(b) Convert above (3(a)) EER diagram into relational Model (4 Marks)

4. [C212.4] Consider a database consisting of following tables. Primary keys are underlined.

Employee (Emp_no, Emp_name, Emp_sal, Dept_no, City, Emp_hiredate)

Fixed_Deposit (Acoount_no, Emp_no, Branch_name, Amount, Date)

Investment (Ino, Emp_no, Branch_name, Amount)

Answer the following queries using MySQL.

(a) Change the Dept_no to "15" where second character of the Emp_name is 'd'. **[1 Mark]**

(b) Give name of employees who have both investment and fixed deposits and are living in city 'Delhi' **[1 marks]**

(c) List the name of the branch having highest number of fixed deposits **[2 Marks]**

(d) Create a query to display the name and hire date of any employee hired after employee "Pradeep" **[2 Marks]**

(e) Give name of employees living in the same city where maximum fixed deposits are located **[2 Marks]**

POSSESION OF MOBILES IN EXAM IS UFM PRACTICE.

Name Himanshu Dixit **Enrollment No.** 21103262

Jaypee Institute of Information Technology, Noida
T1 Examination, 2022
B.Tech. III[rd] Semester

Course Title: Database System and Web **Maximum Time: 1 Hour**
Course Code: 15B11CI312 **Maximum Marks: 20**

After pursuing the above course, students will be able to:

C212.1	Explain the basic concepts of Database Systems and Web components
C212.2	Model the real world systems using entity relationship diagrams and convert the ER model into relational logical schema using various mapping algorithms
C212.3	Develop a simple web application with client and server scripting using Javascript and PHP and connect with a given relational database
C212.4	Make use of SQL commands and relational algebra expressions for query processing
C212.5	Simplify databases using normalization process based on identified keys and functional dependencies.
C212.6	Solve the atomicity, consistency, isolation, durability, transaction and concurrency related issues of databases

Note: All questions are compulsory.

1. **[C212.1]** Consider the table: Book (ISBN, Name, Author, Year, Publisher). Explain the following using above table as an example.

   (a) Different levels of Abstraction

   (b) Schema and Instance **[2 Marks]**

2. **[C212.1]** **(a)** Consider relation TwoBrothers (older, younger) consisting of tuples of the form (o, y) where "o" is older than "y" . Can the first attribute i.e, older brother can be candidate key of the relation? Justify your answer. **[1 Mark]**

   (b) Why disjoint and overlapping constraint are needed? Explain when disjoint constraint should be used. **[1 Mark]**

3. **[C212.2]** **(a)** Indian Ocean band is an orchestra that plays different types of concerts. Due to their popularity they are starting to have problems to keep track of musicians that should play in each concert. In order to solve their issues a database model needs to be created so that the orchestra can keep track of both musicians an musical works. The database models must represent following points.

   - The orchestra play three types of concerts: devotional concerts, private parties, and outdoor concerts
   - The orchestra plays three types of music: classical, popular and Indian folk.
   - For each musical work, musician requires some instruments to play the work.
   - The database should store information for each concert. The information should include the place, date and time of the concert as well as type of concert.
   - For each musician in the orchestra , the model should store his/her name, the instrument that he/she plays and the concert in which he/she participates.

   Draw an EER diagram for the orchestra database showing all types of constraints and state any assumptions made.

   [4 Marks]

POSSESION OF MOBILES IN EXAM IS UFM PRACTICE.

Name Himanshu Dixit **Enrollment No.** 21103262

Jaypee Institute of Information Technology, Noida
T1 Examination, 2022
B.Tech, ODD Semester

Course Title: DATA STRUCTURES
Course Code: 15B11CI311
Maximum Time: 1 HR
Maximum Marks: 20

[CO1]Explain abstract data types, memory allocation schemes and need of linear and non-linear data structures.
[CO2] Apply and implement various linear data structures, like array, linked list, stack, and queue in different problems and applications.
[CO3] Analyze the performance of various sorting and searching techniques.
[CO4] Demonstrate and implement various operations like search, traverse, insertion, deletion etc. on different non-linear data structures.
[CO5] Apply appropriate data structure to design an efficient solution for given and identified problem.

Q.1. [CO1] [5 M] At ISBT Anand vihar, multiple buses arrive and depart at scheduled time. The arrival and departure time of the buses are given in two arrays as below:
bus_arrival = {2:00, 2:10, 3:00, 3:20, 3:50, 5:00}
bus_depart = {2.30, 3:40, 3:20, 4:30, 4:00, 5:20}
Authorities need to allocate minimum number of platforms needed for efficient arrival and departure of the buses. Write pseudo code and approach using **Linked List** to find minimum number of platforms.
Note: At any instance, there can be only one bus at a platform.

