

Jalpaiguri Government Engineering College
Numerical Methods(OEC-IT601A)
CSE 3rd YEAR

Time: 45 Minutes

Full Marks: 15

1. Apply Gauss-Seidal Method to solve the equations

(5)

$$20x+y-2z=17;$$

$$3x+20y-z=-18;$$

$$2x-3y+20z=25;$$

2. Find a real root of the following equations correct to three decimal places, by the regula falsi method

(7)

$$x^6 - x^4 - x^3 - 1 = 0$$

3. Evaluate $\int_0^4 e^x dx$ by Simpson's 1/3rd rule.

(3)

$$e = 2.72, e^2 = 7.39, e^3 = 20.09, e^4 = 54.6$$

3. 12

Class Test Dept. of CSI, 3rd , JGEC MAY 2023.

Numerical Methods OLC-601A, Time: 3/4 hour, Answer any three $3 \times 5 = 15$

1 Evaluate $A(1/x^2 + 5x + 6)$, taking $h=1$

2 Determine the value of $\sin 38^\circ$. Where values of x (in degree) and $\sin x$ are given in the following table:

X (in degree)	15	20	25	30	35	40
f(x)	0.2588	0.3402	0.4226	0.5000	0.5736	0.6428

3 Find the missing terms in the following table:

X: 0	1	2	3	4	5
Y: 0	8	15	-	35	

4 State and proved Newton's forward interpolation formula

5. Use Newton's divided difference formula to approximate $f(0.05)$ from the following data:

X:	0.0	0.2	0.4	0.6	0.8
F(x)	1.000	1.2214	1.4982	1.8221	2.2255

6 Solve the following equations by Gauss-Elimination method

$$3x + 4y + 2z = 15, \quad 5x + 2y + z = 18, \quad 2x + 3y + 2z = 10$$

JALPAIGURI GOVERNMENT ENGINEERING COLLEGE
[A GOVERNMENT AUTONOMOUS COLLEGE]
COE/B.TECH./CSE/ OEC-IT601A/2022-2023
2023
Numerical Methods

Full Marks: 70

Times: 3 Hours

*The figures in the margin indicate full marks.
 Candidates are requested to write their answers in their own words as far as practicable.*

GROUP-A
[OBJECTIVE TYPE QUESTIONS]

Answer all questions

5x2=10

1. Define geometrical interpretation of Newton Raphson method.
2. Prove that $\Delta - \nabla = \delta^2$.
3. Define n^{th} order divided difference of $f(x_0, x_1, \dots, x_n)$.
4. State the sufficient condition for convergence of Gauss-Seidel method
5. Write two advantage of N-R method.

GROUP-B
[LONG ANSWER TYPE QUESTIONS]

Answer any four questions

4x15=60

6. i) Find the value of $(\Delta^3/E)x^3$.
 ii) Find a positive real root of the following equation, $2x - 3\sin x - 5 = 0$ using bisection method.
 iii) Construct an iterative formula of $K^{1/n}$ also find the value of $125^{1/7}$.
7. i) Determine the value of $f(102)$ using Lagrange's interpolation formula. Where values of x and $f(x)$ are given in the following table:
 5+5+5

X :	93	96.2	100	104.2	108.7
$f(x)$:	11.38	12.8	14.7	17.07	19.91

- ii) Find a real root of the equation $xsinx + cosx = 0$ using Newton - raphson method, correct to five decimal places.
- iii) Prove that $f(4)=f(3)+\Delta f(2)+\Delta^2 f(1)+\Delta^3 f(1)$.
8. i) Solve the system of equations by L-U decomposition method.
 $8x - 3y + 2z = 20$, $4x + 11y - z = 33$, $6x + 3y + 12z = 36$.
 ii) Solve the following equations by Gauss-Seidel iteration method
 $3x + y + 5z = 13$, $5x - 2y + z = 4$, $x + 6y - 2z = -1$.
 7+8
9. i) Solve the equation using Gusses elimination method
 $6x + 3y + 2z = 6$, $6x + 4y + 3z = 0$, $20x + 15y + 12z = 6$.
 ii) Find a real root of the equation, $x \log_{10} x - 1.2 = 0$ correct unto four significant figures by Regula Falsi method.
 iii) Find by Taylor's series method, the values of y at $x=0.1$ and $x=0.2$ to five decimals from $dy/dx = 1 + xy$, with $y(0)=2$.
 5+5+5

