

**SEMESTER END EXAMINATIONS – JANUARY 2018**

Course & Branch : B.E.: Information Science & Engineering Semester : V
Subject : Computer Networks Max. Marks : 100
Subject Code : IS611/IS531 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

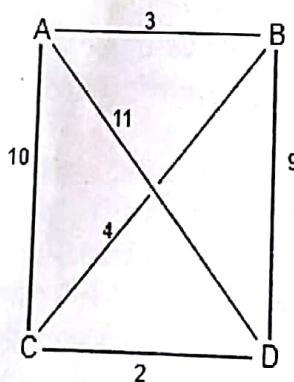
1. a) An ISP is granted a block of addresses starting with 120.60.4.0/22. The CO1 (10) ISP wants to distribute these blocks to 25 organizations with each organization receiving 32 addresses. With slash notation, specify the first and last address of subnets 1, 10, 15 and 25. Find out how many addresses are still available for further allocation.
b) Briefly describe with necessary diagrams, the different strategies to CO1 (10) achieve transition from IPV4 to IPV6.
2. a) An IPV4 datagram has arrived with the following information in the CO1 (10) header(in hexadecimal)

45 00 00 54 00 03 58 50 20 06 00 00 7C 4E 03 02 B4 0E 0F 02

- (i) Calculate the checksum?
 - (ii) Is the packet corrupted?
 - (iii) Are there any options?
 - (iv) Is the packet fragmented?
 - (v) What is the size of the data?
 - (vi) How many more routers can the packet travel to?
- b) With a neat diagram, discuss the procedure for NAT address translation CO1 (10) using one IP address.

UNIT- II

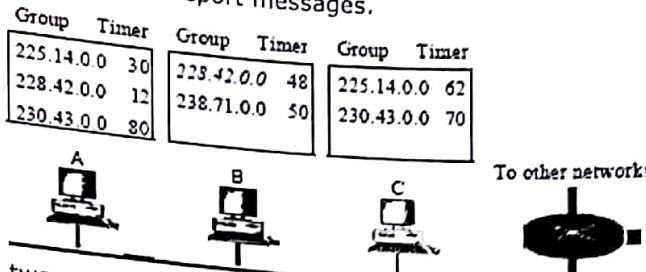
3. a) Explain different cases in which the services of Address Resolution Protocol can be used.
b) Write the Dijkstra's algorithm in calculating shortest path from source CO2 (10) node to all other nodes in the network , & illustrate the calculation of the shortest paths from source node (Assume as Node A) to all the other nodes in the given subnet by using Dijkstra's algorithm. Also write the shortest path tree from Node A to other nodes



IS611/IS531

CO2 (10)

4. a) Imagine there are three hosts in a network, as shown in figure, A query message was received at time 0; the random delay time (in tenths of seconds) for each group is shown next to the group address. Show the sequence of report messages.



- b) What are two node and three node instability problems and discuss the solutions for the same. CO2 (10)

5. a) Illustrate the concept of source based tree and group shared tree approaches in multicasting protocols. CO3 (10)
- b) Give the Comparison between a TCP segment and an SCTP packet. CO3 (10)
6. a) Give the comparison among Reverse Path Multicasting, Reverse Path Broadcasting and Reverse Path Forwarding. CO3 (10)
- b) Briefly discuss different techniques used by TCP to handle lost segments. CO3 (10)
7. a) Describe the working of priority queuing. What is the drawback of priority queuing? Briefly describe the scheduling technique that overcomes this drawback. CO4 (10)
- b) Illustrate with an example, how a DNS client/server program can support an e-mail program to find the IP address of an e-mail recipient. CO4 (08)
- c) If a DNS domain name is **education.msrit.edu**, how many labels are involved in this? How many levels of hierarchy are there? CO4 (08)
8. a) With an example, illustrate how congestion is handled in TCP. CO4 (02)
- b) Explain with necessary diagrams, Iterative resolution and iterative resolution in Domain Name System. CO4 (10)
- c) Define FQDN and PQDN with examples. CO4 (08)
9. a) Briefly explain the three attributes to handle an object which SMI emphasize on. CO4 (02)
- b) Briefly elaborate on the scenarios of e-mail architecture that uses the User Agents and the Message Transfer Agents. CO5 (10)
10. a) Explain the basic model of FTP. Describe the functions of the two FTP connections with necessary diagrams. CO5 (10)
- b) What is the role of SNMP in network management? Briefly explain the functions of Structure of Management Information. CO5 (10)
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**SEMESTER END EXAMINATIONS - JANUARY 2018**

Course & Branch : B.E.: Information Science & Engineering **Semester :** V
Subject : Database Management Systems **Max. Marks :** 100
Subject Code : IS534 **Duration :** 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) Explain three schema based architecture with an appropriate diagram. CO1 (06)
 b) Discuss the different database languages and its interfaces. CO1 (08)
 c) How does MongoDB provide consistency? CO1 (06)
2. a) Briefly discuss the different advantages of using database approach over file based systems. CO1 (06)
 b) Discuss with an appropriate diagram for using high-level conceptual data model for database design. CO1 (08)
 c) Define MongoDB. What are the key features of Mongodb? CO1 (06)

UNIT- II

3. a) Show an example of violation of the integrity constraint in each of the three types of update operations. CO2 (08)
 b) A company has decided to store in a database, information on the musicians who perform for its albums. Design a conceptual schema for the company and draw an ER diagram for your schema. The following information describes the situation on which the company database must be modeled. Indicate all key and cardinality constraints and any assumptions that are made.
 The information provided is as follows:
 i) Each musician that records at this company has an SSN, a name, an address and phone number.
 ii) Each instrument that is used in the songs has a name (e.g., guitar, synthesizer, flute) and a musical key (e.g. C, B-flat, E-flat).
 iii) Each album that is recorded on the company label has a title, a copyright date, a format (e.g., CD or MC), and an album identifier.
 iv) Each song recorded at the company has a title and an author.
 v) Each musician may play several instruments, and several musicians may play a given instrument.
 vi) Each album has a number of songs on it, but no song may appear in more than one album.
 vii) One or more musicians perform each song, and a musician may perform in a number of songs.
 viii) Each album has exactly one musician who acts as its producer. A musician may produce several albums.
- c) How do we create a database in MongoDB? Illustrate with an example. CO2 (04)

- CO2 (06) CO2 (06)
4. a) Name the ER naming conventions. CO2 (06)
- b) What is a relationship type? Explain the differences among a relationship type, a relationship instance and a relationship set. CO2 (06)
- c) Under what condition, does the need for weak entity arise in data modeling? Define the terms owner entity type, weak entity type, identifying relationship type and partial key with an example. CO2 (02)
- d) Write MongoDB command for the following:
Drop collection. CO3 (08)
- UNIT - III**
5. a) Using relational algebra, for the following relations,
Members (mid, name, design, age)
Books (Bid, Btitle, BAuthor, Bpublisher, Bprice)
Reserves (mid, Bid, date)
Where Bid is book identification, Btitle is Book title, Bpublisher is book publisher, Bprice is Book price, mid is Members identification BAuthor is the Book Author and design is designation.
i. List the title of books reserved by professors older than 45 years
ii. Find ids of members who have not reserved books costing more than Rs. 500.
iii. Find the author and title of books reserved on 27-May-2007.
iv. Find the names of members who have reserved all books. CO3 (08)
- b) Describe how ER model construct concepts can be mapped to the relational model with an example. CO3 (04)
- c) Briefly discuss the syntax for MongoDB Insert & Update method. Show with an example on how data could be inserted into a MongoDB collection. CO3 (04)
6. a) Given the schema
EMP (Fname, Lname, SSN, Bdate, Address, Sex, Salary, SuperSSN, DNo)
DEPT (Dname, Dnumber, MgrSSN, Mgrstartdate)
DEPT-LOC(Dnumber, Dloc)
PROJECT(Pname, Pnumber, Ploc, Dnum)
WORKS-ON(ESSN, PNO, Hours)
Give the relational algebraic expression for the following:
i. List female employees from DNo=30 earning more than 25000
ii. Retrieve the first name, last name and salary of all employees who work in department no. 45
iii. Retrieve the name of the manager of each department
iv. Retrieve the name and address of all employees who work for the R&D department. CO3 (04)
- b) Discuss with an appropriate syntax & example on how the MongoDB supports for the projection of data. CO3 (04)
- c) Given relation R with 4 attributes. R = (A, B, C, D) and following FD's. Identify the keys for R and highest normal form.
i) C → D, C → A, B → C ii) B → C, D → A CO3 (08)

7. a) Consider the following relational schema
UNIT- IV
Books(Book_id, B_Name, Author, Purchase-date, cost)
MEMBERS(member_id, m_name, Address, Phone, Birth_date)
ISSUE-RETURN(Book_id, Member_id, Issue_date, Return_date)
Specify Queries using SQL on the database
i) List the Book_id of those books that have been issued to any member whose date of birth is less than 01-01-1985.
ii) In Books relation, increase the price of all the books belonging to Author 'ABC' by 10%
iii) List the detail of members who have borrowed books of Book_id 'b67'.
iv) List the members whose phone entry is not present.
- b) i. Write a PL/SQL program to find the largest number from the given three numbers. CO4 (10)
ii. Write a PL/SQL program that creates a cursor which update the salaries of an employee as follows:
i. If $sal < 1000$ then update the salary to 1500
ii. If $sal >= 1000$ and < 2000 then update the salary to 2500
iii. If $sal >= 2000$ and $<= 3000$ then update the salary to 4000
8. a) Consider the Insurance database; Solve the following queries using SQL method. CO4 (10)
person (driver-id, name, address)
car (license, model, year)
accident (report-number, date, location)
owns (driver-id, license)
participated (driver-id, license, report-number, damage-amount)
i. Find the total number of people who owned cars that were involved in accidents in 1989.
ii. Find the number of accidents in which the cars belonging to "John Smith" were involved.
iii. Add a new accident to the database; assume any values for required attributes.
iv. Delete the Maruti 800 belonging to "John Smith".
v. Update the damage amount for the car with license number "AABB2000" in the accident with report number "AR2197" to \$3000.
- b) i. Write a PL/SQL program to generate all prime numbers below 100. CO4 (10)
ii. Write a PL/SQL program to procedure which updates the salaries of an employee as follows:
i. If $sal < 1000$ then update the salary to 1500
ii. If $sal >= 1000$ and < 2000 then update the salary to 2500

UNIT- V

9. a) Define schedule. Explain the concept of conflict and complete schedule with an example. CO5 (10)
- b) What is ARIES? Discuss its three phases. On what principles is it based on? CO5 (10)
10. a) Discuss the recovery techniques based on deferred update. Why is it called NO-UNDO/REDO method? CO5 (10)
- b) What is the difference between deferred update and immediate update techniques? CO5 (10)

**SEMESTER END EXAMINATIONS - JANUARY 2018**

Course & Branch : B.E.: Information Science & Engineering Semester : V
Subject : Operation Research Max. Marks : 100
Subject Code : IS532 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) Define OR. List and explain the main phases of Operations Research. CO1 (10)
 b) A firm manufactures headache pills in two sizes A and B. Size A contains 2 grains of aspirin, 5 grains of bicarbonate and 1 grain of codeine. Size B contains 1 grain of aspirin, 8 grains of bicarbonate and 6 grains of codeine. It is found by users that it requires at least 12 grains of aspirin, 74 grains of bicarbonate and 24 grains of codeine for providing immediate effect. It is required to determine the least number of pills a patient should take to get immediate relief. Formulate the above problem into LPP. Solve the LPP using graphical method. CO1 (10)
2. a) Discuss the different OR techniques to solve the OR model. CO1 (06)
 b) A manufacturer has three machines A, B, C with which he produces three different articles P, Q, R. The different machine times required per article, the amount of time available in any week on each machine and the estimated profits per article are furnished in the following table: CO1 (08)

Article	Machine time (in hrs)			Profit per article (in rupees)
	A	B	C	
P	8	4	2	20
Q	2	3	0	6
R	3	0	1	8
Available machine hrs	250	150	50	

Formulate the problem as LPP.

- c) Illustrate with an example and explain the Graphical procedure for two variables. CO1 (06)

UNIT- II

3. a) Solve the following by Simplex method: CO2 (08)
 Maximize $Z = 80x_1 + 55x_2$
 Subject to $4x_1 + 2x_2 \leq 40$
 $2x_1 + 4x_2 \leq 32$
 and $x_1 \geq 0, x_2 \geq 0$
- b) Solve the simplex problem using Big M method. CO2 (12)
 Max $Z = -2x_1 - x_2$
 Subject to $3x_1 + x_2 = 3$
 $4x_1 + 3x_2 \geq 6$
 $x_1 + 2x_2 \leq 4$
 and $x_1 \geq 0, x_2 \geq 0$

4. a) Solve the following problem by Two-Phase Method:

$$\text{Min } Z = 4x_1 + x_2$$

Subject to

$$3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 4$$

$$\text{and } x_1 \geq 0, x_2 \geq 0$$

- b) A company manufactures two types of printed circuits. The requirements of transistors, resistors and capacitor for each type of printed circuits along with other data are given in table.

	Circuit		Stock available (units)
	A	B	
Transistor	15	10	180
Resistor	10	20	200
Capacitor	15	20	210
Profit	Rs.5	Rs.8	-

How many circuits of each type should the company produce from the stock to earn maximum profit?

Solve by Simplex method.

UNIT-III

5. a) Discuss the rules for converting any primal into its Dual with the help of below example. CO3 (10)

$$\text{Min } Z_x = 2x_2 + 5x_3$$

Subject to $x_1 + x_2 \geq 2$

$$2x_1 + x_2 + 6x_3 \leq 6$$

$$x_1 - x_2 + 3x_3 = 4$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

(ii) What is Game Theory? Discuss the characteristics of Game Theory.

- b) i. Solve by Dual simplex method: $\text{Min } Z = 3x_1 + 2x_2 + x_3$

Subject to $3x_1 + x_2 + x_3 \geq 3$

$$-3x_1 + 3x_2 + x_3 \geq 6$$

$$x_1 + x_2 + x_3 \leq 3$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

CO3 (10)

(ii) Solve the following payoff matrix

	B1	B2
A2	3	-1
A3	-3	2
	3	6

6. a) Solve by Dual simplex method: $\text{Min } Z = x_1 + 2x_2 + 3x_3$

Subject to $2x_1 - x_2 + x_3 \geq 4$

$$x_1 + x_2 + 2x_3 \geq 8$$

$$x_2 - x_3 \geq 2$$

$$\text{and } x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$$

CO3 (10)

- b) (i) Explain in brief the terms:
i) Mixed strategy, ii) Payoff matrix, iii) Saddle point
(ii) Solve the following payoff matrix:

	B1	B2	B3	B4
A1	1	7	3	4
A2	5	6	4	5
A3	7	2	0	3

(ii)

A1	B1	B3	
A2	4	0	3
	-1	2	4
	2	5	

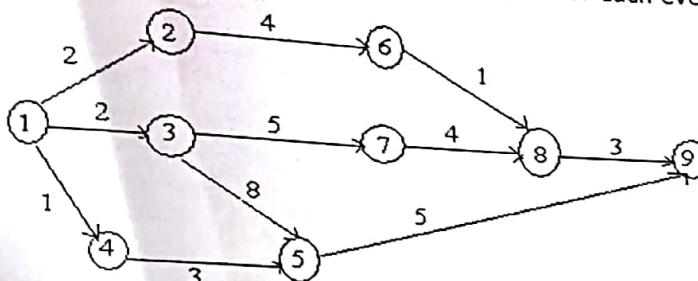
(08)

(06)

(06)

(10)

7. a) (i) Discuss the Rules for Drawing Network Diagram,
(ii) Describe the Uses of PERT/CPM Techniques for management. CO4 (10)
- b) Find the critical path and calculate the slack time for each event for the following PERT diagram. CO4 (10)



(10)

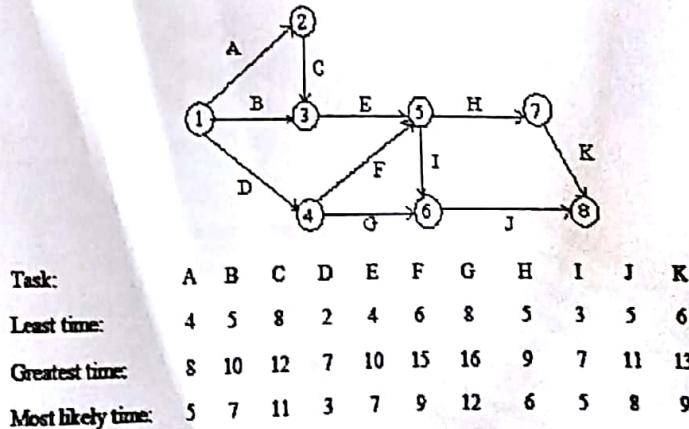
(10)

(10)

8. a) (i) What are some of the common errors in drawing networks?
(ii) Discuss the Advantages and Disadvantages of PERT/CPM. CO4 (10) (04)
- b) Find the earliest and latest expected time for each event and also critical path network? CO4 (10) (06)

(10)

(10)



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1 of 2

CO5 (10)

9. a) **UNIT- V**
 Goods are to be shipped from three warehouses W1, W2, W3 to six customers C1, C2, C3, C4, C5 and C6. The availabilities at the warehouses are 100, 200 and 150 units respectively while the demands of customers are 50, 40, 50, 90, 60 and 80 respectively. The unit costs of transportation are as given in the following table. Develop an optimum transportation schedule and the transportation cost. (using VAM technique to find the IBFS)

		Customer (Rupees)					
		C1	C2	C3	C4	C5	C6
Warehouses	W1	15	25	18	35	40	23
	W2	22	36	40	60	50	38
	W3	26	38	45	52	45	48

- b) Find the optimal solution for the assignment problem with the following cost matrix

	I	II	III		IV
			1	2	
A	5	3			8
B	7	9			6
C	6	4			7
D	5	7			6

10. a) Find the initial basic feasible solution and the optimal solution for the given transportation problem using VAM's Method.