Q.2. [CO2] [3 M] Given an expression:
P * Q - (R + S) * ((T * 6) / 2) ^ U
While converting this expression to postfix notation what is the maximum value of "top" variable in "operator'' stack. Write the content of the stack at that instance when top is maximum.

Q.3. [CO1] [4 M] Given an array of students (RollNo, Grade, Sem) having unique RollNo and duplicacy in Grade and Sem; and sorted against the Grade field. Also given a Grade value (G_v) as input. Suggest the best possible searching technique to find the minimum RollNo having given Grade G_v. Write pseudo code of the suggested approach.

Q.4. [CO2] [4 M] Identify sorting algorithm which can sort, a given character array consisting of lower case English letters, in lexicographic order without any comparison and swapping. At the same time, do not change the placement order of duplicate letters.
Demonstrate your sorting algorithm for the char array "footprints".

Q.5. [CO1] [4 M] Given below recursive code, write o/p and draw a recursive call stack to justify your output.

```
int returnX(int x)
{       x--;
        if(x==0)
                return (1);
        else{
                printf("%d",x);

        return(returnX(x)+returnX(x));
                printf("\n%d",x);
        }
}
```

```
int main()
{
        printf("\n%d", returnX(4));
        printf("Function Executed");
        return 0;
}
```

Q3a [CO1]. In parallel RLC circuit as shown in figure 3, if R = 1 ohm, L = 2 H, C = 0.25 F and $i_s(t) = 4e^{-2t}\,u(t)$, then find:

i) Natural response of inductor current i(t)

ii) Forced response of inductor current i(t)

iii) Total response of inductor current i(t) (6)

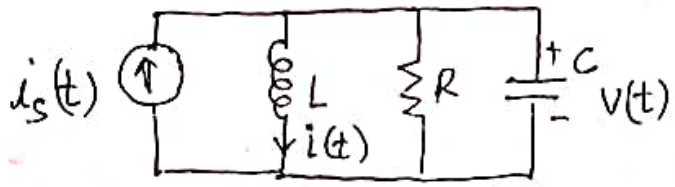


Figure 3.

Q3b [CO1]. Based on the roots of characteristics equation, describe the response for the parallel RLC circuit. (2)

Q4 [CO2]. For the given network as shown in figure 4, find value of all Z parameters (4)

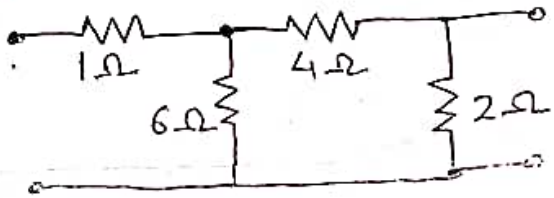


Figure 4.

POSSESION OF MOBILES IN EXAM IS UFM PRACTICE

Name Himanshu Dixit **Enrollment No.** 21105262

Jaypee Institute of Information Technology, Noida
T1 Examination, 2022
B.Tech Semester III

Course Title : Economics
Course Code : 15B11HS211

Maximum Time : 1 hr
Maximum Marks : 20

CO1 Explain the basic micro and macro economic concepts.
CO2 Analyze the theories of demand, supply, elasticity and consumer choice in the market.
CO3 Analyze the theories of production, cost, profit and break even analysis.
CO4 Evaluate the different market structures and their implications for the behaviour of the firm.
CO5 Examine the various business forecasting methods.
CO6 Apply the basic of national income accounting and business cycles to Indian economy.

Q1. Dolors used to work as a high school teacher for $40,000 per year but quit in order to start her own catering business. To buy the necessary equipment, she withdrew $20,000 from her savings (which paid 3% interest per year) and borrowed $30,000 from her uncle, whom she pays 3% interest per year. Last year, she paid $25, 000 for ingredients and had a revenue of $60,000. Calculate Accounting Profit and Economic Profit. Comment whether Dolors should go for catering business? **[CO1, 4 Marks]**

Q2. A company sells ribbon winders. The demand function for ribbon winders is given by $p = 300 - 0.02q$. Find the elasticity of demand when the price is $70 per piece. Will an increase in price lead to an increase in revenue? **[CO2, 3 Marks]**

Q3. The demand and supply for soft drinks are given by $q = 20 - p$ and $q = 3p$ respectively. **[CO2, 5 Marks]**

a) Solve for the equilibrium price and quantity.
b) Suppose now the government imposes a per unit tax of $4 on the sellers and gives $2 per unit subsidy to the buyers. Calculate the impact of the government intervention on the sellers and buyers and the revenue generated by the government because of this intervention.

