M.Tech/IOT

(Please write your Exam Roll No.) Exam Roll No. 02917711721

# END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] JULY 2023

**Paper Code: AIML/ IOT/ AIDS-202 Subject: Object Oriented Programming**

**Time: 3 Hours** **Maximum Marks: 75**

**Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit.**

Q1 i) Find the output of the given code: (3)

```
class Output {
public static void main(String args[])
{
    int x , y;
    x = 10;
    x++;
    --x;
    y = x++;
   System.out.println(x + " " + y);
}
 }
```

ii) What is operator? Write a short note on Logical operators. (3)

iii) What are the various ways to implement threads in Java? (3)

iv) Explain how abstract classes are different from interfaces? (3)

v) List various classes available in Java for performing Input/Output operations. (3)

## UNIT-I

Q2 a) Explain Sandbox model architecture. Also explain its significance with respect to the web based Java applications. (8)

(i) Write a single java program for the implementation of following object oriented concepts: (7)

(a) Encapsulation
(b) Inheritance
(c) Polymorphism
(d) Abstraction

**OR**

Q3 (a) Explain all the steps followed for execution of a Java program. (7)

(a) Write a Java program for the printing the fibonacci series. (4+4)

(b) Differentiate between procedural programming and object oriented programming.

**P.T.O.**

## UNIT-II

Q4 (i) Define wrapper classes. Write a java program to perform autoboxing for conversion of all 8 primitive data types to corresponding objects. **(7)**

(ii) Why exception handling is required? Explain the different Java keywords used for exception handling. **(8)**

**OR**

Q5 (i) Differentiate between collections and collection framework. **(4+4)**
(ii) Define the scenarios where we can use ArrayList instead of an Array.
(iii) Write a Java program to perform push and pop operations on stack with the following conditions: **(7)**
(a) The maximum capacity of stack is 20.
(b) While performing push operation, overflow condition should be checked
(c) While performing pop operation, underflow condition should be checked.

## UNIT-III

Q6 (i) Differentiate between AWT and Swings in Java. Also explain the hierarchy of AWT classes. **(7)**
(ii) Explain the different functions associated with Thread class. **(8)**

**OR**

Q7 (i) Explain the life cycle of a thread. Also explain how the thread transits from one to another during its life cycle? **(7)**
(ii) Explain the term synchronization. Also write Java code as a solution to producer-consumer problem using multithreading. **(8)**

## UNIT-IV

Q8 (i) Explain the term file handling. Also explain how BufferedReader and BufferedWriter classes can be used for file handling. **(8)**
(ii) Explain the significance of socket programming for developing client server applications in Java. **(7)**

**OR**

Q9 (i) Explain the term Java Database Connectivity. Also explain with the help of suitable coding lines, all the steps required to access data from database. The details provided should include the following: **(10)**
(a) JDBC Manager and Different Types of Driver
(b) Various Databases that can be used for connectivity
(c) Connection, Statement and Result Interfaces
(d) Various SQL statements that can be executed
(e) Various methods associated with ResultSet interface

(ii) Write a java program to print the number of characters, words and line in given text file: File_1.txt. The text file is stored at location: C:\\User\\Desktop\\Employee_1. **(5)**

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# END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] JULY-2023

**Paper Code: AIDS/AIML/IOT-204** **Subject: Database Management Systems**

**Time : 3 Hours** **Maximum Marks :75**

***Note:. Attempt five questions in all including question no. 1 which is compulsory. Select one question from each unit. Scientific calculators are allowed.***

Q1 Answer the following questions: **(2.5x6=15)**

(a) Distributed vs Object-oriented databases
(b) Explain ACID property in brief
(c) Discuss three tier architecture of DBMS with example
(d) Explain the concept of referential integrity giving example
(e) Write short note on key features of MongoDB
(f) Tuple vs Domain Relational Calculus

## UNIT-I

Q2 (a) A database is being built up by an e-commerce corporation "ABC" to track vendors and their products. This necessitates writing down the details such as name, mailing address, contact no. and email for each seller, the name, price, and quantity of each product, information like which seller's merchandise it is, a number that is specific to each product. Choose additional attributes for the schema that seems appropriate. Create an entity-relationship (ER) diagram to visualise this data. Be sure to note the restrictions on the relevant relationships, and give the entities the proper primary keys. **(10)**