Warehouse→ Factory	W1	W2	W3	W4	Capacity
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Requirement	5	8	7	14	

- b) A company has 5 jobs to be done. The following matrix shows the return in terms of rupees on assigning i^{th} ($i = 1, 2, 3, 4, 5$) machine to the j^{th} job ($j = A, B, C, D, E$). Assign the five jobs to the five machines to maximize the total expected profit.

Machines	Jobs				
	A	B	C	D	E
1	5	11	10	12	4
2	2	4	6	3	5
3	3	12	5	14	6
4	6	14	4	11	7
5	7	9	8	12	5

MAKEUP EXAMINATIONS - MARCH 2017

Course & Branch : **B.E.-Information Science & Engineering** **Semester** : **V**
Subject : **Database Management Systems** **Max. Marks** : **100**
Subject Code : **IS534 / IS415** **Duration** : **3 Hrs**

Instructions to the Candidates:

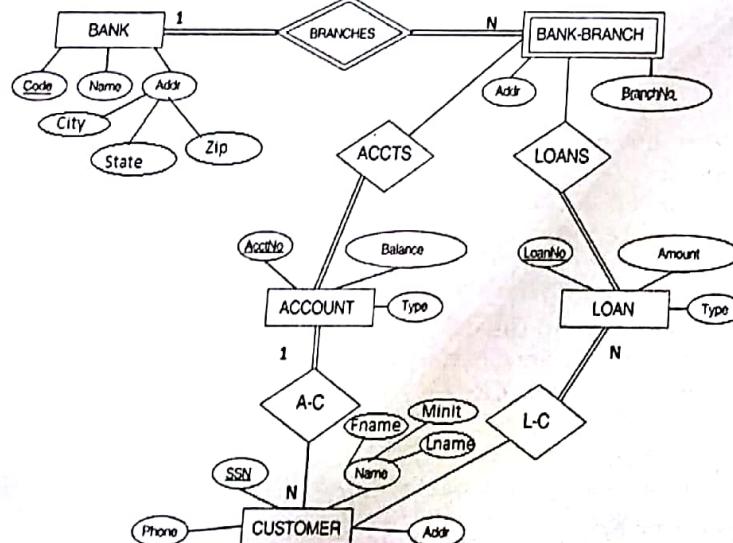
- Answer one full question from each unit.

UNIT - I

1. a) Briefly discuss the implications of using the database approach that can benefit most organizations. CO1 (10)
 b) Describe the three-schema architecture and justify the need of mappings between the schema levels. CO1 (10)
2. a) Illustrate different phases in designing the database with the help of diagram. CO1 (10)
 b) Discuss the types of languages and interfaces provided by a DBMS and the user categories targeted by each interface. CO1 (10)

UNIT - II

3. a) Draw an ER-diagram for Book management database. Assume your own entities (Maximum of 5 entities). Identify weak entity, key attributes, cardinality ratio and participation constraints. CO2 (10)
 b) Discuss the types of constraint violations for transaction with an example CO2 (10)
4. a) Discuss the characteristics of relations that make them different from ordinary tables and files. CO2 (10)
 b) Given the ER diagram of a bank database CO2 (10)



Identify the following from the above diagram

- Entities of the database
- Cardinality ratio between the entities
- Weak entity
- Composite attributes
- Key attributes

- UNIT - III**
5. a) Discuss the various types of inner join operations. Why is theta join CO3 (06)
 b) required? Consider the following order-processing database application in a CO3 (08)
 company
 Customer (cust#, cname, city)
 Order (order#, odate, cust#, ord-amt)
 Order_item (order#, item#, qty)
 Item (item#, unit_price)
 Shipment (order#, warehouse#, ship_date)
 Warehouse (warehouse#, city)
 Specify the following queries using relational algebra:
 i) List the order # and ship_date for all order shipped from
 warehouse W2
 ii) List the orders that were not shipped within 30 days of
 ordering.
 iii) List the order id for orders that were shipped from all
 warehouses that the company has in New York.
 iv) List the warehouse information from which the customer named
 jose john was supplied his orders. Produce a listing order#,
 warehouse#.
- c) A set of FDs for the relation $R(A,B,C,D,E,F)$ is $AB \rightarrow C$, $C \rightarrow A$, $BC \rightarrow D$, $ACD \rightarrow B$, $BE \rightarrow C$, $EC \rightarrow FA$, $CF \rightarrow BD$, $D \rightarrow E$. Find a minimum cover for this set of FDs. CO3 (06)
6. a) For the following relations for a Book club: CO3 (10)
 Members(Member_id, Name, Designation, Age)
 Books(Bid, Btitle, Bpublisher, Bprice)
 Reserves(Member_id, Bid, Date) Where Bid is book identification, Btitle
 is book title, Bpublisher is book publisher and Bprice is book price,
 i. Find the names of members who are professors older than 45
 years.
 ii. List the titles of books reserved by Professors
 iii. Find IDs of members who have not reserved books that cost more
 than Rs.500
 iv. Find the authors and titles of books reserved on 27-May-2016
 v. Find the name of members who have reserved all books.
 b) What is the purpose of normalization?. Explain the First and Second Normal forms with examples. CO3 (06)
 c) Given below are two sets of FDs for a relation $R(A,B,C,D,E)$. Are they equivalent? CO3 (04)
 i) $A \rightarrow B$, $AB \rightarrow C$, $D \rightarrow AC$, $D \rightarrow E$
 ii) $A \rightarrow BC$, $D \rightarrow AE$
- UNIT - IV**
7. a) Consider the following tables CO4 (10)
 Works (Pname, Cname, Salary)
 Lives (Pname, Street, City)
 Locatedin (Cname, City)
 Manager (Pname, Mgrname)
 Where Pname = Person name, Cname = Company name, Mgrname
 = Manager name
 Write the SQL for the following:
 i) Find the people who work for the company "Infosys" with salary
 more than Rs. 50000/- List the names of the people, along with the
 streets and city addresses.
 ii) Find the names of the persons who live and work in the same city.
 iii) Find the names of the person who do not work for "Infosys".

- iv) Find the persons whose salaries are more than that of all of the 'Oracle' employee.
 v) Find the names of the companies that are located in every city where the company 'Infosys' is located
 Illustrate the different types of triggers in PL/SQL with an example.

8. a) Consider the employee database given below , where the primary keys are underlined.
 employee (employee name, street, city)
 works (employee name, company name, salary)
 company (company name, city)
 manages (employee name, manager name)
 Give an expression in SQL for each of the following queries.
 i) Find the names of all employees who work for First Bank Corporation.
 ii) Find all employees in the database who live in the same cities as the companies for which they work.
 iii) Find all employees in the database who live in the same cities and on the same streets as do their managers.
 iv) Find all employees who earn more than the average salary of all employees of their company.
 v) Find the company that has the smallest payroll.
 Write a PL/SQL Program to create a view for the employee working in sales department assigned to more than 10 projects.

- UNIT - V**
9. a) Explain the desirable properties of a transaction. CO5 (08)
 b) Discuss serializability by Two-Phase locking. CO5 (08)
 c) Write short notes on recovery technique based on deferred update CO5 (04)
10. a) Which of the following schedules is (conflict) serializable? For each serializable schedule, determine the equivalent serial schedules. CO5 (08)
 (i) r1 (X); r3 (X); w1(X); r2(X); w3(X)
 (ii) r1 (X); r3 (X); w3(X); w1(X); r2(X)
 (iii) r3 (X); r2 (X); w3(X); r1(X); w1(X)
 (iv) r3 (X); r2 (X); r1(X); w3(X); w1(X)
- b) What is a lock? Explain the types of locks used in concurrency control. CO5 (06)
 c) Describe the three phases of ARIES recovery method. CO5 (06)



MAKEUP EXAMINATIONS - MARCH 2017

Course & Branch : B.E.-Information Science & Engineering Semester : V
Subject : Operation Research Max. Marks : 100
Subject Code : IS532/IS614 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Discuss the different phases of OR study. CO1 (06)
 b) The standard weight of a special purpose brick is 5 kg and it contains two basic ingredients B_1 and B_2 . B_1 costs Rs.5 per kg and B_2 costs Rs.8 per kg. Strength considerations state that the brick contains not more than 4 kg of B_1 and minimum of 2kg of B_2 . Since the demand for the product is likely to be related to the price of the brick. Formulate the problem as a Linear programming problem. CO1 (06)
 c) A pineapple firm produces two products A and B. The specific amounts of material, labor and equipment required to produce each product and the availability of each of these resources are shown below CO1 (08)

	A	B	Available resources
Labour(man-hours)	3	2.0	12.0
Equipment (machine hours)	1	2.3	6.9
Material(unit)	1	1.4	4.9

Assume one unit of A and B gives a profit of £2 and £1, respectively.
 Formulate this as a LPP and solve it graphically.

2. a) Define Operations Research? List any three OR techniques to solve the OR model. CO1 (04)
 b) A company produces two products, A and B. The sales volume for A is at least 80% of the total sales of both A and B. However, the company cannot sell more than 100 units of A per day. Both products use one raw material, of which the maximum daily availability is 240lb. The usage rates of the raw material are 2 lb per unit of A and 4 lb per unit of B. The profit units for A and B are \$20 and \$50, respectively. Determine the optimal product mix for the company using graphical procedure. CO1 (10)
 c) Solve the following LPP by graphical method. CO1 (06)
 $\text{Max } z = 5x_1 + 3x_2$
 Sub to
 $3x_1 + 5x_2 = 15, 5x_1 + 2x_2 = 10$
 $x_1 \geq 0, x_2 \geq 0$

UNIT - II

3. a) Solve the following problem using simplex method. CO2 (08)
 $\text{Min } z = x_1 - 3x_2 + 2x_3$, subject to:
 $3x_1 - x_2 + 3x_3 \leq 7, -2x_1 + 4x_2 \leq 12, -4x_1 + 3x_2 + 8x_3 \leq 10$, and $x_1, x_2, x_3 \geq 0$.

- b) Use penalty(Big-M) method to solve the problem: CO2 (12)
 Max. $z = 6x_1 + 4x_2$, subject to $2x_1 + 3x_2 \leq 30$, $3x_1 + 2x_2 \leq 24$, $x_1 + x_2 \geq 3$, and $x_1, x_2 \geq 0$. Is the solution unique? If not, give two different solutions.
4. a) Use two-phase simplex method to solve the problem: CO2 (09)
 Minimize $z = 15/2 x_1 - 3x_2$, subject to the constraints:
 $3x_1 - x_2 - x_3 \geq 3$, $x_1 - x_2 + x_3 \geq 2$, and $x_1, x_2, x_3 \geq 0$
- b) List the steps to resolve degeneracy. CO2 (04)
- c) Jobco produces two products on two machines. A unit of product 1 requires 2 hours on machine 1 and 1 hour on machine 2. For product 2, one unit requires 1 hour on machine 1 and 3 hours on machine 2. The revenues per unit of products 1 and 2 are \$30 and \$20, respectively. The total daily processing time available for each machine is 8 hours.
 Answer the following questions.
 i. What are the feasibility ranges for machine 1 and 2.
 ii. If Jobco can increase the capacity of both machines, which machine should receive priority?
- UNIT - III**
5. a) Consider the following LP: CO3 (09)
 Maximize $z = 5x + 12y + 4z$, subject to
 $x + 2y + z \leq 10$
 $2x - y + 3z = 8$ and $x, y, z \geq 0$.
 Given that the artificial variable is 'a' and the slack variable 's' form the starting basis variables. The optimal primal tableau is given in **table1**. Write the associated dual problem and determine its optimal solution in two ways.
- table1: Optimal tableau of the Primal**
- | Basic | x | y | z | s | a | Solution |
|-------|---|---|---------------|---------------|-------|----------------|
| z | 0 | 0 | $\frac{3}{5}$ | 295 | - + M | 54 |
| y | 0 | 1 | -15 | $\frac{2}{5}$ | - | 125 |
| x | 1 | 0 | $\frac{7}{5}$ | $\frac{1}{5}$ | 25 | $\frac{26}{5}$ |
- b) Discuss the characteristics of Game Theory. CO3 (06)
 c) Consider the below game matrix which represents payoff to the player CO3 (05)
 A. Find the optimal strategy, if any. Briefly Explain
- | | I | II | III |
|-----|----|----|-----|
| I | -3 | -2 | 6 |
| II | 2 | 0 | 2 |
| III | 5 | -2 | -4 |
6. a) List the rules for constructing the dual problem. Write the dual for each of the following primal problems. CO3 (10)
1. Minimize $z = 15x + 12y$, subject to
 $x + 2y \geq 3$
 $2x - 4y \leq 5$
 $x, y \geq 0$.
2. Maximize $z = 5x_1 + 6x_2$, subject to
 $x_1 + 2x_2 = 5$
 $-x_1 + 5x_2 \geq 3$
 $4x_1 + 7x_2 \leq 8$
 x_1 is unrestricted, $x_2 \geq 0$.

- b) i) Two players A and B without showing each other, put on a table a coin, with head or tail up. A wins Rs 8 when both the coins show head and Re.1 when both are tails. B wins Rs 3 when the coins do not match. Given the choice of being matching player (A) or non-matching player (B), which one would you choose and what would be your strategy?
 ii) Find the optional strategy for the following payoff matrix using mixed strategy. Also find the value of the game.

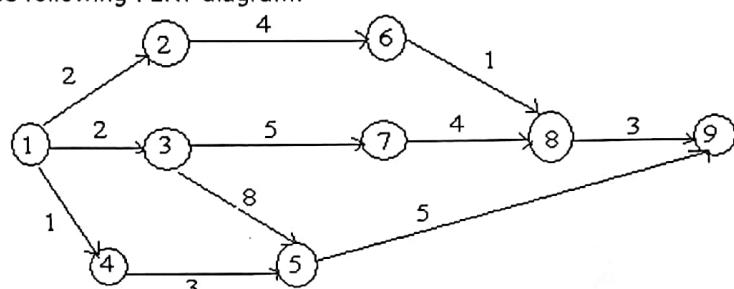
$$\begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix}$$

CO3 (06)

- c) Define the following:
 i) Saddle point ii) Minimax criterion of optimality iii) Payoff Matrix iv) strategy.

CO3 (04)

7. a) I Define the terms:
 i) Activity ii) Event iii) sequencing iv) critical event.
 II Find the critical path and calculate the slack/float time for each event for the following PERT diagram.

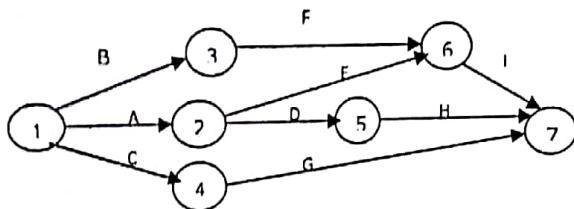


- b) The times (in days) for completion of activities for a certain project are as follows: CO4 (10)

Activity	Immediate Predecessor	Optimistic Time (O)	Most Probable Time (M)	Pessimistic Time (P)
A	-	4	5	6
B	-	6	8	10
C	A	6	6	6
D	B	3	4	5
E	B	2	3	4
F	C,D	8	10	12
G	E	6	7	8
H	C,D	12	13	20
I	F,G	10	12	14

a) Find the critical path. b) Find the probability that all critical activities will be completed in 35 days or less.

8. a) A project is represented by the network shown below and has the following data: CO4 (10)



Task	A	B	C	D	E	F	G	H	I
Least Time	5	18	26	16	15	6	7	7	3
Greatest time	10	22	40	20	25	12	12	9	5
Most Likely Time	8	20	33	18	20	9	10	8	4

Determine the following: i) Expected task time and standard deviation for each activity ii) The critical path

- b) A project consists of the activities as given in the table below.
Constraints:

CO4 (10)

Job	A	B	C	D	E	F	G	H	I	J	K	L
Duration Days	1	5	8	10	9	7	7	12	8	9	4	17

- A and B are start jobs
- A controls C, D and E
- B controls F and K
- G depends on C
- H depends on D
- E and F controls J and M
- L depends on K
- M is also controlled by L

- i) Draw the network for the above project.
ii) Find the critical path and project duration.
iii) Calculate Float/slack for each activity.

UNIT - V

CO5 (10)

9. a) A company has 3 plants at locations A, B and C which supply to warehouses located at D, E, F, G and H. Monthly plant capacities are 800, 500 and 900 units respectively. Monthly warehouse requirements are 400, 400, 500, 400 and 800 units respectively. Unit transportation costs (in Rs) are given below.

	D	E	F	G	H
A	5	8	6	6	3
B	4	7	7	6	4
C	8	4	6	6	5

Determine an optimum distribution for the company in order to minimize the total transportation cost

- b) A car hire company has one car each of five depots a, b, c, d, and e. A customer requires a car in each of the town A, B, C, D, and E. Distance (kms) between depots and towns are given in the following matrix:

CO5 (10)

	a	b	c	d	e
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

Find the assignment that will reduce the minimum distance travelled?

10. a) Goods are to be shipped from three warehouses W1, W2, W3 to six customers C1, C2, C3, C4, C5 and C6. The availabilities at the warehouses are 100, 200 and 150 units respectively while the demands of customers are 50, 40, 50, 90, 60 and 80 respectively. The unit costs of transportation are as given in the following table: CO5 (10)

		Customer (Rupees)					
		C1	C2	C3	C4	C5	C6
Warehouses	W1	15	25	18	35	40	23
	W2	22	36	40	60	50	38
	W3	26	38	45	52	45	48

Develop an optimum transportation schedule and the transportation cost.