10. i) Establish the Lagrange's interpolation formula 5+5+5
ii) State and proved Simpson's 1/3 rule.
iii) Round off the number 37.46235 to four significant figures and compute absolute, relative and percentage error.
11. i) Evaluate $\int_0^{n/2} \sqrt{\sin x} dx$ by Simpson's 1/3 rule, with 8 subintervals. 5+5+5
ii) Solve by Euler's modified method the following differential equation for $x=0.02$ by taking length $h=0.01$. $dy/dx = x^2 + y$, initially $y(0) = 1$.
iii) Use Runge-Kutta method of 4th order method to evaluate $y(1.2)$ with $h=0.1$, given $dy/dx + y/x = 1/x^2$, and $y(1) = 1$.
12. i) Derive Newton's backward interpolation formula. 6+5+4
ii) Advantage &disadvantage of Regula-Falsi method and its geometrical interpretation.
iii) What is the advantages & disadvantages of Lagrange's interpolation formula?

Internal Assessment Examination (2023)
Dept: CSE Semester: 6th
Sub: Software Engineering (PEC-IT 601C)

1. Explain prototyping model. Write down the differences of prototyping model with evolutionary model. 3+2
2. Suppose you are developing a software product in the semidetached mode. You have estimated the size of the product to be about 100 KLOC. Compute the nominal effort and the development time and no. of engineers required. 2+1
3. What do you mean by software risk? Give examples. Explain the role of SRS document in the life cycle model of software development. 3+2

2nd Internal Assessment Examination (2023)
Dept: CSE Semester: 6th
Sub: Software Engineering (PEC-IT 601C)

1. What do you mean by Cyclomatic Complexity of a program? How it can be measured? 1+2
2. What are Driver modules and Stub modules? Where these are required? 2+1
3. Differentiate between software verification and validation. 3
4. What do you mean by reliability and quality of a software product? 3
5. Explain the different levels of testing with their goals. 3

JALPAIGURI GOVERNMENT ENGINEERING COLLEGE
 [A GOVERNMENT AUTONOMOUS COLLEGE]
COE/B.TECH/CSE/PEC-IT-601C/2022-2023
 2023
SOFTWARE ENGINEERING

Full Marks: 70

Times: 3 Hours

The figures in the margin indicate full marks.

Candidates are requested to write their answers in their own words as far as practicable.

GROUP-A
[OBJECTIVE TYPE QUESTIONS]

Answer all questions

1. Explain Context Diagram. 2
2. Write down the different factors for quality. 2
3. What is critical path? 2
4. Write down the differences between fault and failures 2
5. "SRS can be considered a pure black-box". Justify the answer. 2

$5 \times 2 = 10$

2

2

2

2

2

GROUP-B
[LONG ANSWER TYPE QUESTIONS]

Answer any four questions

$4 \times 15 = 60$

6. i) Draw a schematic diagram to represent spiral model of software development and explain why it is called Meta model. Write down the situation where prototyping model is useful. 4+1
- ii) Explain Evolutionary Model. Write down the differences between evolutionary model and prototyping model. 3+2
- iii) What do you mean by size of a software product? Explain the different metrics for project size. 2+3
7. i) Assume that the size of real-time software has been estimated to be 62,000 lines of source code. Assume that the average salary of software developers is Rs. 40,000 per month. Determine the effort required to develop the software, nominal development time, the number of engineers required and the cost to develop the product. 2+2+2+2
- ii) Write down the differences between basic COCOMO and intermediate COCOMO model. 3
- iii) What is software risk? Explain the different steps for Risk Management. 1+3
8. i) What do you mean by Cyclomatic Complexity of a program? How it can be measured? 2+2
- ii) What are Driver modules and Stub modules? Where these are required? Draw the sequence diagram and collaboration diagram for issuing books from library. 2+1+5
- iii) Explain the following: Permanent Failure, Cosmetic Failure, Transient Failure. 3
9. i) Differentiate between software Verification and Validation. Write down the functions of Quality Control cell. 3+2
- ii) Explain the following reliability metrics: 5
 - a) ROCOF
 - b) MTTF
 - c) MTBF
 - d) POFOD
 - e) Availability
- iii) Write down the different levels of SEI Capability Maturity Model and their Key Process Areas. 5
10. i) What do you mean by cohesiveness of a module? Explain the different types of cohesions in increasing cohesiveness. 1+5
- ii) Explain the different methods for white box testing with examples. 6
- iii) Explain the different levels of testing with their goals. 3