(b) Explain the concept of weak and strong entity set with the help of an example. Draw the ER diagram to represent these entities. **(5)**

**OR**

Q3 (a) Write short note on the following with example: **(7)**

i. Multivalued and Derived attributes
ii. Specialization vs Generalization

(b) Explain how the hierarchical, network, and relational DBMS models differ from one another. Any real-time application of each should be given. **(8)**

## UNIT-II

Q4 (a) Explain various steps of query processing with the help of diagram. **(7)**

(b) Explain the concept of join operation in DBMS relations. Differentiate between outer and inner join operations with examples. **(8)**

**P.T.O.**

**OR**

Q5 (a) Write short note on the following with example: **(7)**
i Query optimization techniques
ii Types of Cursors in PL/SQL

(b) Explain the concept Nested queries in SQL. Write syntax of given clausesin SQLsuch as: **GROUP BY, DISTINCT, AVG(), LIKE, AND, CONCAT(),** with the help of examples. **(2+6)**

**UNIT-III**

Q6 (a) What is concurrency? Discuss various concurrency problems associated with it. Explain Time-stamp based protocol for concurrency control. **(8)**

(b) Let there are three concurrent transactions T1,T2 and T3. Determine the following schedule 'S' is conflict serializable or not? For a serializable schedule, find equivalent serial schedule. **(7)**
**S: R3(A), R2(A), W3(A), R1(A), W1(A)**

**OR**

Q7 (a) Define BCNF. Compare 3NF and BCNF. Which normal form is stronger between these two? Give an example of a relation in 3NF that is not in BCNF. **(8)**

(b) Write short note **any two** from the following with example: **(7)**
i. Functional dependency
ii. Two phase locking protocol
iii. View Serializability

**UNIT-IV**

Q8 (a) Explain the architectures of distributed databases. How data is fragmented in distributed databases? Also, discuss how transparency is achieved in such databases. **(8)**

(b) Discuss the need of data security in DBMS. Explain various security measures to protect database against various security threats. **(7)**

**OR**

Q9 (a) Design a data model for an e-commerce website that stores information on users, products, and orders. Evaluate the strengths and weaknesses of an RDBMS versus a NoSQL database for this application. **(8)**

(b) Write short note on the following with example: **(7)**
i. Applications of Data mining
ii. CAP theorem

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# END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] JULY 2023

**Paper Code: AIML/IOT/AIDS-206** **Subject: Software Engineering**

**Time: 3 Hours** **Maximum Marks: 75**

**Note: Attempt any five questions including Q.No.1 which is compulsory. Select one question from each unit.**

Q1 Attempt the following questions: **(2.5x6=15)**

a) Explain the feasibility study in SDLC? Mention any two non-functional requirements on software to be developed?

b) Distinguish between software re-engineering and reverse engineering?

c) Explain the concept of Function points? Why FPs becoming acceptable in industry?

d) Write the differences between Verification and Validation?

e) Draw the Context level 0 and level 1 DFD for the Safe home Software?

f) Differentiate between the features of Top-down and Bottom-up approaches of software design along with its advantages and disadvantages?

**UNIT-I**

Q2 a) Explain iterative waterfall and spiral model for software life cycle? Discuss various activities in each phase and what are its merits and demerits over traditional iterative process model? **[8]**

b) Which is more important-the product or process? Justify your answer? **[7]**

**OR**

Q3 a) Define the term "Software Engineering"? What are the major differences between Software Engineering Process and Traditional Engineering Process? **[8]**

b) Assume that the size of an organic type software product has been estimated to be 32000 lines of source code. Software development team has average experience on similar type of projects. The project schedule is not very tight. The average salary of software engineers are Rs. 15,000/- per month.
Determine the effort, development time, average staff size required and productivity of the project. **[7]**

**UNIT-II**

Q4 a) Narrate the importance of software specification of requirements. Explain a Typical SRS structure and its parts? **[5]**

b) What are the problems associated with software requirement analysis phase? Discuss in brief? **[5]**