- b) Solve the following Assignment problem: CO5 (10)

	I	II	III	IV
A	9	14	19	15
B	7	17	20	19
C	9	18	21	18
D	10	12	18	19
E	10	15	21	16



MAKEUP EXAMINATIONS - MARCH 2017

Course & Branch : B.E.-Information Science & Engineering Semester : V
Subject : Computer Networks Max. Marks : 100
Subject Code : IS531/IS611 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Write the procedure for header translation in IP transition from version 4 to version 6. CO1 (08)
b) List the restrictions imposed on classless address block. CO1 (07)
c) An ISP is granted a block of addresses starting with 120.60.4.0/22. The ISP wants to distribute these blocks to 25 organizations with each organization receiving 32 addresses. With slash notation, specify the first and last address of subnets 1, 10 and 25. Find out how many addresses are still available for further allocation? CO1 (05)
d) Discuss any five types of extension headers supported by IPV6. CO1 (08)
2. a) A node with IP address 10.12.14.5 is having a data of size 48000 bytes to send to another node with IP address 12.6.7.9. Consider the TTL value as 24 and protocol value as 17. Assuming no options and normal service, calculate the checksum and pictorially represent the contents of IPV4 header. CO1 (07)
b) With a neat diagram, discuss the procedure for NAT address translation using one IP address. CO1 (05)
c) Differentiate between IPV4 and IPV6 packet headers. CO1 (05)

UNIT - II

3. a) Explain any two tools used in the internet for debugging. CO2 (10)
b) With block diagram, describe the operations of different internet group management protocol.. CO2 (10)
4. a) Define Address Resolution Protocol. With diagram illustrate the different cases where the service of ARP can be used. CO2 (10)
b) Illustrate the different forwarding techniques used in network layer. Find the Ethernet multicast physical address for the multicast IP address 230.43.14.7. CO2 (10)

UNIT - III

5. a) Define the term Multicasting. Explain multicast distance vector routing in detail. CO3 (10)
b) Explain the different phases of connection-oriented transmission in TCP. CO3 (10)

IS531/IS611

6. a) Explain the User datagram format. Brief the operations of UDP and list its uses. CO3 (10)
- b) Brief the general features of SCTP and compare them with those of TCP. CO3 (10)
7. a) With a flow chart, illustrate how congestion is controlled in TCP. CO4 (08)
- b) Define name-address resolution in DNS. With a neat diagram, describe recursive resolution and iterative resolution. CO4 (07)
- c) Write a brief note on QoS requirements in portable devices. CO4 (05)
8. a) Briefly explain weighted fair queuing technique and leaky bucket technique in improving the quality of service. CO4 (08)
- b) Illustrate with an example, how a DNS client/server program can support an e-mail program to find the IP address of an e-mail recipient. CO4 (07)
- c) Write a brief note on congestion control in Frame Relay. CO4 (05)
9. a) Explain the basic model of FTP. Describe the functions of the two FTP connections with necessary diagrams. CO5 (10)
- b) What are the different types of PDUs SNMPv3? Explain with diagram. Give the format of SNMP PDU and list the fields in it. CO5 (10)
10. a) Briefly elaborate on the scenarios of e-mail architecture that uses the User Agents and the Message Transfer Agents. CO5 (10)
- b) Briefly explain the three attributes to handle an object which SMI emphasize on. CO5 (10)



MAKEUP EXAMINATIONS - MARCH 2017

Course & Branch : B.E.-Information Science & Engineering Semester : V
Subject : Natural Language Processing Max. Marks : 100
Subject Code : IS52A4 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Design a deterministic finite automata which accepts the regular expression $(a|b)^*abb$. Also write the transition table. CO1 (04)
b) Discuss on types of morphology with examples. CO1 (10)
c) Define finite state transducer with its compositions. CO1 (06)
2. a) Design a finite-state automaton for english verbal inflection. CO1 (06)
b) What do you mean by two-level morphology? Explain with an example. CO1 (06)
c) Explain human morphological parsing with suitable examples. CO1 (08)

UNIT - II

3. a) Define add-one smoothing algorithm. Explain With a suitable example. CO2 (10)
b) What is real-word error detection? Distinguish between local and global errors with examples. CO2 (10)
4. a) List the common sample lexicon grammar rules and construct the parse tree for "I prefer a morning flight" using them. CO2 (08)
b) Explain rule-based part-of speech tagging with suitable examples. CO2 (12)

UNIT - III

5. a) Write and explain *UNIFY* (f_1, f_2) pseudo code. CO3 (12)
b) Explain top-down, depth-first left-to-right parser in detail. CO3 (08)
6. a) Distinguish between top-down and bottom-up parsing with an example. CO3 (12)
b) Explain the Stochastic Context Free Grammar (SCFG) with an example. CO3 (08)

UNIT - IV

7. a) Write the context-free grammar specification of the syntax of first order predicate calculus representations. CO4 (06)
b) Explain with an example the word sense disambiguation. CO4 (06)
c) Give first order predicate calculus translations for the following sentences that capture the temporal relationships between the events:
i. When Mary's flight departed, I ate lunch.
ii. When Mary's flight departed, I had eaten lunch. CO4 (08)

IS52A4

8. a) Give a reasonable first order predicate calculus translation of the following example: "If you're interested in baseball, the Rockies are playing tonight." CO4 (06)
- b) Distinguish between homonymy, polysemy, synonymy, and hyponymy with examples. CO4 (08)
- c) Give a set of facts and inferences necessary to prove the following assertions: CO4 (06)
- i. McDonalds is not a vegetarian restaurant.
 - ii. Some vegetarians can eat at McDonalds.
- Do not just place these facts in your knowledge-base. Show that they can be inferred from some more general facts about vegetarians and McDonalds.
9. a) Write the steps of pronoun resolution algorithm. CO5 (08)
- b) Write the discourse structure of the below passage: CO5 (06)
- John went to the bank to deposit his paycheck.
 - He then took a train to Bill's car dealership.
 - He needed to buy a car.
 - The company he works for now is not near any public transportation.
 - He also wanted to talk to Bill about their softball league.
- c) Describe with neat sketch the architecture of natural language generation system. CO5 (06)
10. a) Explain inference based resolution algorithm. CO5 (12)
- b) Write the steps of tree-search algorithm. CO5 (08)

Page 1 of 13


SEMESTER END EXAMINATIONS - JANUARY 2017

Course & Branch : **B.E.-Information Science & Engineering** Semester : **V**
 Subject : **Intellectual Property Rights** Max. Marks : **100**
 Subject Code : **IS523** Duration : **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Explain at least five different forms of Intellectual property Rights. CO1 (10)
 b) What is World Intellectual Property Organization? State the main CO1 (10)
 objectives of World Intellectual Property Organization.
2. a) Discuss any two recent and emerging issues of India being addressed CO1 (10)
 at the World Intellectual Property Organization (WIPO).
 b) Define Intellectual Property. Justify the need for Intellectual Property CO1 (10)
 Rights.

UNIT - II

3. a) Explain the procedure for obtaining a patent. CO2 (10)
 b) Justify whether the following can be patented in India CO2 (10)
 - Hat with a torch.
 - New breed of dog.
 - Process for finding shortest route from city to other.
 - A printer which accepts files through wifi.
 - An intelligent automobile which initiates payment in toll booths.
4. a) How do you protect patent rights from infringement? CO2 (10)
 b) Justify whether the following can be patented in India CO2 (10)
 - A new hairstyle.
 - A makeup kit and process which makes the wearer look younger.
 - A kind of grass in Himalayas which can cure cancer.
 - A software for preparing timetable in colleges.
 - A smart device and software for detecting unlawful activities.

UNIT - III

5. a) Explain the procedure for registering Trademarks in India. CO3 (10)
 b) Justify whether the following can obtain trademark in India CO3 (10)
 - Small Chocolates
 - Curls and Straight Hair Saloon
 - Bangalore Masala Dosa
 - Drive In Restaurant
 - Sai Baba Services.

6. a) How a trademark does differs from a brand name? Give the functions CO3 (10)
b) Justify whether the following can obtain trademark in India CO3 (10)
• Mother Mary Flowers
• www.msrif.edu
• 080 Services 24/7
• Sharma Bakery
• ISO Top Class Tyre.
7. a) How copyright law evolved in India? Discuss. **UNIT - IV** CO2 (10)
b) Briefly explain the scope of copyright law. CO2 (10)
8. a) Copyright is better than patent for protecting software - Debate CO2 (10)
b) Explain in detail, who can obtain copyright for different kinds of artistic CO2 (10)
and commercial works.
9. a) What are the international norms available for protecting software? **UNIT - V** CO3 (10)
b) What legal options are available for protecting software in India? CO3 (10)
10. a) What are the options for protecting Intellectual Property In e-commerce? CO3 (10)
b) Mention the salient points of IT ACT 2000. CO3 (10)


MAKEUP EXAMINATIONS - MARCH 2017

Course & Branch : **B.E.-Information Science & Engineering** Semester : **V**
 Subject : **Intellectual Property Rights** Max. Marks : **100**
 Subject Code : **IS523** Duration : **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Briefly explain with an example any five different forms of IPR. CO1 (10)
 b) "IPR laws are skewed to serve the interests of large corporates and powerful nations" - Debate. CO1 (10)
2. a) Explain the main features of the TRIPS agreement. CO1 (10)
 b) How has India implemented TRIPS rules? Has it compromised the country's sovereignty? CO1 (10)

UNIT - II

3. a) Explain the procedure for obtaining a patent. CO2 (06)
 b) Explain the criteria for an invention to be patentable. CO2 (08)
 c) Which inventions are not patentable in India? CO2 (06)
4. a) What can amount to Infringement of patents. CO2 (10)
 b) What are the rights assigned to a patent holder? Can he transfer these rights? CO2 (10)

UNIT - III

5. a) Discuss on what factors you would consider to support and decide the deceptive similarity between trademarks. CO3 (10)
 b) Discuss the essentials that have to be incorporated when designing the trademark. CO2 (10)
6. a) Define Trademark. Discuss the advantages of a trademark. CO1 (10)
 b) What are the essential guidelines for designing a trademark? State the difference between a registered and an unregistered trademark. CO2 (10)

UNIT - IV

7. a) Explain the evolution of copyright law in India. CO4 (10)
 b) Justify whether the following can obtain copyright in India:
 - A new song for a movie.
 - Painting in a temple wall.
 - Architecture plan for an office.
 - Adaptation of 'Macbeth' in Hindi language
 - Flowchart for a mobile app.
 CO4 (10)

8. a) Explain the infringement of copyright in India.
b) Justify whether the following can obtain copyright in India
• Algorithm for new sorting method.
• Computer program in Java language.
• Background score for a drama production.
• Photograph of ganges planes.
• Academic calendar for institutes.
- UNIT - V**
9. a) What do you understand by the term open source software? CO3 (10)
Differentiate between open source software and proprietary software.
What are the principles underlying open source licensing? CO3 (10)
- b) Justify how a patent provides more secure protection than the CO3 (10)
copyright or trade secrets in terms of protection of software.
10. a) Discuss the significance of Intellectual property rights in Cyberspace. CO1 (10)
b) Explain how software is protected under copyright regime. CO3 (10)
- *****



MAKEUP EXAMINATIONS - MARCH 2017

Course & Branch : B.E.-Information Science & Engineering Semester : V
 Subject : Database Management Systems Max. Marks : 100
 Subject Code : IS534 / IS415 Duration : 3 Hrs

Instructions to the Candidates:

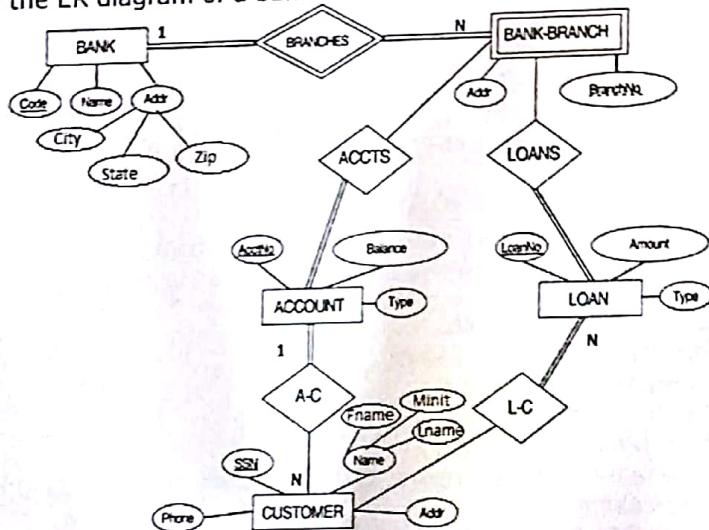
- Answer one full question from each unit.

UNIT - I

1. a) Briefly discuss the implications of using the database approach that can benefit most organizations. CO1 (10)
 b) Describe the three-schema architecture and justify the need of mappings between the schema levels. CO1 (10)
2. a) Illustrate different phases in designing the database with the help of diagram. CO1 (10)
 b) Discuss the types of languages and interfaces provided by a DBMS and the user categories targeted by each interface. CO1 (10)

UNIT - II

3. a) Draw an ER-diagram for Book management database. Assume your own entities (Maximum of 5 entities). Identify weak entity, key attributes, cardinality ratio and participation constraints. CO2 (10)
 b) Discuss the types of constraint violations for transaction with an example CO2 (10)
4. a) Discuss the characteristics of relations that make them different from ordinary tables and files. CO2 (10)
 b) Given the ER diagram of a bank database CO2 (10)



Identify the following from the above diagram

- Entities of the database
- Cardinality ratio between the entities
- Weak entity
- Composite attributes
- Key attributes

UNIT - III

5. a) Discuss the various types of inner join operations. Why is theta join required? CO3 (06)
- b) Consider the following order-processing database application in a company CO3 (08)

Customer (cust#, cname, city)
 Order (order#, odate, cust#, ord-amt)
 Order_item (order#, item#, qty)
 Item (item#, unit_price)
 Shipment (order#, warehouse#, ship_date)
 Warehouse (warehouse#, city)

Specify the following queries using relational algebra:

- List the order # and ship_date for all order shipped from warehouse W2
- List the orders that were not shipped within 30 days of ordering.
- List the order id for orders that were shipped from all warehouses that the company has in New York.
- List the warehouse information from which the customer named Jose John was supplied his orders. Produce a listing order#, warehouse#.

- c) A set of FDs for the relation $R(A,B,C,D,E,F)$ is $AB \rightarrow C$, $C \rightarrow A$, $BC \rightarrow D$, $ACD \rightarrow B$, $BE \rightarrow C$, $EC \rightarrow FA$, $CF \rightarrow BD$, $D \rightarrow E$. Find a minimum cover for this set of FDs. CO3 (06)

6. a) For the following relations for a Book club: CO3 (10)

Members(Member_id, Name, Designation, Age)
 Books(Bid, Btitle, Bpublisher, Bprice)

Reserves(Member_id, Bid, Date) Where Bid is book identification, Btitle is book title, Bpublisher is book publisher and Bprice is book price, years.

- Find the names of members who are professors older than 45
- List the titles of books reserved by Professors
- Find IDs of members who have not reserved books that cost more than Rs.500
- Find the authors and titles of books reserved on 27-May-2016

- b) What is the purpose of normalization?. Explain the First and Second Normal forms with examples.

- c) Given below are two sets of FDs for a relation $R(A,B,C,D,E)$. Are they equivalent? CO3 (06)

- i) $A \rightarrow B$, $AB \rightarrow C$, $D \rightarrow AC$, $D \rightarrow E$

- ii) $A \rightarrow BC$, $D \rightarrow AE$ CO3 (04)

UNIT - IV

7. a) Consider the following tables
 Works (Pname, Cname, Salary)
 Lives (Pname, Street, City)
 Locatedin (Cname, City)
 Manager (Pname, Mgrname)
 Where Pname = Person name, Cname = Company name, Mgrname = Manager name

Write the SQL for the following:

- Find the people who work for the company "Infosys" with salary more than Rs. 50000/-. List the names of the people, along with the streets and city addresses.
- Find the names of the persons who live and work in the same city.
- Find the names of the person who do not work for "Infosys".

- iv) Find the persons whose salaries are more than that of all of the 'Oracle' employee.
- v) Find the names of the companies that are located in every city where the company 'Infosys' is located
- b) Illustrate the different types of triggers in PL/SQL with an example. CO4 (10)
8. a) Consider the employee database given below , where the primary keys are underlined.
employee (employee name, street, city)
works (employee name, company name, salary)
company (company name, city)
manages (employee name, manager name)
- Give an expression in SQL for each of the following queries.
- i) Find the names of all employees who work for First Bank Corporation.
- ii) Find all employees in the database who live in the same cities as the companies for which they work.
- iii) Find all employees in the database who live in the same cities and on the same streets as do their managers.
- iv) Find all employees who earn more than the average salary of all employees of their company.
- v) Find the company that has the smallest payroll.
- b) Write a PL/SQL Program to create a view for the employee working in sales department assigned to more than 10 projects. CO4 (10)
- UNIT - V**
9. a) Explain the desirable properties of a transaction. CO5 (08)
- b) Discuss serializability by Two-Phase locking. CO5 (08)
- c) Write short notes on recovery technique based on deferred update CO5 (04)
10. a) Which of the following schedules is (conflict) serializable? For each serializable schedule, determine the equivalent serial schedules. CO5 (08)
- (i) r1 (X); r3 (X); w1(X); r2(X); w3(X)
- (ii) r1 (X); r3 (X); w3(X); w1(X); r2(X)
- (iii) r3 (X); r2 (X); w3(X); r1(X); w1(X)
- (iv) r3 (X); r2 (X); r1(X); w3(X); w1(X)
- b) What is a lock? Explain the types of locks used in concurrency control. CO5 (06)
- c) Describe the three phases of ARIES recovery method. CO5 (06)
- *****



MAKEUP EXAMINATIONS - MARCH 2017

Course & Branch : B.E.-Information Science & Engineering Semester : V
Subject : Computer Networks Max. Marks : 100
Subject Code : IS531/IS611 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Write the procedure for header translation in IP transition from version 4 to version 6. CO1 (08)
b) List the restrictions imposed on classless address block. CO1 (07)
An ISP is granted a block of addresses starting with 120.60.4.0/22. The ISP wants to distribute these blocks to 25 organizations with each organization receiving 32 addresses. With slash notation, specify the first and last address of subnets 1, 10 and 25. Find out how many addresses are still available for further allocation?
c) Discuss any five types of extension headers supported by IPV6. CO1 (05)
2. a) A node with IP address 10.12.14.5 is having a data of size 48000 bytes to send to another node with IP address 12.6.7.9. Consider the TTL value as 24 and protocol value as 17. Assuming no options and normal service, calculate the checksum and pictorially represent the contents of IPV4 header. CO1 (08)
b) With a neat diagram, discuss the procedure for NAT address translation using one IP address. CO1 (07)
c) Differentiate between IPV4 and IPV6 packet headers. CO1 (05)