11. i) What do you mean by the terms cohesion and coupling in the context of software design? Explain in 2+2
software Development -“We aim to decrease coupling and increase cohesion”.
ii) What is DFD? Explain balancing DFD. What is Integration Testing? Write down the different 1+2+1+4
approaches for Integration Testing.
iii) What do you mean by Software Maintenance? Write down the different types of software 1+2
maintenance.
12. Write Short Notes on any three 3*5
- i) Halstead Software Science
 - ii) Quality Assurance
 - iii) UML
 - iv) Black Box Testing
 - v) Decision Tree and Decision Table
-

Jalpaiguri Govt. Engg. College
Department of Computer Sc. & Engg.
1st Internal Examination, 2023

Sub: Computer Network

Sub. Code: PCC- CS602

Time: 45 Minutes

Full Marks: 15

Answer all the questions:

1. Why is the size of the send window in Selective-Repeat-ARQ is 2^{m-1} instead of 2^m ? Where m is the number of bits in sequence number. Explain with a diagram. What is piggybacking? 4+1
2. Draw 802.3 MAC frame format. What is the minimum length of the data received from upper layer in 802.3 MAC frame and why? What measure would be taken if the data is less than the minimum length?

3. In Slotted Aloha Protocol what is the vulnerable time? Explain with a suitable diagram.
One hundred stations on a pure ALOHA network share a 1-Mbps channel. If frames are 1000 bits long, find the throughput if each station is sending 10 frames per second. 2+3

1+3+1

Jalpaiguri Govt. Engg. College
Department of Computer Sc. & Engg.
2nd Internal Examination, 2023

Sub: Computer Network

Sub. Code: PCC- CS602

Time: 45 Minutes

Full Marks: 15

Answer all the questions:

1. Draw the header format of IP datagram. What is the minimum and maximum size of IP datagram?
2. Explain count-to-infinity problem in Distance Vector Routing with example. 3+2
4
3. Subnet the Class C IP Address 205.11.2.0 so that you have 30 subnets.
 - a) What is the subnet mask for the maximum number of hosts?
 - b) How many hosts can each subnet have?
 - c) What is the IP address of host 3 on subnet 2?

6

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(A Govt. Autonomous College)
COE/B.Tech/CSE/PCC-CS602/2022-23
2023
COMPUTER NETWORK

FM: 70

Time Allotted: 3 hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Group - A

[Objective Type Questions]

Answer all the questions

5 X 2 = 10

- 1 In which two layers of OSI model flow control is performed and why? ?
- 2 Assume that communication links are error free. Is data link layer still needed? Why?
- 3 For n devices in a network, what is the number of cable links required for a mesh, ring, bus and star topology?
- 4 What is firewall?
- 5 A 4-Mbps token ring has a token-holding timer value of 10msec. What is the frame that can be sent on this ring?

Group - B

[Long Answer Type Questions]

Answer any four of the following

4 X 15 = 60

- 6 a. Briefly describe the different layers of OSI model.
b. Describe the components of a data communication system.
c. Write down the sender algorithm for Go-back-N sliding window protocol.

6+3+6

- 7 a. "In Selective-Repeat ARQ, sender window size cannot be greater than 2^{m-1} ". Justify it with a suitable pictorial example.
b. Consider the distance between devices is 4000km and the speed of propagation over the channel is 200,000km/sec. The channel has a bit rate of 4Kbps. For what range of frame size does stop-&-wait protocol give an efficiency of at least 60 percent?
c. Explain why the vulnerable time in ALOHA depends on T_{fr} , but in CSMA depends on T_p ?