**P.T.O.**

P-1/2

c) What is data flow diagram? Explain rule for drawing good data flow diagram with the help of suitable example? [5]

**OR**

Q5 a) Draw an ER diagram and DFD level1- diagram for automation of job placement agency and also write down the typical requirements, which you consider for a typical job placement agency? [5]

b) What is Software Requirement Specification? List out the advantages of SRS standards. Why is SRS known as the black box specification of a system? [5]

c) How is a data dictionary useful during software development? [5]

**UNIT-III**

Q6 a) Write short notes on the following

i) Software testing

ii) Modularity and explain important properties of modular system.

iii) Cyclomatic complexity measure of a software with the help of example [7]

b) Consider a program that input two integers having values in the range (10,250) and classifies them as even or odd. For this program generate Test cases using (i) boundary values analysis and (ii) Equivalence class testing? [8]

**OR**

Q7 a) What are the various debugging approaches? Discuss them with the help of examples? [5]

b) Does fault necessarily lead to failure? Justify your answer with an example? [5]

c) What are the objectives of software testing? Discuss the purpose of integration testing and how integration testing is done? [5]

**UNIT-IV**

Q8 a) What is risk exposure? What techniques can be used to control each risk? [5]

b) Explain Boehm's maintenance diagram with the help of diagram? [5]

c) The development effort for a project is 600PMs. The empirically determined constant (K) of Belady and Lehman model is 0.5. The complexity of code is quite high and is equal to 7.Calculate the total effort expended (M) if maintenance team has reasonable level of understanding of the project? [5]

**OR**

Q9 a) Discuss various cost-estimation & configuration management techniques? [5]

b) Explain Risk management in detail. Also discuss the points that differentiate project risk from technical risk? [5]

c) What are the five levels of CMM? List important features of each level? [5]

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# END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] JULY 2023

**Paper Code: AIML/ IOT/ AIDS-208** **Subject: Computer Networks and Internet Protocol**

**Time: 3 Hours** **Maximum Marks: 75**

**Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit.**

Q1 Attempt all questions:

a) What do mean by network topology? [3]

b) Compare the following: a) HDLC and PPP; b) TCP and UDP. [3]

c) What is the difference between MAC address and IP address? Also, List out the need for IPV6 Addressing? [3]

d) Define the following terms - a) Hub b) Switch c) Router d) Bridge e) Gateway f) Repeater [3]

e) What is ARQ and List the requirement of Domain Name Space (DNS)? [3]

## UNIT-I

Q2 a) Illustrate the ISO-OSI reference model with neat diagram. [7.5]

b) Categorize the different types of addressing used in computer network. [7.5]

**OR**

Q3 a) Explain the TCP/IP reference model with neat diagram. [7.5]

b) What are the different types of networks? Explain in detail. [7.5]

## UNIT-II

Q4 a) Compare the different sliding window protocols. [7.5]

b) Explain Point to Point protocol in detail. [7.5]

**OR**

Q5 a) Elaborate the various protocols for noisy channel. [7.5]

b) Illustrate IEEE 802.3 standard with its appropriate application. [7.5]

## UNIT-III

Q6 a) What are the responsibilities of Network Layer? [7.5]

b) Identify the major difference between distance vector routing and link state routing. [7.5]

**OR**

Q7 a) Write a detail note on Internet protocols. [7.5]

b) Explain about the Shortest Path Algorithm? [7.5]

**P.T.O.**

## UNIT-IV

Q8 a) Write short notes on performance issues of transport layer. **[7.5]**

b) Explain the working of Electronic mail. How SMTP used in Email applications. **[7.5]**

**OR**

Q9 a) Discuss the features of HTTP and also discuss how HTTP works. **[7.5]**

b) Write Short Note on a) IPV4 Addressing b) IPV6 Addressing c) Routing Table. **[7.5]**

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# END TERM EXAMINATION

## FOURTH SEMESTER [B.TECH] JULY 2023

**Paper Code: IOT-210** **Subject: Internet of Things**

**Time: 3 Hours** **Maximum Marks: 75**

**Note: Attempt five questions in all including Q.No.1 which is compulsory. Assume missing data. Select one question from each unit.**

Q1 This question contains 10 parts and carries equal weightage. This question is compulsory. **(3x5=15)**

a) Explain the functional block diagram of IoT

b) Analyze any three IoT challenges and its solution

c) Compare and contrast between IPv4 and IPv6

d) What is Cloud computing? State Benefits of using cloud computing in IoT systems

e) Compare and contrast NFC, BT LE, ZigBee, and WLAN protocols in a tabular format stating the contrasting properties.