UNIT - II

3. a) Explain any two tools used in the internet for debugging. CO2 (10)
b) With block diagram, describe the operations of different internet group management protocol.. CO2 (10)
4. a) Define Address Resolution Protocol. With diagram illustrate the different cases where the service of ARP can be used. CO2 (10)
b) Illustrate the different forwarding techniques used in network layer. Find the Ethernet multicast physical address for the multicast IP address 230.43.14.7. CO2 (10)

UNIT - III

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IS531/IS611

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- UNIT - IV**
9. a) Explain the basic model of FTP. Describe the functions of the two FTP connections with necessary diagrams. CO5 (10)
b) What are the different types of PDUs SNMPv3? Explain with diagram. Give the format of SNMP PDU and list the fields in it. CO5 (10)
10. a) Briefly elaborate on the scenarios of e-mail architecture that uses the User Agents and the Message Transfer Agents. CO5 (10)
b) Briefly explain the three attributes to handle an object which SMI emphasize on. CO5 (10)


SUPPLEMENTARY SEMESTER EXAMINATIONS - AUGUST 2012

Course & Branch : **B.E.-Information Science & Engineering** Semester : **V**
 Subject : **Natural Language Processing** Max. Marks : **100**
 Subject Code : **IS52A4** Duration : **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

- a) Illustrate some current applications and near-term possibilities of natural language processing. CO1 (09)
- b) Discuss the use of caret and question-mark in regular expressions. Give examples. CO1 (05)
- c) Explain porter stemmer method. CO1 (06)
- a) Distinguish language processing systems from data processing systems with an example. CO1 (08)
- b) Explain human morphological parsing with suitable examples. CO1 (08)
- c) Suppose the regular expression (RE) is : /beg.n/ and input patterns are 'begin', 'begin', 'begun' and 'begsn'. Which of the given input patterns the RE recognizes? CO1 (04)

UNIT - II

- a) Consider the following table of bigram counts for 3 of the words (out of 1616 total word types) of corpus 10,000 sentences. Apply add-one smoothing technique to find the probability and the new count. (Unigram counts of: Today(3437), NLP(1215), test(3256)) CO2 (10)

	Today	NLP	exam
Today	8	1087	0
NLP	3	0	786
exam	3	0	10

- b) What is part-of-speech tagging? Explain. Tag the following sentences: CO2 (10)
 - Book that flight.
 - Does that flight serve dinner?
- a) Discuss witten-bell discounting algorithm in detail. CO2 (12)
- b) Explain rule-based part-of speech tagging with suitable examples. CO2 (08)

UNIT - III

- a) Discuss the functionality of scanner and completer in earley algorithm. CO3 (10)
- b) Write and explain the Unification algorithm. CO3 (10)

IS52A4

- | | | | |
|------------------|---|-----|------|
| 6. | a) Which are the unification operations? Explain each with examples. | CO3 | (10) |
| | b) Explain coordination ambiguity with an example and discuss the other problems with Probabilistic Context-Free Grammar (PCFG). | CO3 | (10) |
| UNIT - IV | | | |
| 7. | a) Write the context-free grammar specification of the syntax of first order predicate calculus representations. | CO4 | (06) |
| | b) Explain with an example the word sense disambiguation. | CO4 | (06) |
| | c) i) What is the difference between $P(A \rightarrow \beta)$ and $P(A \rightarrow \beta A)$?
ii) Define probability of parse tree. How to compute the probability of a parse tree? Given an example. | CO4 | (08) |
| 8. | a) Give a reasonable first order predicate calculus translation of the following example: "If you're interested in baseball, the Rockies are playing tonight." | CO4 | (06) |
| | b) Distinguish between homonymy, polysemy, synonymy, and hyponymy with examples. | CO4 | (08) |
| | c) Discuss on the pitfalls in representing the meaning of natural language utterances. | CO4 | (06) |
| UNIT - V | | | |
| 9. | a) Write a detailed note on inference based resolution algorithm. | CO5 | (10) |
| | b) Explain discourse planner and surface realizer in architecture for generation. | CO5 | (10) |
| 10. | a) Explain syntactic transformations in machine translation with examples. | CO5 | (10) |
| | b) Write a detailed note on discourse structure. | CO5 | (10) |


SUPPLEMENTARY SEMESTER EXAMINATIONS - AUGUST 2017

Course & Branch : **B.E.-Information Science & Engineering** Semester : **V**
 Subject : **Operating Systems** Max. Marks : **100**
 Subject Code : **IS514** Duration : **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Explain with diagram the various modes of operations by giving justification CO1 (10)
 for what reasons they are required. Mention the advantages of the having
 privileged instructions.
 b) Discuss in brief the various activities the operating system is responsible for CO1 (10)
 in terms of file system management? Briefly explain cache coherency in the
 hierarchical storage structure of computer system.
2. a) Modern operating systems are interrupt driven. Explain the statement CO1 (10)
 based on the operating system operations. Also discuss the importance of
 having Dual-Mode Operation in most computer systems.
 b) Consider the following set of processes, with length of the CPU burst time CO1 (10)
 given in milliseconds.

Process	Arrival Time	Burst Time	Priority
P1	0	10	3
P2	0	1	1
P3	3	2	3
P4	7	1	4
P5	9	5	2

- i) Draw Gantt charts illustrating the execution of these processes using
 FCFS, SJF, non-preemptive Priority and Round Robin (Quantum = 2)
 ii) Determine the Turnaround time for each of the scheduling
 algorithms mentioned above.
 iii) What is the average waiting time of each process for each of the
 scheduling algorithms?

UNIT - II

3. a) State the dining philosopher's problem. Illustrate monitor concept by CO2 (10)
 presenting a solution to the dining-philosophers problem.
 b) Explain in details the various methods of Recovery from Deadlock. CO2 (10)
4. a) Explain the Peterson's solution to the critical section problem showing the CO2 (10)
 general structure of the process P_i .
 b) What do you mean by Race Condition? Illustrate the classic software-based CO2 (10)
 solution to the critical section problem.

		UNIT - III	
5.	a)	What do you mean by Lazy swapper? Demand paging can significantly affect the performance of a computer system. Explain.	CO3 (10)
	b)	Explain the following in detail: i. Hashed Page tables ii. Inverted Page tables.	CO3 (10)
6.	a)	Illustrate the various steps involved in handling page faults?	CO3 (10)
	b)	Describe the concept of Paging with neat diagram. Show how the access time to user memory location can be reduced in paging?	CO3 (10)
		UNIT - IV	
7.	a)	What is free-space list? Explain in details the four approaches to free-space management.	CO4 (10)
	b)	A disk drive has 200 cylinders numbered from 0 – 199. The disk head is initially at cylinder 53. The queue of pending requests in FIFO order is: 98, 183, 37, 122, 14, 124, 65, and 67 . Starting from the current head position, what is the total distance travelled by the disk arm to satisfy the requests using algorithms FCFS, SSTF, SCAN and C-LOOK. Illustrate with diagram.	CO4 (10)
8.	a)	Briefly explain the different groups of process properties?	CO4 (10)
	b)	Explain with an example the operation of SCAN and C-SCAN Scheduling.	CO4 (10)
		UNIT - V	
9.	a)	With an example explain the Swap-Space Management.	CO5 (10)
	b)	Briefly explain the goals and Domain of Protection in modern computer system.	CO5 (10)
10.	a)	Discuss in detail the UNIX Process Management Model giving brief explanation of different parts of the process context.	CO5 (10)
	b)	Write short notes on: i) Slab Allocation ii) Buddy systems.	CO5 (10)



SUPPLEMENTARY SEMESTER EXAMINATIONS - AUGUST 2017

Course & Branch : B.E.-Information Science & Engineering Semester : VI
Subject : Operation Research Max. Marks : 100
Subject Code : IS532/IS614 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Define the following terms: CO1 (04)
 i. Feasible ii. Optimal iii. Network programming iv. Linear Programming.
- b) A firm manufactures 3 products A, B and C. The profits are Rs. 3, Rs. 2 and Rs. 4 respectively. The firm has 2 machines and the required processing time in minutes for each machine on each product is given below. Machine G and H have 2000 and 2500 machine minutes, respectively. The firm must manufacture 100 A's, 200 B's and 50 C's, but no more than 150 A's. Formulate the problem as Linear Programming problem. CO1 (06)
- | | | | |
|---|---|---|---|
| | A | B | C |
| G | 4 | 3 | 5 |
| H | 2 | 2 | 4 |
- c) Solve the following LP problems graphically : CO1 (10)
 1. Max. $z = 8000x_1 + 7000x_2$, subject to
 $3x_1 + x_2 \leq 66$, $x_1 + x_2 \leq 45$, $x_1 \leq 45$, $x_2 \leq 40$ and $x_1, x_2 \geq 0$.
 2. Min. $z = 1.5x_1 + 2.5x_2$, subject to
 $x_1 + 3x_2 \geq 3$, $x_1 + x_2 \geq 2$, $x_1, x_2 \geq 0$.
2. a) Briefly discuss the basic components of all OR models. List the steps of the graphical Linear Programming solution. CO1 (05)
- b) A firm plans to purchase at least 200 quintals of scrap containing high quality metal X and low quality metal Y. It decides that the scrap to be purchased must contain at least 100 quintals of X metal and not more than 35 quintals of Y-metal. The firm can purchase the scrap from two suppliers (A and B) in unlimited quantities. The percentage of X and Y metals in terms of weight in the scrap supplied by A and B is given below. The price of A's scrap is Rs 200 per quintal and that of B's is Rs 400 per quintal. Formulate the LP model and solve it using graphical method, to determine the quantities that the firm should buy from the two suppliers so as to minimize the total purchase cost. CO1 (10)

Metals	Supplier A	Supplier B
X	25%	75%
Y	10%	20%

Identify the corner points and indicate whether they are feasible or not.

- c) Solve the LP problem graphically. Justify your answer.
 $\text{Max } z = 2x_1 + x_2$

Subject to: $x_1 - x_2 \leq 10$
 $2x_1 - x_2 \leq 40$
 and $x_1 \geq 0, x_2 \geq 0$

CO2 (08)

3. a) **UNIT - II**

Maximize $Z = 80x_1 + 55x_2$

Subject to $4x_1 + 2x_2 \leq 40$
 $2x_1 + 4x_2 \leq 32$
 and $x_1 \geq 0, x_2 \geq 0$

CO2 (08)

- b) Solve the following problem using Simplex method (Big M Method):
 Objective function: Maximize $Z = 2x_1 + 4x_2$,

Subject to the constraints: $2x_1 + x_2 \leq 18$
 $3x_1 + 2x_2 \geq 30$
 $x_1 + 2x_2 = 26$
 $x_1, x_2 \geq 0$

CO2 (04)

- c) Solve the following linear programming problem:

Maximize $Z = x_1 + 0.5x_2$

Subject to $2x_1 + x_2 \leq 4$
 $x_1 + 2x_2 \leq 3$
 and $x_1 \geq 0, x_2 \geq 0$.

Is this a special case of Simplex? If so, Which one?

CO2 (10)

4. a) Solve the following problem using Simplex method:

Maximize $Z = x_1 + 2x_2$, subject to

$x_1 + x_2 \leq 3, x_1 + 2x_2 \leq 5, 3x_1 + x_2 \leq 6$ and $x_1, x_2 \geq 0$

CO2 (10)

- b) Solve the problem below using Two-phase Method.

Min $Z = x_1 + 2x_2$,
 subject to: $x_1 + x_2 \geq 4$,
 $x_1 - x_2 \geq 1$,
 $x_1 - 2x_2 \leq 1$,
 $x_1, x_2 \geq 0$.

UNIT - III

5. a) Write the Dual of the following primal problem.

CO3 (05)

Min $z = 6x_1 + 3x_2$

Subject to

$6x_1 - 3x_2 + x_3 \geq 2$; $3x_1 + 4x_2 + x_3 \geq 5$

$x_1, x_2, x_3 \geq 0$

- b) Discuss the characteristics of the game theory.

CO3 (06)

- c) In a game of matching coins with two players, suppose one player wins Rs.2 when there are two heads and wins nothing when there are two tails; and losses Re.1 when there are one head and one tail. Determine the payoff matrix, the best strategies for each player and the value of the game.

CO3 (09)

6. a) Consider the following Lp

$$\text{Maximize: } z = 5x_1 + 2x_2 + 3x_3$$

$$x_1 + 5x_2 + 2x_3 = 30$$

$$\text{Subject to: } x_1 - 5x_2 - 6x_3 \leq 40$$

$$x_1, x_2, x_3 \geq 0$$

Given that the artificial variable x_4 and the slack variable x_5 form the starting basic variables and that M was set equal to 100 when solving the problem, the optional table an is given as:

Basic	x_1	x_2	x_3	x_4	x_5	Solution
z	0	23	7	105	0	150
x_1	1	5	2	1	0	30
x_5	0	-10	-8	-1	1	10

Write the associated dual problem, and determine its optimal solution in two ways.

- b) Define:

- Competitive game
- Pure strategies
- Mixed strategies
- Two-person, zero sum
- Pay off matrix.

- c) Two Players A and B without showing each other, put on a table a coin, with head and tail up. A wins Rs. 8 when both the coins show head and Re. 1 when both are tails. B wins Rs 3 when the coins do not match. Given the choice of being matching player(A) or non-matching player(B), which one would you choose and what would be your strategy?

UNIT - IV

7. a) Explain the basic steps in PERT/CPM techniques.

- b) A project consists of a series of tasks labeled A,B,...,H,I with the following relationships (W < X,Y, means X and Y cannot start until W is completed; X,Y < W means W cannot start until both X and Y are completed). With this notation, construct the network diagram having the following constraints:

$$A < D, E ; B, D < F ; C < G ; B < H ; F, G < I.$$

Find also the optimum time of completion of the project, when the time (in days) of completion of each task is as follows:

Task:	A	B	C	D	E	F	G	H	I
Time:	23	8	20	16	24	18	19	4	10

8. a) Discuss the main steps of the Fulkerson's 'I-J' rule with suitable illustrations.

- b) A project has the following times schedule:

Construct PERT network and compute:-

- T_E and T_L for each event.

- Float for each activity.

- Critical path and its duration.

Activity	Time in weeks	Activity	Time in weeks
(1-2)	4	5-7	8
(1-3)	1	6-8	1
(2-4)	1	7-8	2
(3-4)	1	8-9	1
(3-5)	6	8-10	8
(4-9)	5	9-10	7
(5-6)	4		

9. a) Determine the initial basic feasible solution using Vogel's approximation Method to the following transportation problem. And also check for the optimality solution. CO5 (12)

From	To			Available
	2	7	4	
Required	3	3	1	5
	5	4	7	8
	1	6	2	7
	7	9	18	14

- b) A Method's Engineer wants to assign four new methods to three work centres. The assignment of the new methods will increase production and they are given below. If only one method can be assigned to a work centre determine the optimum assignment: CO5 (08)

Methods	Work centres			Available
	A	B	C	
1	10	7	8	
2	8	9	7	
3	7	12	6	
4	10	10	8	

10. a) Solve the following transportation problem (cell entries represent unit costs): CO5 (11)

Required	Available					
	5	3	7	3	8	5
3	3	6	2	1	2	17
5	6	12	5	7	11	3
2	1	3	4	8	2	4
9	6	10	5	10	9	2
						8

- b) An automobile dealer wishes to put four repairmen to four different jobs. The repairmen have somewhat different kinds of skills and they exhibit different levels of efficiency from one job to another. The dealer has estimated the number of man-hours that would be required for each job-man combination. This is given in the matrix form below: CO5 (09)

Man	Job			
	A	B	C	D
1	5	3	2	8
2	7	9	2	6
3	6	4	5	7
4	5	7	7	8

Find the optimum assignment that will result in minimum man-hours needed.

**SUPPLEMENTARY SEMESTER EXAMINATIONS - AUGUST 2017**

Course & Branch : B.E.-Information Science & Engineering Semester : VI
Subject : Computer Networks Max. Marks : 100
Subject Code : IS531/IS611 Duration : 3 Hrs

Instructions to the Candidates:

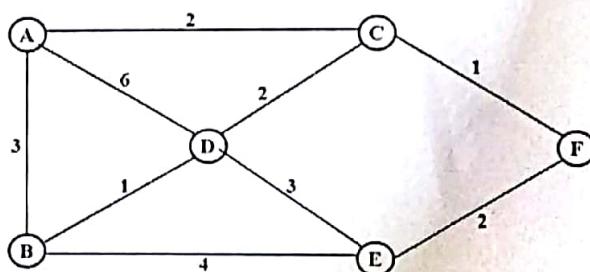
- Answer one full question from each unit.