5+5+5

- 8 a. Draw 802.3 MAC frame format. What is the minimum length of the data received from upper layer in 802.3 MAC frame and why? What measure would be taken if the data is less than the minimum length?
b. A network with one primary and four secondary stations uses polling. The size of a data frame is 1000 bytes. The size of the poll, ACK and NAK frames are 32 bytes each. Each station has 5 frames to send. How many total bytes are exchanged if there is no limitation on the number of frames a station can send in response to a poll?
c. Explain why collision is an issue in random access protocols but not in controlled access protocols.

(1+3+1)+6+4

- 9 a. In bit-oriented protocol what is bit stuffing? Why is it used?
b. Draw the flow chart for CSMA/CD media access control.
c. Draw and explain HDLC frame format.

P.T.O

10. a. Draw the frame format of IPv4 datagram. (2+2)+5+6
- b. In an IPv4 datagram, the value of HLEN is 5, the value of total length is 200, and the offset value is 200. What is the number of the first byte and number of the last byte in this datagram? Is this the last fragment, the first fragment, or a middle fragment?
- c. An ISP is granted a block of address starting with 150.8.0.0/16. The ISP needs to distribute these addresses to three group of customers.
- i) The first group has 200 customers, each need 16 addresses.
 - ii) The second group has 400 customers, each need 8 addresses.
 - iii) The third group has 2000 customers, each need 4 addresses.
- Design the sub-blocks and give the slash notation for each sub-block. Find out how many addresses are still available after these allocations.
11. a. What is routing? Define static and dynamic routing.
b. Draw the header format of IP datagram. What is the minimum and maximum size of IP datagram?
c. "Distance Vector Routing propagates good news rapidly, but bad news very slowly"- Justify. (3+5+7)
12. a. What is the minimum and maximum size of a UDP header? In TCP, if the value of HLEN is 0111, how many bytes of OPTIONS are included in the segment?
b. Draw and explain the common fields of a routing table.
c. A client uses TCP to send data to a server. The data rate are 16 bytes. Calculate the efficiency of this transmission at the TCP level (ratio of useful bytes to total bytes), assuming no options in the TCP segment. Calculate the efficiency of transmission at the IP level. Assume no options for the IP header. Calculate the efficiency of transmission at the data link layer. Assume no options for the IP header and use Ethernet at the data link layer. (2+4)+4+5

(2+2) +5 +6

.....END.....

Jalpaiguri Government Engineering College
Department of Computer Science and Engineering
DATA WAREHOUSING & DATA MINING (PEC-IT602B)

Full marks: 15,

Time : 45 minutes

- 1. What is data warehousing? Compare the star schema with snowflake schema of data warehouse.** 2+3=5

<i>Transaction ID</i>	<i>List of Item ID's</i>
<i>T1</i>	<i>f, a, c, d, g, i, m, p</i>
<i>T2</i>	<i>a, b, c, f, l, m, o</i>
<i>T3</i>	<i>b, f, h, j, o</i>
<i>T4</i>	<i>b, c, k, s, p</i>
<i>T5</i>	<i>a, f, c, e, l, p, m, n</i>

Table 1

- 2. Derive the FP-Tree for the dataset given in Table 1. Find the conditional FP-Trees for all frequent items? Let min_support count = 60%.** 10

Jalpaiguri Government Engineering College
B.Tech./CSE/PEC-IT-602B/2022/ Class Test II
Data Warehousing and Data Mining

FM: 15
Answer all questions

Time Allotted: 45 minutes

- 1. Write the differences between i) classification and clustering, ii) k-means and PAM.** 5
- 2. State the PAM algorithm of clustering.** 5
- 3. Consider the following data points and apply PAM algorithm on it to update the initial medoids, if any.**

Data points: (3,4,5,10,11,12); Initial medoids are {4} and {10}.

5

JALPAIGURI GOVERNMENT ENGINEERING COLLEGE

[A GOVERNMENT AUTONOMOUS COLLEGE]

COE/B.TECH./CSE/PEC-IT602B/2022-23

2023

DATA WAREHOUSING & DATA MINING

Full Marks: 70

Time: 3 Hours

The figures in the margin indicate full marks.

Candidates are requested to write their answers in their own words as far as practicable.

GROUP-A [OBJECTIVE TYPE QUESTIONS]

5x2=10

Answer all questions

1. "Data mining is also called as Knowledge Discovery in Database"- Explain.
2. Define snowflake schema of data warehousing.
3. What is the use of Entropy in data mining?
4. Draw a probable concept hierarchy for "location" dimension.
5. What is virtual warehouse?