**UNIT-I**

Q2 i) Explain the architecture of an IoT system. **(5)**

ii) Write short note on Application Layer Protocols (HTTP, CoAP, XMPP, MQTT and AMQP. **(2x5=10)**

**OR**

Q3 i) Write an overview on the Design Principles for Connected Devices **(5)**

ii) Discuss the factors that influence the choice of sensors. List different types of sensors which can be used in IoT. **(3+3)**

iii) Outline different communication models in IoT? **(4)**

**UNIT-II**

Q4 For the serial communication (UART, SPI, and I2C) protocols highlight the following points in detail: **(15)**

i) Definition

ii) Steps of transmission,

iii) Advantages

iv) Disadvantages and

v) Application area

**OR**

Q5 i) Construct a temperature and humidity monitoring system with NodeMCU and display the contents on serial monitor. Explain circuit connections and write code snippets. **(7.5)**

ii) Design and develop an Arduino code for obstacle avoidance application using ultrasonic sensor. Include the necessary circuit connections and code snippets. **(7.5)**

**UNIT-III**

Q6 i) Describe the physical and MAC header format of IEEE 802.15.4 **(3+3)**

ii) Draw a neat well labeled diagram of ZigBee architecture **(4)**

iii) State valid points for using Ipv6 in IoT Environments. **(5)**

**P.T.O.**

**OR**

Q7 i) Explain how constrained nodes deal with bigger headers **(4)**

ii) What is 6LoWPAN? Why is it called so? What are its features? **(2+2+3)**

iii) What is the role of 6LowPAN in wireless sensor networks? **(4)**

**UNIT-IV**

Q8 i) What is Big Data? Elaborate on its characteristics. How is it important for IoT systems? Explain the challenges faced while handling and processing IoT-generated data. **(2+3+3+3)**

ii) What are the benefits associated with the integration of Big Data, Cloud Computing, and Data Analytics within IoT systems? **(4)**

**OR**

Q9 i) What is the concept of Data Analytics and what are the popular data analytics techniques? How does it play a significant role in IoT systems? **(2+4+3)**

ii) What are the difficulties encountered in implementing Big Data, Cloud Computing, and Data Analytics? **(3)**

iii) State the future trends and advancements in technologies like Big Data, Cloud Computing, and Data Analytics for IoT **(3)**

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(Please write your Exam Roll No.) Exam Roll No. .....

# END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] JULY 2023

**Paper Code: AIML/AIDS-210** **Subject: Fundamentals of Machine Learning**

**Time: 3 Hours** **Maximum Marks: 75**

**Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit. Only scientific calculator are allowed.**

Q1 Answer all the following with precise justification:-

(a) State any five examples of machine learning applications. (2.5)

(b) State any two model combination scheme to improve the accuracy of a classifier. (2.5)

(c) Write down the major differences between K-means clustering and hierarchical clustering. (2.5)

(d) What is Reinforcement Learning? (2.5)

(e) Define (a)Decision trees (b) Imbalanced data (2.5)

(f) Define (A) Classification (b) Q learning (2.5)

## UNIT-I

Q2 (a) Distinguish between supervised learning and unsupervised learning. Illustrate with an example. (7.5)

(b) List and explain the steps to design a learning system in detail. (7.5)

Q3 (a) What is Machine Learning? Explain different perspectives and issues in machine learning? (7.5)

(b) Discuss the role of machine learning in fraud detection, medical diagnosis and email spam detection. (7.5)

## UNIT-II

Q4 (a) Using example of your own Compare Classification with regression? Also Explain the methods used to learn multiple classes for a K class Classification Problem. (7.5)