UNIT - I

1. a) What is NAT? How can NAT help in address depletion? How does the NAT router know the destination address for a packet coming from the Internet? CO1 (10)
b) Explain Fragmentation and the related flags used in detail. A packet has arrived in which the offset value is 100, the value of HLEN is 5, and the value of the total length field is 100. What are the numbers of the first byte and last byte? CO1 (10)
2. a) An ISP is granted a block of addresses starting with 190.100.0.0/16. The ISP needs to distribute these addresses to three groups of customers as follows:
(i) The first group has 6 customers; each needs 256 addresses.
(ii) The second group has 128 customers; each needs 128 addresses.
(iii) The third group has 128 customers; each needs 64 addresses.
Design the subblocks and find out how many addresses are still available after these allocations. CO1 (10)
b) With a neat diagram explain the IPv6 datagram format. Give a brief comparison between IPv4 options and IPv6 extension headers. CO1 (10)

UNIT - II

3. a) With a flow diagram, explain how an IP address is allocated dynamically using DHCP. CO2 (08)
b) Discuss the solutions for the node instability problem. Write any four considerations of Routing Information Protocol in Implementing Bellman Ford routing. CO2 (07)
c) What is the need for delayed response strategy in IGMP? Change the multicast IP address 235.153.212.96 to an Ethernet multicast physical address CO2 (05)
4. a) Enumerate the different cases in which the services of ARP can be used. CO2 (08)
b) Applying distance Link State Routing, calculate the shortest path from the root node A to all other nodes in the following network configuration. CO2 (07)



IS531/IS611

- CO2 (05)
- c) Explain the different ICMP error reporting messages. CO3 (08)
- UNIT - III**
5. a) Give the diagrammatic representation of connection establishment using three-way handshaking protocol. Briefly describe any five flags used in TCP. CO3 (07)
- b) Write a brief note on the multiple-stream concept of SCTP. Give any three differences between a TCP segment and SCTP packets. CO3 (05)
- c) Illustrate how Reverse Path Multicasting is more efficient when compared to Reverse Path Broadcasting. CO3 (08)
6. a) Explain the importance of queuing in UDP. Give any four uses of UDP. CO3 (07)
- b) Discuss the various features supported by TCP. CO3 (05)
- c) Describe the three IANA ranges for port numbers. Give any two differences between connectionless service and connection oriented service. CO3 (08)
- UNIT - IV**
7. a) Discuss the different methods used by TCP to avoid congestion in the network. CO4 (10)
- b) Identify and explain the different sections of DNS in the internet. find the total number of labels and levels of hierarchy involved in "student.cn.msrif.edu" domain name. CO4 (10)
8. a) Describe traffic shaping techniques to improve QoS. Find the congestion in the network (backward or forward direction) if the address field of a frame relay is 1011000000010111. CO4 (10)
- b) Discuss the different sections of domain name space in Internet. Calculate the gallons of liquid left in the bucket using leaky bucket technique, if the output rate is 6 gal/min, there is an input burst of 100 gal/min for 11s and there is no input for 49s? CO4 (10)
- UNIT - V**
9. a) With block diagram, Illustrate any two scenarios of electronic mail. CO5 (10)
- b) Discuss the components of network management on the Internet. CO5 (10)
- Show the MIME header format if a sender sends a JPEG message.
10. a) Write short notes on network virtual terminal and SNMP PDU format. CO5 (10)
- b) List and explain the different functions of network management system. CO5 (10)
- *****



SUPPLEMENTARY SEMESTER EXAMINATIONS - AUGUST 2017

Course & Branch : B.E.-Information Science & Engineering Semester : IV
 Subject : Database Management Systems Max. Marks : 100
 Subject Code : IS534 / IS415 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) List and explain any four advantages of Database Management System. CO1 (08)
 b) Define Data independence. Explain its types. Which one is harder to CO1 (07)
 achieve? Why?
 c) Discuss the classification of database management systems. CO1 (05)
2. a) Compare and contrast traditional file system approach with database CO1 (06)
 approach.
 b) With a neat diagram explain three schema architecture. CO1 (07)
 c) Discuss the different types of user friendly interfaces and the types of CO1 (07)
 users who typically use each.

UNIT - II

3. a) Consider the following set of requirements for a UNIVERSITY CO2 (12)
 database that is used to keep track of students' transcripts. This is similar but not identical to the database:
 - (i) The university keeps track of each student's name, student number, social security number, current address and phone, permanent address and phone, birthdate, sex, class (freshman, sophomore, ..., graduate), major department, minor department (if any), and degree program (B.A., B.S., ..., Ph.D.). Some user applications need to refer to the city, state, and zip of the student's permanent address, and to the student's last name. Both social security number and student number have unique values for each student.
 - (ii) Each department is described by a name, department code, office number, office phone, and college. Both name and code have unique values for each department.
 - (iii) Each course has a course name, description, course number, number of semester hours, level, and offering department. The value of course number is unique for each course.
 - (iv) Each section has an instructor, semester, year, course, and section number. The section number distinguishes different sections of the same course that are taught during the same semester/year; its values are 1, 2, 3, ...; up to the number of sections taught during each semester.
 - (v) A grade report has a student, section, letter grade, and numeric grade (0, 1, 2, 3, 4)

Design an ER schema for this application, and draw an ER diagram for that schema. Specify key attributes of each entity type and structural constraints on each relationship type. Note any unspecified requirements, and make appropriate assumptions to make the specification complete.

- b) Enumerate with an example of violation of different types of constraints during insert, delete and update operation. CO2 (08)
4. a) A university database contains information about professors (identified by social security number, or SSN) and courses (identified by courseid). Professors teach courses; each of the following situations concerns the Teaches relationship set. For each situation, draw an ER diagram that describes it (assuming that no further constraints hold): CO2 (12)
- i) Professors can teach the same course in several semesters, and each offering must be recorded.
 - ii) Professors can teach the same course in several semesters, and only the most recent such offering needs to be recorded. (Assume this condition applies in all subsequent questions.)
 - iii) Every professor must teach some course.
 - iv) Every professor teaches exactly one course (no more, no less).
 - v) Every professor teaches exactly one course (no more, no less), and every course must be taught by some professor.
- b) Explain different characteristics of a relation that differentiate from a file or a table. CO2 (08)

UNIT - III

5. a) Consider a database with the following schema:
- | | |
|-----------------------------------|----------------------------|
| Person (name, age, gender) | name is a key |
| | (name, pizzeria) is a |
| Frequents (name, pizzeria) | key |
| Eats (name, pizza) | (name, pizza) is a key |
| Serves (pizzeria, pizza, price) | (pizzeria, pizza) is a key |
- Write relational algebra expressions for the following queries.
- i) Find all pizzerias frequented by at least one person under the age of 18.
 - ii) Find the names of all females who eat either mushroom or pepperoni pizza (or both).
 - iii) Find the names of all females who eat both mushroom and pepperoni pizza.
 - iv) Find all pizzerias that serve at least one pizza that Amy eats for less than \$10.00
 - v) Display the number of people who eats all pizza types with total price.
- b) Illustrate different steps in relational database design using ER-to Relational mapping. CO3 (10)
6. a) Consider the following relation for published books:
- | | |
|--|--|
| BOOK (Book_title, Authorname, Book_type, Listprice, Author_affil, Publisher) | Author_affil refers to the affiliation of the author. Suppose the following dependencies exist: |
| Author_name -> Author_affil | Book_title -> Publisher, Book_type |
| i) What normal form is the relation in? Explain your answer. | ii) Apply normalization until you cannot decompose the relations further. State the reasons behind each decomposition. |
- CO3 (12)

- b) Find the result of these expressions for the relational schema R and S. CO3 (08)

R				S		
A	B	C	D	C	D	E
1	2	3	1		1	2
2	2	5	1		3	1
3	1	2	6		5	1
4	2	5	3		1	2

- (a) $R \bowtie S$
 (b) $R \bowtie_{RC=SC} S$
 (c) $R \overline{\bowtie}_{RA=SC} S$
 (d) $R \bowtie_{RA=SE} S$

UNIT - IV

CO4 (08)

7. a) Consider the following relational schema

BOOK

ISBN	Book_Title	Category	Price	Copyright_date	Year	Page_count	P_ID

PUBLISHER

P_I	Pname	Address	State	Phone	Email-ID

AUTHOR

A_ID	Aname	City	State	Zip	Phone	URL

AUTHOR_BOOK

A_I	ISBN

REVIEW

R_ID	ISBN	Rating

Specify the following queries using relational algebra.

- Retrieve ISBN, title & price of the books belonging to either novel or language book category.
- Retrieve ID, name, URL of author & category of the book C++.
- Retrieve book title, price, author name & URL for the publishers 'Bright Publications'.
- Retrieve the name & address of publishers who have not published any books.

- b) Write a program using PL/SQL statement, that given 2 sides of triangle & find out its area is greater than its perimeter or not. CO4 (06)
- c) Discuss views in SQL. Write a PL/SQL code to copy the contents BOOK & discuss views in SQL. Write a PL/SQL code to copy the contents BOOK from the BOOK relation to the new table BOOK_new CO4 (06)

8. a) Consider the following relations:

STUDENT (snum: integer, sname: string, major: string, level: string, age: integer)
 CLASS (name: string, meets at: string, room: string, fid: integer)
 ENROLLED (snum: integer, cname: string)
 FACULTY (fid: integer, fname: string, deptid: integer)

Write the following queries using SQL.

- Find the age of the oldest student who is either a ISE major or enrolled in a course taught by 'Darshan'.
- Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than four.
- Find the names of all classes that either meet in room P18 or have five or more students enrolled.



SEMESTER END EXAMINATIONS - JANUARY 2017

Course & Branch : B.E.-Information Science & Engineering Semester : V
Subject : Operation Research Max. Marks : 100
Subject Code : IS532/IS614 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Define OR. Discuss the different phases of OR. What are some of the application areas? CO1 (10)
- b) A firm produces products, A & B, each of which requires two resources, namely raw materials and labour. Each unit of product A requires 2 & 4 units and each unit of product B requires 3 & 3 units respectively of raw materials and labour. Everyday 60 units of raw materials and 96 units of labour are available. If the unit profit contribution of product A is Rs.40/-, product B is Rs.35/- determine the number of units of each of the products that should be made each day to maximize the total profit contribution. (i) Formulate the problem and (ii) solve graphically with proper labeling. (iii) Identify corner points and indicate feasible space and optimum solution. CO1 (10)
2. a) A Bank is in the process of devising a loan policy that involves a maximum of Rs. 12 million. The following table provides data about the available types of loans: CO1 (10)

Type of Loan	Interest rate	Bad-Debt ratio
Personal	.140	.10
Car	.130	.07
Home	.120	.03
Farm	.125	.05
Commercial	.100	.02

Bad debts are unrecoverable and produce no interest revenue. The Bank decides to allocate 40% of the funds to farm and commercial loans. Home loans must equal at least 50% of the personal, car, and home loans. The Bank also has a stated policy of not allowing the overall ratio of bad debts on all loans to exceed 4%. Formulate the problem to determine the amount of loan in each category to maximize net return.

- b) A dealer wishes to purchase a number fans and sewing machines. He has only Rs.5760/- to invest and has space utmost for 20 items. A fan costs him Rs 360 and a sewing machine Rs 240. His expectation is that he can sell a fan at a profit of Rs 22 and sewing machine at a profit of Rs 18. Assuming that he can sell all the items that he can buy, how should he invest his money in order to maximize his profit? Formulate this problem as linear programming problem and then use graphical method to solve it. CO1 (10)

UNIT - II

3. a) Consider the following LP:

$$\text{Max } z = x_1 + 3x_2$$

Subject to

$$x_1 + x_2 \leq 2$$

$$-x_1 + x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

i) Determine all the basic feasible solutions of the problem using algebraic method.

ii) Use direct substitution in the objective function to determine the best basic solution.

- b) Solve the following LPP by penalty method

$$\text{Max } z = 3x_1 + 2x_2$$

Subject to

$$2x_1 + x_2 \leq 2$$

$$3x_1 + 4x_2 \geq 12$$

$$x_1, x_2 \geq 0$$

- c) A company manufactures two products, A and B. The unit revenues are \$2 and \$3 respectively. Two raw materials, M1 and M2, used in the manufacture of the two products have daily availabilities of 8 and 18 units, respectively. One unit of A uses 2 units of M1 and 2 units of M2, and 1 unit of B uses 3 units of M1 and 6 units of M2

i) Determine the dual prices of M1 and M2 and their feasibility ranges.

ii) Suppose that 4 additional units of M1 can be acquired at the cost of 30 cents per unit. Would you recommend the additional purchase?

4. a) Solve the following problem by Two phase method.

$$\text{Min } z = x_1 + x_2$$

Subject to

$$2x_1 + x_2 \geq 4$$

$$x_1 + 7x_2 \geq 7$$

$$x_1, x_2 \geq 0$$

- b) Solve the following problem by revised simplex method.

$$\text{Max } z = x_1 + 2x_2$$

Subject to

$$x_1 + x_2 \leq 3 ; x_1 + 2x_2 \leq 5 ; 3x_1 + x_2 \leq 6$$

$$x_1, x_2 \geq 0$$

UNIT - III

5. a) Construct the dual problem for the following linear programming model:

$$\text{Maximize } Z = 5x_1 + 4x_2 - x_3 + 3x_4$$

$$\text{subject to } 3x_1 + 2x_2 - 3x_3 + x_4 \leq 24$$

$$3x_1 + 3x_2 + x_3 + 3x_4 \leq 36$$

$$\text{and } x_1 \geq 0, x_2 \geq 0, x_3 \geq 0, x_4 \geq 0.$$

- b) Briefly describe Game Theory? Find the saddle point for the following payoff matrix:

		B				
		I	II	III	IV	V
A	I	9	3	1	8	0
	II	6	5	4	6	7
	III	2	4	4	3	8
	IV	5	6	2	2	1

- c) i) For the game with pay off matrix,
Player B

-1	2	-2
6	4	-6

Player A

Determine the best strategies for players A and B and also the values of the game for them. Is the game i) Fair ii) strictly determinable
ii) solve the following game and determine the value of the game using arithmetic method.

CO3 (09)

6. a) for the game with the following payoff matrix for the row player, determine the optimal strategies for both the players and the rule of the game: CO3 (6)

1	7
6	2

- b) Explain in brief the terms: i. Strategy ii. Rectangular Game CO3 (6)

- c) What are the important characteristics of Duality, their advantages and applications? Write the dual of the problem below: CO3 (8)

$$\text{Min } Z = 2x_2 + 5x_3$$

Subject to: $x_1 + x_2 \geq 2$,
 $2x_1 + x_2 + 6x_3 \leq 6$,
 $x_1 - x_2 + 3x_3 = 4$,
 $x_1, x_2, x_3 \geq 0$

UNIT - IV

7. a) Discuss the rules for drawing network diagram and also highlight the common errors in drawing networks. CO4 (08)

- b) A project has the following time schedule: CO4 (12)

Activity	Time in weeks	Activity	Time
(1-2)	4	(5-7)	8
(1-3)	1	(6-8)	1
(2-4)	1	(7-8)	2
(3-4)	1	(8-9)	1
(3-5)	6	(8-10)	8
(4-9)	5	(9-10)	7
(5-6)	4		

Construct PERT network and Compute:

- i) TE and TL for each event
ii) Float for each activity
iii) Critical path and its duration.

8. a) Illustrate with an example and explain the following. CO4 (08)

- i) Activity ii) Event iii) Sequencing.

- b) A project is represented by the network shown below and has the following data: CO4 (12)

Task	A	B	C	D	E	F	G	H	I
Least Time	5	18	26	16	15	6	7	7	3
Greatest Time	10	22	40	20	25	12	12	9	5
Most Likely time	8	20	33	18	20	9	10	8	4

Determine the following

- i) Expected task time and their variance
ii) The earliest and latest expected times to reach each node
iii) Critical path

9.

a)

A department head has 4 subordinates, and 4 tasks have to be performed. Subordinates differ in efficiency and tasks differ in their intrinsic difficulty. Time each man would perform each task is given in the effectiveness matrix. How the tasks should be allocated to each person to minimize the total man-hours? Use the Hungarian Method for solving this assignment problem. **UNIT - V**

b)

After obtaining an initial basic feasible solution to a given transportation problem, how to arrive at the optimum solution? Discuss. **C05 (10)**

10.

a)

What do you mean by degeneracy in the transportation problem? How do you resolve it? **C05 (06)**

b)

Find the optimal solution to the following transportation problem to minimize the total cost using the Vogel's approximation method. **C05 (10)**

Warehouse → Factory ↓	W_1	W_2	W_3	W_4	Factory capacity
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	20	18
Warehouse Requirement	5	8	7	14	34

c)

Prove that the following is an unbalanced assignment problem. A company is faced with the problem of assigning six different machines to five different jobs. The costs are estimated as follows (in hundreds of rupees): **C05 (04)**

Jobs		1	2	3	4	5
Machines	1	2.5	5.0	1.0	6	1.0
	2	2.0	5.0	1.5	7	3.0
	3	3.0	6.5	2.0	8	3.0
	4	3.5	7.0	2.0	9	4.5
	5	4.0	7.0	3.0	9	6.0
	6	6.0	9.0	5.0	10	6.0

**SEMESTER END EXAMINATIONS - JANUARY 2017**

Course & Branch : B.E.-Information Science & Engineering Semester : V
 Subject : Database Management Systems Max. Marks : 100
 Subject Code : IS534 / IS415 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

- a) Describe the main characteristics of database approach and how it differs from traditional file system? CO1 (06)
 b) Describe the three schema architecture. Why do we need mappings between schema levels? CO1 (08)
 c) Explain classification of database system. CO1 (06)
- a) Explain main phases of the high level conceptual data models for database design. CO1 (10)
 b) Discuss the advantages of using the DBMS approach. CO1 (10)

UNIT - II

- a) What are two conditions for the key? Explain entity integrity and referential integrity constraints with an example. CO2 (08)
 b) Write an ER diagram for Bank database application with primary key, weak entity, identifying relationship with proper cardinality ratio (assume at least 4 entity). CO2 (08)
 c) Explain the relationship type and value set with an example. CO2 (04)
- a) Demonstrate different update operations and constraints violations with an example. CO2 (08)
 b) Suppose you are given the following requirements for a simple database for the National Hockey League (NHL): CO2 (12)

- the NHL has many teams,
- each team has a name, a city, a coach, a captain, and a set of players,
- each player belongs to only one team,
- each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records,
- a team captain is also a player,
- a game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 11th, 1999) and a score (such as 4 to 2). CO1

Construct a clean and concise ER diagram for the NHL database.