GROUP-B [LONG ANSWER TYPE QUESTIONS]

4x15=60

Answer the Question 6 and any three from the remaining questions

6. i) "Classification is a supervised learning but clustering is an unsupervised learning." Explain it. 2
- ii) Define CLARA and CLARANS. 3
- iii) Draw a decision tree from the training data set given in Table 1 using information gain. {cheat is the class label attribute}. 10

TID	Marital Status	Taxable Income	Refund	Cheat
1	Single	High	No	Yes
2	Married	High	No	No
3	Single	Low	No	No
4	Married	High	Yes	No
5	Divorced	Average	No	Yes
6	Married	Low	No	No
7	Divorced	High	Yes	No
8	Single	Average	No	Yes
9	Married	Low	No	No
10	Single	High	Yes	No

Table 1

7. i) Describe the 3-tier architecture of data warehouse with a diagram. State the functions of bottom and top tiers. 5
- ii) Explain the functions of slicing and dicing, and drill down and roll up OLAP operations with example. 5
- iii) Write the differences between OLAP and OLTP. 5

8. i) State the joining and pruning steps of apriori algorithm with an example.

- ii) Enumerate all frequent item-sets from the given database (Table-2) using Apriori Algorithm with minimum support count S=3. List all the candidate set and large frequent item-sets for each database scan.

- iii) Explain the impact of Apriori algorithm on Customer Relationship Management (CRM).

Table-2

Trans. Id	A	B	C	D	E	F	G	H	I	J	K
T100	x	x	x	v	x	v	v	v	v	x	v
T200	x	x	v	v	x	v	v	v	v	x	v
T300	x	v	x	v	v	v	x	x	v	x	x
T400	v	x	x	v	x	v	v	x	x	x	x
T500	x	v	x	x	x	v	v	x	x	v	v

v means the item is purchased and x means the item is not purchased

9. i) Draw a lattice of cuboid for four dimensional (item, location, time, customer) data.

- ii) Construct a FP-Tree and draw all the conditional FP-Tree assuming minimum support count = 2 of the given dataset (Table-3).

- iii) Define ETL steps and discuss the importance of ETL steps in data mining.

Table-3

Trans. Id	List of items
T1	Keyboard, CPU, UPS
T2	CPU, Monitor, Pen drive
T3	CPU, Mouse
T4	CPU, Monitor, Keyboard
T5	Keyboard, Mouse, Speaker
T6	CPU, Mouse, RAM
T7	Mouse, Keyboard
T8	CPU, Keyboard, Mouse, UPS
T9	CPU, Keyboard, Mouse

10. Suppose that a data warehouse for big-bazar consists of the four dimensions customer, city, product, and time, and two measures count and sales-amount. At the lowest conceptual level (i.e., for a given customer, city, product and time combination), the sales-amount measure stores the actual purchase amount of the customer.

At higher conceptual levels, sales-amount stores the total purchase amount for the given combination.

a) Draw a schema diagram for modeling the above data warehouse. State clearly the tables, facts & keys.

b) Starting with the base cuboid [customer, city, product and time], what specific OLAP operations should you perform in order to list the total sales amount of "product=Speaker" for each country.

11. i) What are the advantages and disadvantages of k-means algorithms?

ii) State the steps of the PAM algorithm.

iii) Cluster the following data points into three (03) clusters using k-means algorithm and Euclidean distance.

Items: A1(2, 5); A2(2,10); A3(8,4); B1(5,8); B2(7,5); B3(6,4); C1(1,2); C2(1,2); C3(4,7).

Suppose that the initial centres of each cluster are A1, B1 and C1. Assign the data points to the clusters using k-means algorithm for first iteration.

iv) Consider the following data points and apply PAM algorithm on it to replace the initial medoids with a non-selected data point, if any.

Data points: (3,4,5,10,11,12); Initial medoids are {4} and {10}.

12. i) Write two advantages of Genetic Algorithm. Briefly describe the operators of genetic algorithm.

- ii) State the name of different parent selection methods in genetic algorithm. Explain any two with example.