(b) Describe the random forest algorithm to improve classifier accuracy. For the following set of training samples, find which attribute can be chosen as the root for decision tree classification. (7.5)

| Instance | Classification | a1 | a2 |
|---|---|---|---|
| 1 | + | T | T |
| 2 | + | T | T |
| 3 | - | T | F |
| 4 | + | F | F |
| 5 | - | F | T |
| 6 | - | F | T |

Q5 (a) Write Bayes theorem. What is the relationship between Bayes theorem and the problem of concept learning? (7.5)

(b) Consider the training data in the following table where Play is a class attribute. In the table, the Humidity attribute has values "L" (for low) or "H" (for high), Sunny has values "Y" (for yes) or "N" (for no), Wind has values "S" (for strong) or "W" (for weak), and Play has values "Yes" or "No". (7.5)

| Humidity | Sunny | Wind | Play |
|---|---|---|---|
| L | N | S | No |
| H | N | W | Yes |
| H | Y | S | Yes |
| H | N | W | Yes |
| L | Y | S | No |

P.T.O.

What is class label for the following day (Humidity=L,Sunny=N,Wind=W), according to naïve Bayesian classification?

**UNIT-III**

Q6 (a) Compare K means clustering with Hierarchical Clustering Techniques. Explain the basic elements of a Hidden Markov Model (HMM). List any two applications of HMM. **(7.5)**

(b) Use K Means clustering to cluster the following data into two groups. Assume cluster centroid are m1=2 and m2=4. The distance function used is Euclide an distance. {2, 4, 10, 12,3, 20, 30, 11, 25} **(7.5)**

Q7 (a) Explain the EM Algorithm and Fuzzy C means clustering in detail. **(7.5)**

(b) Explain Apriori algorithm in machine learning and association analysis in detail? **(7.5)**

**UNIT-IV**

Q8 (a) Explain the Q function and Q Learning Algorithm assuming deterministic rewards and actions with example. **(7.5)**

| Day | Outlook | Temperature | Humidity | Wind | Play Tennis |
|---|---|---|---|---|---|
| D1 | Sunny | Hot | High | Weak | No |
| D2 | Sunny | Hot | High | Strong | No |
| D3 | Overcast | Hot | High | Weak | Yes |
| D4 | Rain | Mild | High | Weak | Yes |
| D5 | Rain | Cool | Normal | Weak | Yes |
| D6 | Rain | Cool | Normal | Strong | No |
| D7 | Overcast | Cool | Normal | Strong | Yes |
| D8 | Sunny | Mild | High | Weak | No |
| D9 | Sunny | Cool | Normal | Weak | Yes |
| D10 | Rain | Mild | Normal | Weak | Yes |
| D11 | Sunny | Mild | Normal | Strong | Yes |
| D12 | Overcast | Mild | High | Strong | Yes |
| D13 | Overcast | Hot | Normal | Weak | Yes |
| D14 | Rain | Mild | High | Strong | No |

(b) Discuss Bellman equation and its role in machine learning? Explain Value function approximation? **(7.5)**

Q9 (a) Write a note on the following:- **(7.5)**

(i) Markov Decision Process

(ii) Applications of Neural Networks

(b) Discuss the significance of Deep Q Neural Networks in machine learning? Also write down the applications of reinforcement learning? **(7.5)**

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(Please write your Exam Roll No.) Exam Roll No. .....

# END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] JULY 2023

**Paper Code: AIDS/AIML/IOT-212** **Subject: Computational Methods**

**Time: 3 Hours** **Maximum Marks: 75**

**Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit.**

Q1 Attempt all questions:-

(a) Explain two types of complexities of an algorithm. (2.5)

(b) Define rate of convergence of an iterative method. Find the rate of convergence of Newton- Raphson's method. (2.5)

(c) Use Lagrange's Interpolation formula to find the value of y when x=10. (2.5)

The following values of x and y are given.

| x | 5 | 6 | 9 | 11 |
|---|---|---|---|---|
| y | 12 | 13 | 14 | 16 |

(d) The following table of values are given for a function f(x). (2.5)

| | x | 0.1 | 0.2 | 0.3 |
|---|---|---|---|---|
| y | | | | |
| 0.1 | | 2.0200 | 2.0351 | 2.0403 |
| 0.2 | | 2.0351 | 2.0801 | 2.1153 |
| 0.3 | | 2.0403 | 2.1153 | 2.1803 |

Determine the value of $\frac{\partial f}{\partial x}$ *and* $\frac{\partial f}{\partial y}$ at (0.2, 0.2) using central difference formula.