Q4. In 2022, Netflix increased its monthly price for new subscribers by $1. In response, one individual tweeted the following: "So, tired of being a college student. Can't wait until I have a stable job and won't have a meltdown because Netflix raised their price by $1." What does this statement indicate about the income elasticity of demand for Netflix? Is the subscription normal or inferior? **[CO2, 2 Marks]**

Q5. The values of linear demand function are given as follows: **[CO2, 4 Marks]**

P	7	6	5	4	3
Q	3	4	5	6	7

a) Find the point of unitary elasticity.
b) What is the point elasticity at p=9.
c) To increase the total revenue, should the price be increased or decreased?

Q6. Correct (if required) the following sentences without changing the underlined phrase(s): **[2 Marks]**

a) There is always full employment on Production Possibility Curve. **[CO1]**
b) Adam Smith defines economics in terms of scarcity and resources. **[CO1]**
c) Shifting of demand curve can be attributed to the change in price. **[CO2]**
d) Rationing is done to control problems arise due to Price-ceiling. **[CO2]**

End of the question paper

POSSESION OF MOBILES IN EXAM IS UFM PRACTICE.

Name Himanshu **Enrollment No.** 21103262

Jaypee Institute of Information Technology, Noida

T1 Examination, 2022
B.Tech III Semester

Course Title: Theoretical Foundation of Computer Science **Maximum Time: 1 Hr**
Course Code: 15B11CI212 **Maximum Marks: 20**

C211.1	Apply the concepts of set theory, relations and functions in the context of various fields of computer science e.g., Database, Automata, Compiler etc.
C211.2	Evaluate Boolean Functions and Analyze algebraic structure using the properties of Boolean Algebra.
C211.3	Convert formal statements to logical arguments and correlate these arguments to Boolean logic, truth tables, rules of propositional and predicate logic.
C211.4	Apply the fundamental principle of counting, combinatorics and recurrence relations to find the complex pattern and sequences in given datasets.
C211.5	Apply graph theory concepts for designing solutions of various computing problems e.g, shortest path, graph coloring, Job sequencing etc.
C211.6	Explain basic concepts of automata theory and formal languages e.g., Finite Automata, regular expressions, context free grammars etc.

Q1. [C211.1, 2 Marks] Consider the function $f(x) = (x-2)^3$ from R to R. Show that this function has an inverse.

Q2. [C211.1, 3 Marks] Prove using Set Algebra:

$$A \times (B-C) = (A \times B) - (A \times C)$$

Q3. [C211.1, 3 Marks] A relation is defined by the following adjacency matrix

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

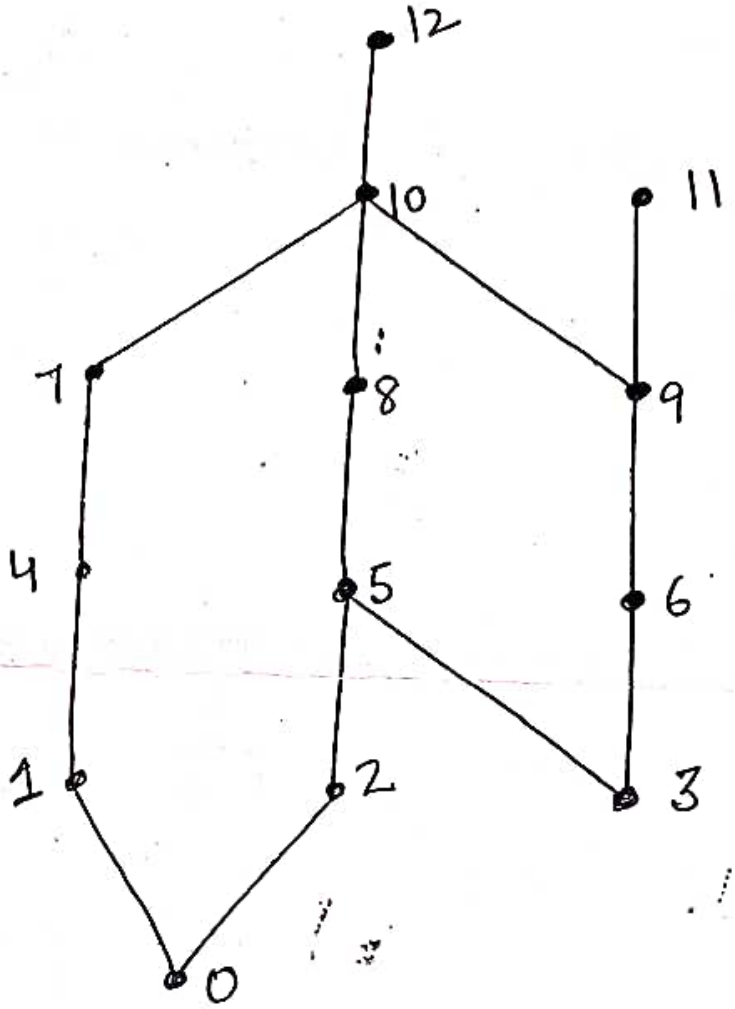
a) Find the transitive closure of the above given relation.
b) Find the reflexive closure of the resultant relation obtained in part (a).