UNIT - III

5. a) Consider the following relational Student(ssn, name, address, major) Course(code, title) Registered(ssn, code) Write the following queries using relational algebra.
- List the codes of courses in which at least one student is registered (registered courses):
 - List the Names of students and the titles of courses they registered to.
 - Retrieve SSNs of students who are registered for 'Database Systems' or 'Analysis of Algorithms'.
 - Retrieve SSNs of students who are registered for both 'Database Systems' and 'Analysis of Algorithms'
 - List the codes of courses for which no student is registered
- b) Explain ER to Relational mapping algorithms. CO3 (06)
 c) Describe informal design guidelines for relation schemas CO3 (04)
6. a) Explain different join and division operation with an example CO3 (10)
 b) Consider the following functional dependences: CO3 (10)
- fd1: name \rightarrow address, gender
 fd2: address \rightarrow rank
 fd3: rank, gender \rightarrow salary
- Give a primary key of the relation $r(\text{name, address, gender, rank, salary})$. Prove your answer formally using Armstrong's Axioms
 - Normalize the relation $r(\text{name, address, gender, rank, salary})$ to 3rd normal form, ensuring that the resulting relations are dependency-preserving and lossless-join decompositions. Specify the primary keys in the normalized relations by underlining them.
7. a) Consider the following schema and Specify the following queries in SQL: CO4 (08)
- SAILORS (Sid, Sname, rating, age).
 BOATS (bid, bname, color).
 RESERVES (sid, bid, day).
- Find age of sailors who reserved green boat.
 - Find the name of boats reserved by "Ramesh".
 - Find names of sailors who have reserved a red or a green boat.
 - Find the "sids" of sailors with age over 20 who have not registered a red boat.
- b) Explain different Schema change statements in SQL.
 c) Explain the concept of cursor and passing parameter to cursor in PL/SQL. CO4 (06) CO4 (06)
8. a) Explain how **Group By** clause works. What is the difference between **Where** clause and **Having** clause? CO4 (08)

- b) Consider the following Book relation;
Book (ISBN, Book-Title, category, Price, copyright_date, year, page_count) write the SQL statements for the following queries
 i) Retrieve the details of all authors whose name begins with the characters "J"
 ii) Retrieve Title and price of all the text books with page_count of greater than 600
 iii) Retrieve the book categories in which no. of books published is less than 5.
 c) Explain stored procedure and write a PL/SQL program to calculate
- UNIT - V**
9. a) Which of the following schedules is (conflict) serializable? For each serializable schedule, determine the equivalent serial schedules.
 (a) r1(X); r3(X); w1(X); r2(X); w3(X)
 (b) r1(X); r3(X); w3(X); w1(X); r2(X)
 (c) r3(X); r2(X); w3(X); r1(X); w1(X)
 (d) r3(X); r2(X); r1(X); w3(X); w1(X)
10. a) Consider the three transactions T1, T2, and T3, and the schedules S1 and S2 given below. Draw the serializability (precedence) graphs for S1 and S2 and state whether each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s).
 T1: r1(x); r1(z); w1(x)
 T2: r2(z); r2(y); w2(z); w2(y)
 T3: r3(x); r3(y); w3(y)
 S1: r1(x); r2(z); r1(x); r3(x); r3(y); w1(x); w3(y); r2(y); w2(z); w2(y)
 S2: r1(x); r2(z); r3(x); r1(z); r2(y); r3(y); w1(x); w2(z); w3(y); w2(y)
- b) Explain the concept of two phase locking techniques for concurrency control.
- CO4 (06) CO4 (06) CO5 (10) CO1 (06) CO1 (08) CO1 (06) CO1 (10) CO1 (10) CO2 (08) CO2 (08) CO2 (04) CO2 (08) CO2 (12)


SEMESTER END EXAMINATIONS - JANUARY 2017

Course & Branch : **B.E.-Information Science & Engineering** Semester : **V**
 Subject : **Natural Language Processing** Max. Marks : **100**
 Subject Code : **IS52A4** Duration : **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Discuss the six distinct categories or steps in complex language behavior. CO1 (09)
 b) Design an algorithm for deterministic recognition of finite state automata. CO1 (05)
 c) Explain porter stemmer method. CO1 (06)
2. a) Distinguish between inflectional and derivational morphology with examples. CO1 (08)
 b) Explain human morphological parsing with suitable examples. CO1 (08)
 c) Define lexical and surface levels in finite state transducers with an example for each. CO1 (04)

UNIT - II

3. a) Discuss Witten-Bell Discounting algorithm in detail. CO2 (06)
 b) Explain how transformation-based learning approach rules are applied. CO2 (06)
 c) Draw tree structures for the following Air Traffic Information System (ATIS) phrases:
 - i. after five p.m.
 - ii. early flights
 - iii. on Thursday
 - iv. a one-way fare.
 CO2 (08)
4. a) Write rules expressing the verbal subcategory of English auxiliaries. (for example you might have a rule can → verb-with-bare-stem-VP-complement) CO2 (06)
 b) Identify the relation between frequency count and POS tagging. Explain. CO2 (06)
 c) Distinguish between rule-based taggers and stochastic taggers. CO2 (06)

UNIT - III

5. a) Explain how predictor and scanner work in the Earley algorithm. CO3 (10)
 b) Write and explain the Unification algorithm. CO3 (10)
6. a) List and explain the modifications to the Earley algorithm to include unification. CO3 (10)
 b) Explain coordination ambiguity with an example and discuss the other problems with Probabilistic Context-Free Grammar (PCFG). CO3 (10)

UNIT - IV

7. a) Write a detailed note with examples on elements of first order predicate calculus. CO4 (06)
- b) Implement the Earley-based semantic analyzer. CO4 (08)
- c) Discuss on quantifiers with suitable examples. CO4 (06)
8. a) Give a detailed account of similarities and differences among the following set of lexemes: Imitation, synthetic, artificial, fake and simulated. CO4 (10)
- b) Develop a set of grammar rules and semantic attachments to handle predicate adjectives for the following:
 i. Flight 308 from New York is expensive
 ii. Murphy's restaurant is cheap

UNIT - V

9. a) Write a detailed note on Inference based resolution algorithm. CO5 (10)
- b) Explain discourse planner and surface realizer in architecture for generation. CO5 (10)
10. a) Explain syntactic transformations in machine translation with examples. CO5 (10)
- b) Write a detailed note on discourse structure. CO5 (10)


SEMESTER END EXAMINATIONS - JANUARY 2017

Course & Branch : **B.E.-Information Science & Engineering** Semester : **V**
 Subject : **Computer Networks** Max. Marks : **100**
 Subject Code : **IS531/IS611** Duration : **3 Hrs**

Instructions to the Candidates:

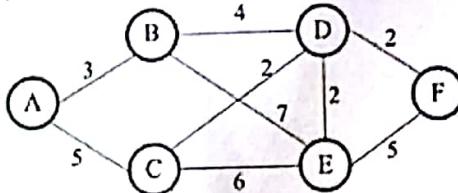
- Answer one full question from each unit.

UNIT - I

1. a) Illustrate classless address mechanism in IPv4. Calculate first, last and CO1 (10)
 total addresses for a given block, if one of the addresses is
 205.16.37.39/28.
 b) Differentiate between IPv4 and IPv6 packet header. CO1 (10)
2. a) Enumerate the different fields related to fragmentation and reassembly CO1 (10)
 of an IPv4 Datagram.
 b) Describe network address translation. Explain the different methods CO1 (10)
 used to overcome the problem of a NAT router.

UNIT - II

3. a) Illustrate the ARP packet format. A router with IPv4 address CO2 (10)
 123.45.21.12 and Ethernet physical address 23:45:BA:00:67:CD has
 received a packet for a host destination with IP 124.10.78.10. Show the
 entries in ARP request packet sent by the router. Assume no
 subnetting.
 b) Illustrate the two node instability in Distance Vector Routing. What are CO2 (10)
 the different solutions for such a problem?
4. a) Explain the IGMP operation in detail. Change the multicast IP address CO2 (10)
 238.212.24.9 to an Ethernet multicast physical address.
 b) Consider the network given below. Use Dijkstra's algorithm to find the CO2 (10)
 shortest path from the source node E to all the other destination nodes.
 Find the shortest path tree from node E to the other nodes.


UNIT - III

5. a) With block diagram, distinguish between source based trees and group CO3 (10)
 shared tree. Compute the value of the receiver window for host A if the
 receiver, host B, has a buffer size of 5000 bytes and 1000 bytes of
 received and unprocessed data?
 b) List out the different well known ports of UDP. Enumerate the process CO3 (10)
 of connection termination in TCP.

IS531/IS611

6. a) Illustrate Transmission control protocol segment format. CO3 (10)
b) Discuss lost segment scenario in Transmission Control Protocol. In CO3 (10)
TCP, if the value of HLEN is 1000, how many bytes of option are included in the segment?

UNIT - IV

7. a) With suitable diagrams explain the general policy used by TCP for CO4 (10)
handling congestion to avoid or alleviate congestion in the network.
b) What do you mean by Traffic Shaping? Describe the two techniques CO4 (10)
used to shape the traffic.
8. a) What are the different Traffic Profiles data flow? Explain the Closed- CO4 (10)
Loop Congestion Control mechanisms in detail.
b) What is the purpose of having domain name space? Explain FQDN and CO4 (10)
PQDN. Elaborate on the usage of Inverse domain?

UNIT - V

9. a) With a neat diagram explain the various fields of SNMP PDU format. CO5 (08)
b) Give the purpose of TELNET usage. Explain the three modes in which CO5 (07)
the TELNET implementation operates.
c) Write a brief note on mobile network applications. CO5 (05)
10. a) Briefly describe the Communication over Data Connection in FTP. CO5 (08)
b) List and explain the three attributes used by Structure of Management CO5 (07)
Information (SMI) in handling an object.
c) Discuss the services provided by the user agent in Electronic Mail. CO5 (05)
- *****



MAKEUP EXAMINATIONS - FEBRUARY 2018

Course & Branch : B.E.: Information Science & Engineering Semester : V
 Subject : Database Management Systems Max. Marks : 100
 Subject Code : IS534 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Distinguish between database approach and traditional approach of CO1 (06)
 programming with files.
 b) Describe the three schema architecture. What characteristics of CO1 (08)
 database approach are achieved in this model?
 c) How does MongoDB provide consistency? CO1 (06)
2. a) Explain the main characteristics of database approaches. CO1 (07)
 b) What are the responsibilities of the DBA and the database designers? CO1 (07)
 c) What are the most important features of MongoDB. CO1 (06)

UNIT - II

3. a) Consider a Railway Reservation System. Write the problem statement CO2 (07)
 and ER Diagram (explain the relationship types and constraints
 considered).
**Note: You must be able to identify atleast 5 entities and 5
 relationships in your problem statement.**
 b) Discuss the steps involved in converting the ER diagram into a CO2 (08)
 relational schema diagram. Map the following ER diagram shown in
 fig. 3(b) into a relational schema diagram and establish all the
 constraints properly.

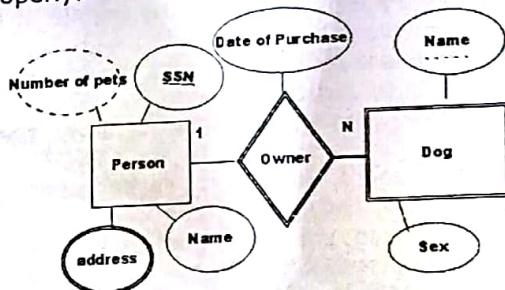


Fig. 3(b)

4. c) Illustrate with an example how to drop a collection using MongoDB. CO2 (05)
 a) What are the different considerations why designing schema in MongoDB? CO2 (07)
 b) What are the types of constraints violated by an insert operation? Give examples. CO2 (07)
 c) Draw an ER diagram for a hospital with a set of patients and a set of CO2 (06)
 doctors associate with each patient a log of the various tests and examinations conducted.

UNIT - III

5. a) Discuss the following Relational Algebra operations with examples: CO3 (06)
- i) Project
 - ii) Natural Join
 - iii) Rename.
- b) Discuss 3NF and BCNF. Which among them is strong and why? CO3 (06)
- c) Consider the following relations CO3 (08)
- SALESPERSON(SSN, Name, Start_Year, Dept_No)
TRIP(SSN, From_city, To_City, Departure_Date,
Return_Date,TRIP_ID)
EXPENSE(Trip_ID, Account#, Amount)
- i) List the expenses incurred by the salesperson named Nishal.
 - ii) List the trip details of department number 5.
 - iii) Count the trips taken by the salesperson named Nishal.
 - iv) List the trip_ids taken by the salesperson named Nishal to Bangalore.
6. a) Discuss with an appropriate syntax and example on how the MongoDB supports for the projection of data. CO3 (06)
- b) Discuss the informal design guidelines for relation schemas. CO3 (06)
- c) Consider the following relations: CO3 (08)
- Customer(Cust#, Cname, City)
Order(Order#, Odate, Cust#, Ord_Amt)
Order_Item(Order#, Item#, Qty)
Item(Item#, Unit_price)
Shipment(Order#, Warehouse#, Ship_Date)
Warehouse(Warehouse# City)
- Specify the following queries in Relational Algebra:
- i) Produce a listing of Custname, #oforders, Avg_Order_Amt
 - ii) List all the items shipped to all warehouses located in Bangalore.
 - iii) List the orders of customer named 'John' whose item's unit price is greater than 10,000 and is shipped to warehouse located in Bombay.

UNIT - IV

7. a) Why does not SQL eliminate duplicates in the results of the queries? CO4 (06)
How can the duplicates values be eliminated?
- b) What is a view and how is it defined? Discuss the problem that might arise when one attempts to update a view. CO4 (06)
- c) Consider the relationsscheme given below, answer the queries in SQL: CO4 (08)
- student (rollNo, name, degree, year, sex, deptNo, advisor)
department (deptId, name, hod, phone)
professor (empId, name, sex, startYear, deptNo, phone)
course (courseId, cname, credits, deptNo)
enrollment (rollNo, courseId, sem, year, grade)
teaching (empId, courseId, sem, year, classRoom)
preReq(preCourseId, courseId)
- i) Get the rollNo, name of students in the CSE dept (deptNo= 3)along with their advisor's name and phone number.
 - ii) Get the roll number and name of students whose gender is same as their advisor's.
 - iii) Obtain the department Id and name of departments that do not offer any 4 credit courses.

8. a) Discuss any six data types in SQL. CO4 (06)
b) Demonstrate the following operations with a suitable example, CO4 (06)
Update, Insert and Delete with select or sub select.
c) Consider the following tables: CO4 (08)
Sailors (sld: Integer, sname: string, rating: integer, age: real)
Boats (bld: Integer, bname: string, color: string)
Reserves (sld: Integer, bld: Integer, day: date)
Write SQL statements for the following queries:
I) Create the above tables by properly specifying the primary keys
and the foreign keys.
II) Alter the table Sailors with ALTER TABLE option to add the
following constraints
1. sname must be unique,
2. rating must be 1 to 10,
3. age must be less than 100
III) Compute increments for the ratings of persons who have sailed
two different boats on the same day.
IV) Find the age of the youngest sailor who is eligible to vote (i.e., at
least 18 years old) for each rating level with at least two such sailors.
- UNIT - V**
9. a) Explain the ACID properties of DBMS. CO5 (06)
b) Explain the lost update problem with an examples. CO5 (06)
c) Explain the three phases of recovery process. CO5 (08)
10. a) What are conflict equivalent and serializable schedules? Explain strict
2PL. CO5 (06)
b) Explain all the phases of ARIES algorithm. CO5 (06)
c) Explain the write-ahead log protocol.



MAKEUP EXAMINATIONS – MARCH 2017

Course & Branch : B.E.-Information Science & Engineering Semester : V
Subject : Digital Image Processing Max. Marks : 100
Subject Code : IS52A1 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT – I

1. a) What are the important components of an image processing system? CO1 (08)
 b) Explain any two important application areas where image processing CO1 (05)
 is important.
 c) Consider p and q as the pixels at coordinates (10, 12) and (15, 20) CO1 (07)
 respectively. Find out which distance measure gives the minimum
 distance between them.
2. a) Explain the formulation of digital image model by sampling and CO1 (06)
 quantization.
 b) Consider the image segment shown below. Let $V = \{0, 1\}$, compute CO1 (06)
 the length of the shortest 4, 8 and m-path between p and q.
 3 1 2 1 (q)
 2 2 0 2
 1 2 1 1
 (p)1 0 1 2
 c) Discuss the fundamental steps in digital image processing. CO1 (08)

UNIT – II

3. a) What is the difference between spatial domain and frequency domain CO2 (08)
 filtering? Compute the median value of the bold pixels shown below
 using a 3x3 mask.

$$\begin{bmatrix} 18 & 22 & 33 & 25 & 32 & 24 \\ 34 & \mathbf{28} & \mathbf{24} & 72 & 26 & 23 \\ 22 & 19 & 32 & 31 & 28 & 36 \end{bmatrix}$$

 b) Discuss image enhancement using arithmetic and logic operations. CO2 (04)
 c) Why smoothing is needed in image processing and what is its effect CO2 (08)
 on the image? Explain an ideal LPF and Butterworth LPF in the above
 context.
4. a) Perform histogram equalization of the image segment given below. CO2 (10)

$$\begin{array}{|c|c|c|c|c|} \hline 4 & 4 & 4 & 4 & 4 \\ \hline 3 & 4 & 5 & 4 & 3 \\ \hline 3 & 5 & 5 & 3 & 3 \\ \hline 3 & 4 & 5 & 4 & 3 \\ \hline 4 & 4 & 4 & 4 & 4 \\ \hline \end{array}$$

 b) Explain the homomorphic filtering approach for image enhancement. CO2 (10)

IS52A1

- UNIT - III**
5. a) What is Image segmentation? How is segmentation done using global thresholding? CO3 (10)
b) Discuss the concept of region based segmentation. CO3 (10)
6. a) What is the use of region descriptor? Discuss topological and texture descriptor. CO3 (10)
b) How is segmentation done by using region splitting and merging procedure? CO3 (10)
- UNIT - IV**
7. a) What is a pattern and pattern class? Discuss with an example the working of the minimum distance classifier. CO4 (10)
b) A source emits four symbols {a, b, c, d} with the probabilities 0.4, 0.2, 0.1, 0.3. Construct arithmetic coding to encode and decode the word 'dad'. CO4 (10)
8. a) Discuss how a Bayes classifier works for Gaussian pattern classes with an example. CO4 (10)
b) A source emits four symbols {a, b, c, d, e} with the probabilities 0.3, 0.2, 0.1, 0.3, 0.1. Construct Huffman coding to encode and decode the word 'bade'.
- UNIT - V**
9. a) Write the process of converting colors from RGB to HIS and vice-versa. CO5 (08)
b) Define morphological image processing? Explain dilation and erosion with an example. CO5 (06)
c) Discuss about thinning and thickening morphological algorithm. CO5 (06)
10. a) What are color models? Explain pseudocolor image processing. CO5 (08)
b) Explain the morphological image processing operation opening and closing with an example. CO5 (06)
c) Discuss about hit-or-miss transform. CO5 (06)

