12) is:
 a) `show_shape` b) `print_shape_info` c) `display_area` d) `shape_info`

Complete the following function that the minimum element in a list:

```
def find_min (input_list):
    min_value = ...(1)...
    for value in input_list[ ...(2)... : ]:
        if ...(3)... :
            ...(4)...
    return ...(5)...
```

- 21) (1) is:
 a) `input_list[1]` b) `input_list` c) `input_list[0]` d) NOA
- 22) (2) is:
 a) 1 b) 2 c) 3 d) NOA
- 23) (3) is:
 a) `value > min_value` b) `value < min_value` c) `value == min_value`
- 24) (4) is:
 a) `value = min_value` b) `min_value = value` c) NOA
- 25) (5) is:
 a) `input_list` b) `value` c) `min_value` d) NOA

Complete the following code:

```
class Shape:
    def perimeter(self, a, ...(1)... ):
        if ...(2)... :
            ...(3)... ('Perimeter of Rectangle is:', ...(4)... )
        else:
            ...(3)... ('Perimeter of Square is:', ...(5)... )
```

- 26) (1) is:
 a) b b) b=1 c) b=0 d) NOA
- 27) (2) is:
 a) b < 0 b) b > 0 c) b == 0 d) NOA
- 28) (3) is:
 a) Print b) print c) prinT d) NOA
- 29) (4) is:
 a) 2*(a + b) b) 2*a + b c) 2a + b d) NOA
- 30) (5) is:
 a) a * 4 b) a + 4 c) a % 4 d) NOA

Complete the following code in Python:

```
class ...(1)... :
    def __init__(...(2)...):
        ...(3)...
    def __add__(...(4)...):
        return ...(5)...

b1 = Bok(400)
b2 = Bok(300)
print("Total number of pages: ", b1 + b2) # ...(6)...
```

- 31) (1) is:
 a) Book b) book c) NOA
- 32) (2) is:
 a) self, pages b) pages, self c) pages d) NOA
- 33) (3) is:
 a) Pages =pages b) pages = self.pages c) self.pages= pages
- 34) (4) is:
 a) other b) self, other c) other, self d) NOA
- 35) (5) is:
 a) self.pages + other.pages b) pages + other.pages c) NOA
- 36) (6) is:
 a) operator overloading b) method overloading c) method overriding

Q2: Answer the following questions:

- a- Calculate the return value of `ceil(-5.859)` ?
- b- What is the output of `turtle.circle(5, steps = 3)`?