Q.4 [C211.1, 3 Marks] An Airtel company wants to place a tower along a straight road for the broad band service so that each building on the road receives a broadband service. Each building receives the service if it is within one mile of a tower. A greedy approach is used to provide the service to d buildings located at position $x_1, x_2, \ldots x_d$ from the start of the road with minimum number of towers being used. Use mathematical induction to prove that Airtel company uses fewest towers to provide broad band service to all buildings.

----------PTO----------

Q.5 [C211.1, 4 Marks] Find the number of students enrolled in either in Data Structures (DS), Theoretical Foundation of Computer Science (TFCS), Artificial Intelligence (AI) or Software Engineering (SE). Given that, there are 50, 29, 31 and 34 students in these courses respectively; 14 are in both DS and AI; 21 in both DS and SE; 20 are in both TFCS and AI; 4 in both TFCS and SE; and no student can take DS and TFCS or AI and SE, concurrently?

Q.6 [C211.1, 5 Marks] Consider the Hasse diagram given below:



a) Find the maximal elements.
b) Find the minimal elements.
c) Find the greatest element.
d) Find the least element
e) Determine the lower bound, upper bound, GLB and LUB for A = {8,9}
f) Is the given Hasse Diagram a Lattice or not? Justify your answer.

POSSESION OF MOBILES IN EXAM IS UFM PRACTICE.

Name Himanshu **Enrollment No.** 21103262

Jaypee Institute of Information Technology, Noida

T1 Examination, 2022
B.Tech 3rd Semester

Course Title: Electrical Science 2	**Maximum Time: 1 hr**
Course Code: 15B11EC211	**Maximum Marks: 20**

After pursuing this course, the students will be able to:

CO1 Study and analyze the complete response of the first order and second order circuits with energy storage and/or non storage elements.
CO2 Understand two port network parameters and study operational amplifier, first order & second order filters
CO3 Study the properties of different types of semiconductors, pn junction diode, zener diode and analyze diode applications.
CO4 Study the characteristics, operation of bipolar junction transistors (BJT) and its biasing, stability aspects.

Note: Attempt all the questions

Q1[CO1]. The switch has been closed for a long time and opened at t = 0 as shown in figure 1. Find i(t) and v(t) for all values of t. (4)

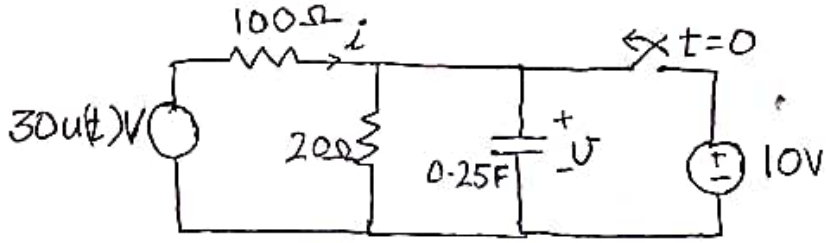


Figure 1.

Q2 [CO1]. The circuit shown in figure 2 is at steady state before the switch closes at time t=0. The switch remains closed for 2 sec and then opens. Determine the inductor current i(t) for t>0. (4)

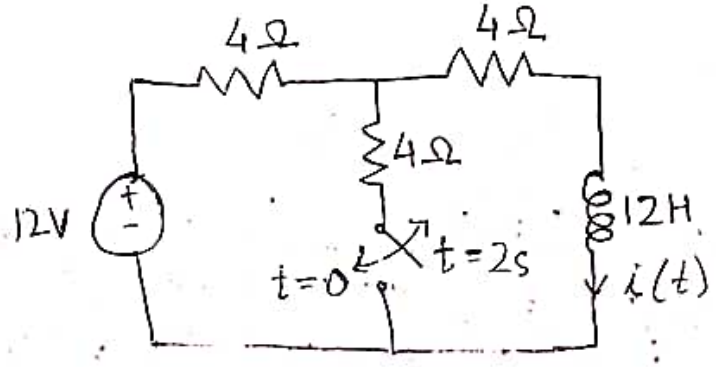


Figure 2.