(e) Evaluate $\int_{-1}^{1} \frac{dx}{1+x^2}$ using three-point Gaussian Quadrature formula. (2.5)

(f) Classify the PDE $\frac{\partial^2 u}{\partial x^2} - 2x\frac{\partial^2 u}{\partial x \partial y} + x^2\frac{\partial^2 u}{\partial y^2} - 2\frac{\partial u}{\partial x} = 0$. (2.5)

## UNIT-I

Q2 (a) Find the real root of equation $x^3 - 9x + 1 = 0$ correct to three places of decimal using simple fixed point iteration method. (7.5)

(b) Find the 4th root of 32 correct to three places of decimal using Secant method. (7.5)

Q3 (a) Using Regula Falsi method find the real root of $x\log_{10}x = 1.2$ correct to three places of decimal. (7.5)

(b) Using Bisection method find the root of the equation $x^3 - 5x + 1 = 0$ correct to two places of decimal. (7.5)

## UNIT-II

Q4 (a) Solve the following system of equations using Gauss Elimination method with partial pivoting: (7.5)

$$2x_1 + 2x_2 + x_3 = 6$$
$$4x_1 + 2x_2 + 3x_3 = 4$$
$$x_1 + x_2 + x_3 = 0$$

(b) Find the largest eigen values and corresponding eigen vector of the following matrix: (7.5)

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

**P.T.O.**

Q5 (a) Solve the following system of equations by Cholesky method: **(7.5)**

$$x + 2y + 3z = 5$$
$$2x + 8y + 22z = 6$$
$$3x + 22y + 82z = -10$$

(b) Calculate cubic spline for the given data: **(7.5)**

| $x$ | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| $y$ | 1 | 5 | 11 | 8 |

Also find y(1.5) and y'(2)

## UNIT-III

Q6 (a) Evaluate $\int_0^1 \frac{dx}{1+x}$ using Simpson's 3/8 rule taking h=1/6. Hence evaluate the approximate value of π. **(7.5)**

(b) Use Romberg's method to find $\int_0^1 \frac{dx}{1+x^2}$ correct to four places of decimals. **(7.5)**

Q7 (a) Find the first derivative of $f(x) = -0.1x^4 - 0.15x^3 - 0.5x^2 - 0.25x + 1.2$ at x=0.5 using forward, backward and central differences formulae taking step size h=0.25. **(7.5)**

(b) Find the values of f'(0) and f'(8) from the following data using approximate initial values based on finite differences and Richardson's extrapolation method. **(7.5)**

| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| f(x) | -5 | -2 | 7 | 34 | 91 | 190 | 343 | 562 | 859 |

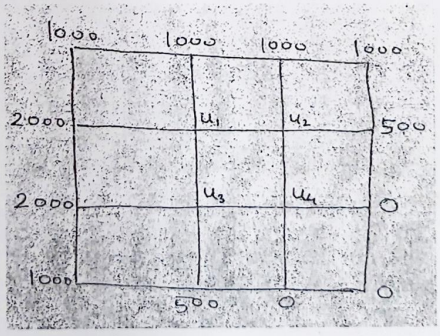
## UNIT-IV

Q8 (a) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with initial condition y=1 at x=0. Find y for x=0.1 by Euler's method. **(7.5)**

(b) Using the finite differences method find y(0.25),y(0.5) and y(0.75) satisfying the differential equation $y'' + y = x$ subject to the boundary condition y(0)=0 , Y(1)=2. **(7.5)**

Q9 (a) Using Runge Kutta method solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$ with initial condition y(0)=1 at x=0.2 and 0.4. **(7.5)**

(b) Given the value of u(x,y) on boundary of the square in the figure. Evaluate the function u(x,y) satisfying the Laplace equation $\nabla^2 u = 0$ at the pivotal points of the figure by Gauss-Seidal formula. **(7.5)**

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