**MAKEUP EXAMINATIONS - FEBRUARY 2018**

Course & Branch : B.E.: Information Science & Engineering Semester : **V**
Subject : Natural Language Processing Max. Marks : **100**
Subject Code : IS52A4 Duration : **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) Explain briefly the test which Alan Turing has introduced in the paper he published in 1950. CO1 (07)
 b) Discuss the use of square bracket, caret and question mark in regular expressions. Give examples. CO1 (07)
 c) What are errors of commission and errors of omission? Given examples. CO1 (06)
2. a) Explain inflectional morphology with examples. CO1 (10)
 b) Design an algorithm for deterministic recognition of finite state automata. Explain and trace the algorithm on sheep language 'baaa!' CO1 (10)

UNIT- II

3. a) Consider the following table of bigram counts for 3 of the words (out of 1616 total word types) of corpus 10,000 sentences. Apply add-one smoothing technique to find the probability and the new count. (Unigram counts of: Today(3437), NLP(1215), exam(3256)). CO2 (10)

	Today	NLP	exam
Today	8	1087	0
NLP	3	0	786
exam	3	0	10

4. b) Explain how transformation-based rules are learned and applied with examples. CO2 (10)
4. a) What is real-word error detection? Distinguish between local and global errors with examples. CO2 (05)
 b) How good-turing technique is different from add-one smoothing? CO2 (10)
 Explain good turing smoothing.
 c) Explain the meaning of following code snippet with examples: CO2 (05)
ADVERBIAL-THAT RULE
 Given input: " that"
 if
 (+1 A/ADV/QUANT);
 (+2 SENT-LIM);
 (NOT -1 SVOC/A);
 then eliminate non-ADV tags
 else eliminate ADV tag

IS52A4

5. a) Explain how predictor and scanner work in the Earley algorithm with the code. **UNIT- III** CO3 (10)
b) Discuss the unification operation considering the different cases. CO3 (10)
6. a) List the common sample lexicon grammar rules and construct the parse tree for "I prefer a morning flight" using them. CO3 (07)
b) Discuss the four types of sentence-level structures. Give examples. CO3 (09)
c) Draw a directed acyclic graph for the sentence Book that flight by considering the following productions: CO3 (04)
 $S \rightarrow .VP, [0,0], NP \rightarrow Det. Nominal, [1,2], VP \rightarrow V NP., [0,3]$
7. a) Give FOPC translations for the following sentences: **UNIT- IV** CO4 (06)
i. Vegetarians do not eat meat.
ii. Not all vegetarians eat eggs.
- b) Discuss on quantifiers with suitable examples. CO4 (06)
- c) Explain forward and backward chaining with examples. CO4 (08)
8. a) Explain with examples the elements of first order predicate calculus. CO4 (09)
b) Discuss the problems of probability context free grammar. CO4 (06)
c) How time is represented in PCFG? Explain. CO4 (05)
9. a) Explain syntactic transformations in machine translation with examples. **UNIT- V** CO5 (12)
b) Discuss on noun relations in WordNet. CO5 (08)
10. a) Explain inference based resolution algorithm. CO5 (12)
b) Write the discourse structure of the below passage: CO5 (08)
 - John went to the bank to deposit his paycheck.
 - He then took a train to Bill's car dealership.
 - He needed to buy a car.
 - The company he works for now is not near any public transportation.

**MAKEUP EXAMINATIONS - FEBRUARY 2018**

Course & Branch : B.E.: Information Science & Engineering **Semester :** V
Subject : Operation Research **Max. Marks :** 100
Subject Code : IS532 **Duration :** 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) A company making cool drinks has 2 bottling plants located at towns T1 and T2. Each plant produces 3 drinks A, B and C and their production capacity per day is given in the table. CO1 (10)

Cool drinks	Plant at	
	T1	T2
A	6000	2000
B	1000	2500
C	3000	3000

The marketing department of the company forecasts a demand of 80000 bottles of A, 22000 bottles of B and 40000 bottles of C during the month of June. The operating cost per day of plants at T1 and T2 are Rs. 6000 and Rs. 4000 respectively. Find graphically the number of days for which each plants must be run in June so as to minimize the operating cost while meeting the market demand.

- b) Discuss the phases of OR in detail. CO1 (10)
2. a) A farmer cultivates tomato, carrot and potato in his farm of area 100 acres. Average yield per acre is 2000Kgs of tomato, 2000 Kgs of carrot and 1000 Kgs of potato. The cost of the fertilizer is Rs 3 per kg and the requirement of fertilizer is 100 Kgs each for tomato, carrot, and 60 Kgs for potato per acre. Labour required is 5 man-days for tomatoes and potatoes and 6 man-days for carrot per acre. A total of 400 man-days are available at Rs 60 per man-day. Formulate this problem as a LPP to maximize the farmer's profit if he can sell the items at Rs 5 per kg for tomato, Rs 8 per Kg for carrot and Rs 10 per Kg for potato. CO1 (10)

- b) (i) Solve the following LPP graphically CO1 (10)

$$\text{Maximum } Z = 6x_1 + 9x_2$$

$$\text{Subject to } x_1 + x_2 \leq 512$$

$$x_1 + 5x_2 \leq 45$$

$$3x_1 + x_2 \leq 30 \quad x_1, x_2 \geq 0$$

- (ii) What are the characteristics of OR?

UNIT- II

3. a) Express the following LP problem in standard form: CO2 (05)

$$\text{Min } z = x_1 - 2x_2 + x_3$$

$$\text{Subject to constraints}$$

$$2x_1 + 3x_2 + 4x_3 \geq -4; 3x_1 + 5x_2 + 2x_3 \geq 7;$$

$$x_1 \geq 0, x_2 \geq 0 \text{ and } x_3 \text{ is unrestricted in sign.}$$

- b) Consider the following problem.

Minimize $Z = 3x_1 + 2x_2$,
subject to

$$\begin{aligned} 2x_1 + x_2 &\geq 10 \\ -3x_1 + 2x_2 &\leq 6 \\ x_1 + x_2 &\geq 6 \end{aligned}$$

and

$$x_1 \geq 0, \quad x_2 \geq 0.$$

Using the Big M method, construct the complete first simplex tableau for the Simplex method and identify the corresponding initial (artificial) BF solution. Also identify the initial entering basic variable and the leaving basic variable.

- c) Solve the following LPP:

$$\text{Max } z = 2x_1 + x_2$$

Subjected to constraints

$$4x_1 + 3x_2 \leq 12, \quad 4x_1 + x_2 \leq 8, \quad 4x_1 - x_2 \leq 8 \text{ and } x_1 \geq 0, \quad x_2 \geq 0. \text{ Does the degeneracy occur in this problem?}$$

4. a) Consider the following problem.

$$\text{Maximize } Z = x_1 + 2x_2$$

subject to

$$x_1 + 3x_2 \leq 8 \text{ (resource 1)}$$

$$x_1 + x_2 \leq 4 \text{ (resource 3)}$$

and

$$x_1 \geq 0, \quad x_2 \geq 0$$

Work through the algebraic method to solve the above model.

- b) Solve the following LP problem using Two phase method

$$\text{Min } z = x_1 + x_2$$

Subjected to constraints

$$2x_1 + x_2 \geq 4; \quad x_1 + 7x_2 \geq 7; \text{ and } x_1 \geq 0, x_2 \geq 0.$$

- c) For the following LPP

$$\text{Max } z = 5x_1 + 4x_2$$

Subjected to constraints

$$6x_1 + 4x_2 \leq 24; \quad x_1 + 2x_2 \leq 6, \quad -x_1 + x_2 \leq 1, \quad x_2 \leq 2; \text{ and } x_1 \geq 0, x_2 \geq 0.$$

[x_1 =Tons produced daily of exterior paint; x_2 =Tons produced daily of interior paint]

- Determine the range for the ratio of the unit revenue of exterior point to the unit revenue of interior paint.
- If the revenue per ton of exterior paint remains constant at \$5 (in thousands) per ton, determine the maximum unit revenue of interior paint that will keep the present optimum solution unchanged.

UNIT- III

5. a) State the general rules for converting any primal LPP into its dual.

- b) Use dual simplex method to solve

$$\text{Min } z = 3x_1 + x_2$$

Subjected to constraints

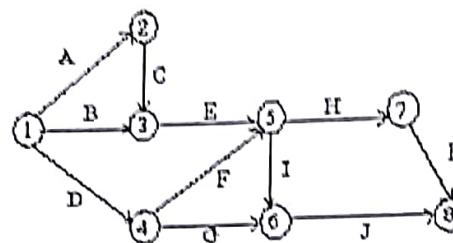
$$x_1 + x_2 \geq 1; \quad 2x_1 + 3x_2 \geq 2; \text{ and } x_1, x_2 \geq 0.$$

- b) For the game with payoff matrix

		Player B		
		B1	B2	B3
Player A	A1	-1	2	-3
	A2	6	4	-6

Determine the optimal strategies for players A and B. Also determine the value of game. Is this game i)fair ii)strictly determinable?

6. a) Give the dual of the LP problem:
 $\text{Min } z = 2x_1 + 3x_2 + 4x_3$
 Subjected to constraints
 $2x_1 + 3x_2 + 5x_3 \geq 2; 3x_1 + x_2 + 7x_3 = 3; x_1 + 4x_2 + 6x_3 \leq 5, x_1, x_2 \geq 0$ and x_3 is unrestricted. CO3 (06)
- b) Use dual simplex method to solve:
 $\text{Max } z = -2x_1 - x_3$
 Subjected to constraints
 $x_1 + x_2 - x_3 \geq 5; x_1 - 2x_2 - 4x_3 \geq 8$; and $x_1, x_2, x_3 \geq 0$. CO3 (09)
- c) Define the following:
 i) Competitive game ii) Payoff matrix iii) Two person, zero sum game. CO3 (05)
- UNIT- IV**
7. a) Calculate the variance and expected time for each activity, find also the critical path and time to complete the project. CO4 (10)



Task:	A	B	C	D	E	F	G	H	I	J	K
Least time:	4	5	8	2	4	6	8	5	3	5	6
Greatest time:	8	10	12	7	10	15	16	9	7	11	13
Most likely time:	5	7	11	3	7	9	12	6	5	8	9

- b) The following table contains information related to the major activities of a research project. Use the information to do the following: (i) Draw a precedence network diagram. (ii) Find the critical path by identifying all the start to end paths and calculating their lengths. (iii) What is the expected duration of the project? CO4 (10)

Activity	Immediate Predecessor(s)	Expected Duration (days)
A.....	—	5
C.....	A	8
D.....	C	2
B.....	A	7
E.....	—	3
F.....	E	6
I.....	B, D	10
M.....	F	8
G.....	—	1
H.....	G	2
K.....	H	17

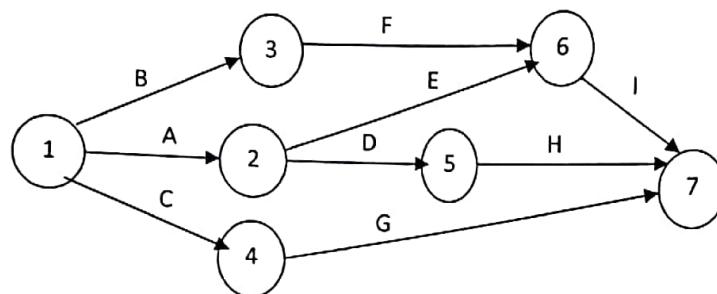
8. a) A project has the following times schedule:

Activity	Times in weeks	Activity	Times in weeks
(1 - 2)	4	(5 - 7)	8
(1 - 3)	1	(6 - 8)	1
(2 - 4)	1	(7 - 8)	2
(3 - 4)	1	(8 - 9)	1
(3 - 5)	6	(8 - 10)	8
(4 - 9)	5	(9 - 10)	7
(5 - 6)	4		

Construct the network and compute:

- T_E and T_L for each event
- Float for each activity
- Critical path and its duration.

- b) A project is represented by the network shown below and has the CO4 (10) following data:



Task : A B C D E F G H I

Least time: 5 18 26 16 15 6 7 7 3

Greatest time :10 22 40 20 25 12 12 7 5

Most likely time:8 20 33 18 20 9 10 8 4

Determine the following: i) Expected task time and standard deviation for each activity ii) The critical path.

UNIT- V

9. a) Find an optimal solution for the following transportation problem after using Vogel's Approximation method to find the initial basic feasible solution:

CO5 (10)

	W ₁	W ₂	W ₃	W ₄	Availability
F ₁	19	30	50	10	7
F ₂	70	30	40	60	9
F ₃	40	8	70	20	18
Requirement	5	8	7	14	

- b) Solve the following Assignment problem:

	I	II	III	IV
A	9	14	19	15
B	7	17	20	19
C	9	18	21	18
D	10	12	18	19
E	10	15	21	16

CO5 (10)

10. a) A company has 3 plants at locations A, B, C, which supply to warehouses located at D, E, F G, and H. Monthly plant capacities are 800, 500 and 900 units respectively. Monthly warehouse requirements are 400, 400, 500, 400 and 800 units respectively. Unit transportation costs (in Rs) are given below. Find the optimum solution (use lowest cost method to find IBFS)

CO5 (12)

	D	E	F	G	H
A	5	8	6	6	3
B	4	7	7	6	4
C	8	4	6	6	5

- b) Solve the following Assignment problem to minimize the cost:

CO5 (08)

$$\begin{array}{c} S1 \quad S2 \quad S3 \quad S4 \quad S5 \\ \left[\begin{array}{ccccc} B1 & 4 & 6 & 7 & 5 & 11 \\ B2 & 7 & 3 & 6 & 9 & 5 \\ B3 & 8 & 5 & 4 & 6 & 9 \\ B4 & 9 & 12 & 7 & 11 & 10 \\ B5 & 7 & 5 & 9 & 8 & 11 \end{array} \right] \end{array}$$

**MAKEUP EXAMINATIONS - FEBRUARY 2018**

Course & Branch : B.E.: Information Science & Engineering Semester : V
Subject : Digital Image Processing Max. Marks : 100
Subject Code : IS52A1 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) What is a digital image? With a neat diagram explain the image formation model. CO1 (10)
 b) Let p and q be the pixels at coordinates (5,5) and (10,5) respectively. Find out which distance measure gives the minimum distance between the pixels. CO1 (10)
2. a) Explain with a neat diagram, the procedure for processing the input image. CO1 (10)
 b) Consider the image segment shown. Let $V=\{2, 3, 4\}$ and compute the lengths of the shortest 4-, 8- and m-path between p and q . CO1 (10)

3	4	1	2	0
0	1	0	4	2
2	2	3	1	4
3	0	4	2	1
1	2	0	3	4

(p) (q)

UNIT- II

3. a) Explain histogram specification method for image enhancement. CO2 (10)
 b) Explain how homomorphic filtering can be used for dynamic range compression and contrast enhancement. CO2 (10)
4. a) Perform histogram equalization on the image segment given below. CO2 (10)
- | | | | | |
|---|---|---|---|---|
| 6 | 4 | 4 | 5 | 4 |
| 2 | 5 | 5 | 4 | 6 |
| 3 | 5 | 5 | 5 | 3 |
| 3 | 4 | 5 | 4 | 4 |
| 4 | 6 | 5 | 5 | 5 |
- b) What is image sharpening? Explain how sharpening of an image can be achieved in frequency domain. CO2 (10)

UNIT- III

5. a) What is global threshold? How is it different from local threshold? Analyze the effect of image smoothing and edge usage on global thresholding. CO3 (10)
 b) What is image segmentation? Write a procedure for extracting the region of interest using region growing algorithm and mention the drawbacks of this method. CO3 (10)
6. a) Differentiate between boundary and regional descriptors. Explain the constraints to be satisfied by the pixels in minimum perimeter polygon approximation algorithm. CO3 (10)

IS52A1

CO3 (10)

- b) Explain in detail the following Regional descriptors:
i) Simple Regional Descriptors
ii) Topological Descriptors.

UNIT- IV

7. a) A source emits letters from an alphabet $A=\{a_1, a_2, a_3, a_4, a_5\}$ with probabilities $P(a_1)=0.3$, $P(a_2)=0.4$, $P(a_3)=0.15$, $P(a_4)=0.05$ and $P(a_5)=0.1$.
i) Find Huffman code for this source
ii) Find average length of the code.

CO3 (10)

- b) What is image compression? Discuss in detail three principal types of data redundancies.

CO1 (10)

8. a) What is an image compression system model?. Draw the block diagram and explain functions of its components.
b) Consider the two training sets: class $w_1=\{(0,0,1)^T, (0,1,1)^T\}$, class $w_2=\{(1,0,1)^T, (1,1,1)^T\}$. Apply the training algorithm for these linearly separable training set and obtain the solution vector.

CO1 (10)

CO3 (10)

9. a) Define the following with an example for each considering morphological image processing:
i) erosion ii) dilation iii) opening iv) closing.
b) Highlight the importance of morphological image processing. Explain morphological opening and closing operations along with its properties.

CO1 (10)

CO3 (10)

10. a) Differentiate between the following with respect to color image processing:
i) Gray level and color image
ii) Hue and saturation
iii) RGB and HIS color models.
b) How an RGB model is represented using HSI format? Describe the transformation.

CO1 (10)

CO3 (10)

**SEMESTER END EXAMINATIONS - JANUARY 2018**

Course & Branch : B.E.: Information Science & Engineering Semester : V
 Subject : Digital Image Processing Max. Marks : 100
 Subject Code : IS52A1 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT-I

1. a) What is digital image processing? Explain any three applications of it in detail. CO1 (10)
 b) Explain how to compute 4, 8 and m path between p and q. Consider p and q as the pixels at coordinates (8, 9) and (10, 12) respectively. Find out which distance measure gives the minimum distance between them. CO1 (10)
2. a) Explain the sampling and quantization process. CO1 (06)
 b) Consider the image segment shown below. Let $V = \{1, 2\}$, compute the length of the shortest 4, 8 and m-path between p and q. CO1 (06)

3	1	2	1	(q)
2	2	0	2	
1	2	1	1	
(p)	1	0	1	2
- c) Discuss the components of a general purpose image processing system. CO1 (08)

UNIT-II

3. a) What is the difference between spatial and frequency domain filtering? Compute the median value of the bold pixels shown below using a 3×3 mask. CO2 (10)

18	22	33	25	32	24
34	28	24	72	26	23
22	19	32	31	28	36
- b) Explain the mechanics and usefulness of spatial filtering. Write the procedure for image sharpening using high boost filtering. CO2 (10)
4. a) Consider 64×64 image whose histogram is given in the table below (col: 1-3). Transform this histogram so that it will have the values specified in the 4th column of the table. CO2 (10)

r_k	n_k	$P_r(r_k)$	$P_z(z_k)$
$r_0=0$	790	0.19	0.00
$r_1=1$	1023	0.25	0.00
$r_2=2$	850	0.21	0.00
$r_3=3$	656	0.16	0.15
$r_4=4$	329	0.08	0.20
$r_5=5$	245	0.06	0.30
$r_6=6$	122	0.03	0.20
$r_7=7$	81	0.02	0.15
- b) Describe how Homomorphic filtering is used to separate illumination and reflectance component CO2 (10)

UNIT- III

5. a) Differentiate between the following:
i) Variable thresholding and Adaptive thresholding
ii) Chain codes and shape numbers
iii) Robert and Sobel operators.
b) What are the properties of image gradient? Explain the edge detection process using the following gradient operators:
i) Roberts operator
ii) Prewitt operators
iii) Sobel operators. CO1 (10)
6. a) Define the following with respect to image thresholding:
i) Intensity thresholding
ii) Global Thresholding
iii) Variable Thresholding
iv) Adaptive thresholding
v) Multiple thresholding.
b) Explain the minimum perimeter polygon algorithm for boundary representation. CO3 (10)

UNIT- IV

7. a) Given set of symbols $a_1 = 0.1$, $a_2 = 0.4$, $a_3 = 0.06$, $a_4 = 0.1$, $a_5 = 0.04$, $a_6 = 0.3$, develop Huffman codes for these symbols and find the compression ratio. CO4 (10)
b) With the help of block diagram explain lossy predictive coding. CO4 (10)
8. a) For a given simple dictionary generate LZW code for a given string.
A B A B B A B C A B A B B A
Code 123
String A B C.
b) Discuss the digital water marking techniques. CO4 (10)

UNIT-V

9. a) What is image morphology? Write the morphological algorithms for the following:
i) Thinning ii) Thickening.
b) Using appropriate examples, discuss dilation, erosion, opening and closing operations in morphological image processing. CO3 (10) CO3 (10)
10. a) What is color image processing? Explain the working of the following techniques with respect to color images.
i) color image segmentation
ii) color histogram processing.
b) Explain CMY and CMYK color models along with their applications.
***** CO3 (10)



MAKEUP EXAMINATIONS - MARCH 2017

Course & Branch : B.E.-Information Science & Engineering **Semester :** V
Subject : Digital Image Processing **Max. Marks :** 100
Subject Code : IS52A1 **Duration :** 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) What are the important components of an image processing system? CO1 (08)
b) Explain any two important application areas where image processing is important. CO1 (05)
c) Consider p and q as the pixels at coordinates (10, 12) and (15, 20) respectively. Find out which distance measure gives the minimum distance between them. CO1 (07)
2. a) Explain the formulation of digital image model by sampling and quantization. CO1 (06)
b) Consider the image segment shown below. Let $V = \{0, 1\}$, compute the length of the shortest 4, 8 and m-path between p and q.
3 1 2 1 (q)
2 2 0 2
1 2 1 1
(p)1 0 1 2
c) Discuss the fundamental steps in digital image processing. CO1 (08)

UNIT - II

3. a) What is the difference between spatial domain and frequency domain filtering? Compute the median value of the bold pixels shown below using a 3×3 mask. CO2 (08)
$$\begin{bmatrix} 18 & 22 & 33 & 25 & 32 & 21 \\ 34 & 28 & 24 & 72 & 26 & 23 \\ 22 & 19 & 32 & 31 & 28 & 36 \end{bmatrix}$$

b) Discuss image enhancement using arithmetic and logic operations. CO2 (04)
c) Why smoothing is needed in image processing and what is its effect on the image? Explain an ideal LPF and Butterworth LPF in the above context. CO2 (08)
4. a) Perform histogram equalization of the image segment given below. CO2 (10)
$$\begin{array}{|c|c|c|c|} \hline 4 & 4 & 4 & 4 \\ \hline 3 & 4 & 5 & 4 \\ \hline 3 & 5 & 5 & 3 \\ \hline 3 & 4 & 5 & 4 \\ \hline 4 & 4 & 4 & 4 \\ \hline \end{array}$$

b) Explain the homomorphic filtering approach for image enhancement. CO2 (10)

- UNIT - III**
5. a) What is image segmentation? How is segmentation done using global thresholding? CO3 (10)
b) Discuss the concept of region based segmentation. CO3 (10)

6. a) What is the use of region descriptor? Discuss topological and texture descriptor. CO3 (10)
b) How is segmentation done by using region splitting and merging procedure? CO3 (10)

- UNIT - IV**
7. a) What is a pattern and pattern class? Discuss with an example the working of the minimum distance classifier. CO4 (10)
b) A source emits four symbols $\{a, b, c, d\}$ with the probabilities 0.4, 0.2, 0.1, 0.3. Construct arithmetic coding to encode and decode the word 'dad'. CO4 (10)
8. a) Discuss how a Bayes classifier works for Gaussian pattern classes with an example. CO4 (10)
b) A source emits four symbols $\{a, b, c, d, e\}$ with the probabilities 0.3, 0.2, 0.1, 0.3, 0.1. Construct Huffman coding to encode and decode the word 'bade'. CO4 (10)

- UNIT - V**
9. a) Write the process of converting colors from RGB to HIS and vice-versa. CO5 (08)
b) Define morphological image processing? Explain dilation and erosion with an example. CO5 (06)
c) Discuss about thinning and thickening morphological algorithm. CO5 (06)
10. a) What are color models? Explain pseudocolor image processing. CO5 (08)
b) Explain the morphological image processing operation opening and closing with an example. CO5 (06)
c) Discuss about hit-or-miss transform. CO5 (06)

SEMESTER END EXAMINATIONS - JANUARY 2017

Course & Branch : B.E.-Information Science & Engineering Semester : V
Subject : Digital Image Processing Max. Marks : 100
Subject Code : IS52A1 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) What is digital image processing? Explain in detail any two applications CO1 (10) of digital image processing.
b) Consider the image segment shown. Let $V=\{0, 1, 2\}$ and compute the CO2 (10) lengths of the shortest 4-, 8- and m-path between p and q.

3	4	1	2	0
0	1	0	4	2
2	2	3	1	4
3	0	4	2	1
1	2	0	3	4

(p)

(q)

- 2 a) With the help of a neat block diagram explain the components of a CO1 (10) general purpose image processing system.
b) Consider the two image subsets, S1 and S2 shown in the following CO2 (10) figure. For $V= \{1\}$, determine whether these two subsets are
(i) 4-adjacent (ii) 8-adjacent (iii) m-adjacent.

S1					S2				
0	0	0	0	0	0	0	1	1	0
1	0	0	1	0	0	1	0	0	1
1	0	0	1	0	1	1	0	0	0
0	0	1	1	1	0	1	0	0	0
0	0	1	1	1	0	0	1	1	1

UNIT - II

3. a) Consider 8-level gray scale image of size 8X8 shown below. Compute CO2 (10) histogram of the given image and perform histogram equalization. Display the histograms graphically.

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

- b) Highlight the importance of histogram specification. Explain the CO3 (10) procedure used to transform the histogram of the input image to the specified-histogram.

4. a) What are smoothing spatial filters? Consider the 5x5 Image shown below. Apply the 3x3 mean filter on the given image to smoothen the image.

0	0	9	9	9
0	0	9	9	9
0	0	9	9	9
0	0	9	9	9
0	0	9	9	9

Image

1	1	1
1	1	1
1	1	1

Filter

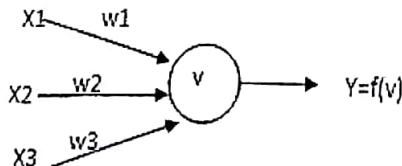
- b) What is the need of image transformation to the frequency domain? Explain the working principle as well as effect of the following frequency-domain filters.
- Ideal low pass filter
 - Butterworth low pass filter
 - Gaussian low pass filter.

UNIT - III

5. a) What is image gradient? Describe gradient operators based edge detection method with necessary masks and equations.
- b) Explain Otsu's algorithm for image thresholding. Discuss in brief any two applications where this algorithm can be used.
6. a) Why image representation and description are necessary? How Fourier descriptors can be derived to region boundary? Explain.
- b) What is the goal of polygonal approximation? Write minimum perimeter polygon algorithm for boundary representation.

UNIT - IV

7. a) How is an object recognized in an image? Explain the working principle of the following classifiers.
- Neural network classifier
 - Minimum distance classifier.
- b) What are patterns and pattern classes? Below is the diagram of a single neuron.



The node has 3 inputs $X=(x_1, x_2, x_3)$ that receive only binary signals (0/1). The weights corresponding to the inputs have the following values: $w_1=2$, $w_2=-4$, $w_3=1$. The activation function is given as

$$f(v) = \begin{cases} 1 & \text{if } v >= 0 \\ 0 & \text{otherwise} \end{cases}$$

- How many different input patterns can this node receive?
- Give a formula that computes the number of binary input patterns for a given number of inputs.
- Calculate what will be the output value 'y' of the unit for each of the following input patterns.

Pattern	P1	P2	P3	P4
X1	1	0	1	1
X2	0	1	0	1
X3	0	1	1	1

8. a) What is digital water marking? Explain with a neat diagram the process CO1 (10)
 b) Explain the working of arithmetic coding compression technique. A source emits four symbols{a, b, c,d} with the probabilities{0.4, 0.2, 0.1, 0.3} respectively. Construct arithmetic codes to encode and decode the word 'dad'
9. a) Explain in detail RGB and HSI color models used in color image processing. **UNIT - V** CO1 (10)
 b) Write the steps involved in converting colors from RGB to HIS color model and vice-versa. Given (R, G, B)=(0.683, 0.1608, 0.1922) convert this into HIS model. CO2 (10)
10. a) What is morphological image processing? Explain with an example the following morphological operations: CO1 (10)
 i) Thickening
 ii) Thinning
 iii) Hole filling.
 b) Highlight the importance of morphological erosion and dilation. CO2 (10)
 Consider the MXN image. Perform the morphological erosion and dilation using the given structuring element(SE).

1	0	1	1	0	0
0	1	1	1	0	1
0	1	1	1	1	0
0	1	1	1	1	0
1	1	0	1	0	0
1	0	0	0	0	0

Image

0	1	0
1	1	1
0	1	0

SE

**SEMESTER END EXAMINATIONS – JANUARY 2018**

Course & Branch : B.E.: Information Science & Engineering Semester : V
Subject : Operating Systems Max. Marks : 100
Subject Code : IS632/IS514/IS545 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) List and Explain the services provided by an operating systems that are designed to make using computer systems more convenient to the users. CO1 (10)
b) What is a process? Write a state diagram, explain states of a process. Also write the structure of Process control block. CO1 (10)
2. a) List the Operating system responsibilities in connection with process management and memory management. CO1 (08)
b) What is CPU scheduler? Consider the 4 jobs with (arrival Time , burst time) as (0,5) (0.2,2) (0.6,8) (1.2,4).Find the Gantt chart , average turnaround time and waiting time for the jobs using FCFS,SJF and RR(quantum=10msec) CO1 (12)

UNIT - II

3. a) Define mutual exclusion and critical section. Write the software solution for 2 – process synchronization. CO2 (07)
b) Explain the solution to dining philosopher problem using monitors. CO2 (06)
c) What is a semaphore? Explain how it can be used to solve the producer – consumer problem. CO2 (07)
4. a) Explain Banker's algorithm for the deadlock avoidance. CO2 (10)
b) Explain critical section problem. List and explain the requirements to be met by a solution to critical section problem. CO2 (06)
c) What is synchronization? Explain synchronization hardware. CO2 (04)

UNIT - III

5. a) What is Dynamic storage allocation? Explain the commonly used strategies for dynamic storage allocation. CO3 (12)
b) Consider the following reference string:
7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1 Assuming the frames, all initially empty, how many page faults would occur for :
i) LRU
ii) FIFO replacement algorithms? Which of the algorithms is more efficient in this case?

IS632/IS514/IS545

6. a) Explain the internal and external fragmentation problem encountered in contiguous memory allocation with an example. CO3 (07)
- b) What is page fault? Explain with a neat diagram the steps in handling the page fault. CO3 (08)
- c) Explain the process of mapping logical address to physical address in segmentation. CO3 (05)
7. a) How does the modern operating system concurrently support multiple types of file system? Explain its implementation in detail. CO4 (10)
- b) List the common file types along with its extensions and functions. CO4 (10)
8. a) What do you mean by free space list? With suitable examples, explain any two methods of implementation of a free space list. CO4 (08)
- b) What are the major methods used for allocating a disk space? Explain each with suitable examples. CO4 (12)
9. a) Discuss how memory management is dealt in LINUX operating system. CO5 (10)
- b) Explain the different system components of LINUX operating system. CO5 (10)
10. a) Discuss the interprocess communication facility in LINUX operating system. CO5 (08)
- b) Briefly explain Processes and Threads. CO5 (06)
- c) Describe the access Matrix model used for protection in a computer system. CO5 (06)



SEMESTER END EXAMINATIONS – JANUARY 2018

Course & Branch : B.E.: Information Science & Engineering Semester : V
Subject : Intellectual Property Rights Max. Marks : 100
Subject Code : IS523 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) State the need and importance of various forms of IPR. CO1 (10)
 b) Should India remain or move out of WIPO? Debate. CO1 (10)
2. a) Explain the main features of the TRIPS agreement. CO1 (10)
 b) What are the avenues available for countries to protect their self CO1 (10)
 interest in the international policy regime of IPR?

UNIT- II

3. a) How do you protect patent rights from infringement? CO2 (10)
 b) Justify whether the following can be patented in India:
 - Fan with light.
 - Mechanical car cleaning device.
 - Pizza with health benefits.
 - New star near plato.
 - App which auto-dials ambulance on emergency.
4. a) Explain the procedure for obtaining a patent. CO2 (10)
 b) Justify whether the following can be patented in India:
 - Electric perfume sprayer.
 - Smart Drainage block detector.
 - New form of salsa dance.
 - Massage technique to relieve back pain.
 - Self driving cars.

UNIT- III

5. a) Give the need of registering a trademark. Discuss the procedure of CO3 (10)
 trademark registration.
 b) How a trademark differs from a brand name? Give the functions of a CO3 (10)
 trademark.
6. a) Justify whether the following can obtain trademark in India CO3 (10)
 - International Gas Stove Repairs
 - Super Detergent Powder
 - Gandhi Khadi Dresses
 - Sachin Sports Gear
 - Vivian Explorers.
- b) How is a Trademark is acquired? What are the grounds for refusal of CO3 (10)
 trademark registration?

UNIT- IV

7. a) Explain the Infringement of copyright and the available legal recourse CO4 (10)
in India. CO4 (10)
- b) Justify whether the following can obtain copyright in India:
• Remake of a hollywood movie in hIndi.
• Screenplay of a film.
• Sequence Diagrams.
• Project Management Plan.
• Costume Designs.
8. a) Copyright is better than patent for protecting software - Debate. CO4 (10)
b) Justify whether the following can obtain copyright in India CO4 (10)
• Map of a city.
• Blueprint of a building.
• Layout Design of an embedded system.
• Deployment Diagrams.
• Use Case Diagrams.
9. a) Mention the salient points of IT ACT 2000. CO5 (10)
b) What is software licensing? How proprietary software uses this to CO5 (10)
restrict users?
10. a) What are the alternatives for proprietary licenses available in India? CO5 (10)
b) What are the options for protecting Intellectual Property in CO5 (10)
e-commerce?



MAKEUP EXAMINATIONS – FEBRUARY 2018

Course & Branch : B.E.: Information Science & Engineering Semester : V
Subject : Intellectual Property Rights Max. Marks : 100
Subject Code : IS523 Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) List the main activities of WIPO and how did originate? CO1 (10)
b) How can IPR laws be made more proactive than reactive? Explain with CO1 (10) examples.
2. a) Briefly explain with an example any five different forms of IPR. CO1 (10)
b) Justify why engineers should have a knowledge of IPR laws with CO1 (10) specific examples.

UNIT- II

3. a) What is a Patent? Discuss the criteria of patentability in India. CO2 (10)
b) Briefly describe the provisional and complete specification. CO2 (10)
4. a) Explain briefly Opposition proceedings to grant of patent. CO2 (10)
b) Discuss the inventions which are not patentable. CO2 (10)

UNIT- III

5. a) With a neat flow chart explain the process of trademarks prosecution in CO3 (10) India.
b) Justify whether the following can obtain trademark in India CO3 (10)
 - Shaadi Mubarak Flower Decorators
 - Garama Garam Tea products
 - Fruitsy Juices
 - Ram Rahim Bags
 - We will do it (slogan of a political party)
6. a) Can a company register a single trademark across different categories? CO3 (10)
Explain with the relevant procedure.
b) Justify whether the following can obtain trademark in India: CO3 (10)
 - New aroma of a perfume
 - Sparkle dish cleaner
 - Nehru Coat
 - Vizard bats
 - Champion cooker.

UNIT- IV

7. a) Write a note on 'copyright as fair play to the author'. CO4 (10)
b) Justify whether the following can obtain copyright in India CO4 (10)
- Flowchart for a program.
 - Pseudo Code of an app.
 - Lyrics of a song.
 - Portrait painting of a baby.
 - Shape of a footwear.
8. a) Briefly explain the scope of copyright law. CO4 (10)
b) Justify whether the following can obtain copyright in India CO4 (10)
- Timetable for exams.
 - Question papers.
 - Wedding invitation.
 - Class Diagrams.
 - Selfie.

UNIT - V

9. a) What are the alternatives for proprietary licenses available in India? CO5 (10)
b) How do licenses like GPL help developers to legally distribution of software. CO5 (10)
10. a) Explain 'Copyleft' and describe how it can be used to effectively protect software. CO5 (10)
b) What are the options for protecting Intellectual Property in e-commerce? CO5 (10)