4

8

3

2

5+4

4

10

5

2

5

3

5

2+6

2+5

First Internal Examination 2023, DATABASE MANAGEMENT SYSTEM (PCC-CS601)

Dept: CSE, Semester: 6th

FM: 15, Time: 40mins

Answer all the questions:

Q1	What is Foreign key?	1
Q2	Describe how the entity animal (in a ZOO) can be developed into a specialization hierarchy.	3
Q3	How are the different schema layers related to concepts of logical and physical data independence?	2
Q4	Write down the difference between procedural and non-procedural DML.	2
Q5	Let the following relation schemas be given: Sailors(sid, sname, rating, age) Boats(bid, bname, color) Reserves(sid, bid, day) Perform the following queries on the tables in relational algebra: (Any Two) a) Find the color of the boats reserves by Sachin. b) Find the sid's of sailors with age over 21 who have not reserved any Red boat. c) Find the name of the sailors who have reserved boat 709(bid).	2.5X2=5
Q6	Explain Full outer join with example.	2

Database Management Systems (PCC-CS601)

Date of Examination: 22.05.23 (Internal Exam-2)

Full Marks: 15

Time: 45 Minutes

Attempt any three. (Each question carries 5 marks)

- i) a) Let R(ABCDE) be a relational schema with the following functional dependencies $\{AB \rightarrow C, DE \rightarrow B, CD \rightarrow E\}$. Identify the various candidate keys of R.
b) Give example of spurious tuples and when does it generate.
- ii) Briefly explain different anomalies a designer has to consider when creating a database schema?
- iii) Find the canonical cover of the functional dependency set $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$.
- iv) Let R(A,B,C,D,E) be a relation and the functional dependency set $F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$ that holds in R. Find out the highest normal form that R satisfies and decompose R into 2NF relations.

JALPAIGURI GOVERNMENT ENGINEERING COLLEGE

[A GOVERNMENT AUTONOMOUS COLLEGE]

COL/B.TECH./CSE/PCC-CS601/2022-23

2023

DATA BASE MANAGEMENT SYSTEMS

Full Marks: 70

Time: 3 Hours

The figures in the margin indicate full marks.

Candidates are requested to write their answers in their own words as far as practicable.

GROUP-A [OBJECTIVE TYPE QUESTIONS]

Answer all questions

1. What is prime attribute? 2
2. Briefly explain non recoverable schedule with suitable example. 2
3. Discuss the role of DBA. 2
4. What is strong entity set? 2
5. What is system log in database recovery system? 2

5x2=10

2

2

2

2

2

GROUP-B [LONG ANSWER TYPE QUESTIONS]

Answer any four questions

4x15=60

6. i) Let R(A,B,C,D,E) be a relation and the functional dependency set F={A→BC, CD→E, B→D, E→A} that holds in R. Find out the highest normal form that R satisfies and decompose R into 3NF relations. 6
ii) Explain lossless join decomposition with condition and examples. 5
iii) Define BCNF and give one example of it. 4
7. i) Describe Data independence. 3
ii) Explain in brief 3-schema architecture of DBMS. 3
iii) Let the following relation schemas be given:
Sailors(sid:integer, sname: string, rating: integer, age: real)
Boats(bid: integer, bname: string, color: string)
Reserves(sid: integer, bid: integer, day: date)
Perform the following queries on the tables in relational algebra, tuple relational calculus and domain relational calculus:
a) Find the color of the boats reserves by Nivedita.
b) Find the sid's of sailors with age over 18 who have not reserved any green boat.
c) Find the name of the sailors who have reserves boat 209(bid) using subquery. 3x3
8. i) Consider the following schemas. Primary keys are underlined.
RESTAURANT (r_id, r_name, r_city, phone, seat_capacity)
DISHES (d_id, d_name, d_type)
CUSTOMER (c_id, c_name, c_city)
SERVES (r_id, d_id)
HAS_ALLERGY (c_id, d_id)
Write SQL statement for the queries given below.
1) Find the names of the restaurants that serve "Chilly Chicken" (dish name).
2) List the names of the dishes that customer "Sharma" can eat without allergy problem.
3) List the names of the dishes that appear in all restaurants at 'Mirik'.
4) Find the names of the customers who are in the same city as restaurant "Green View" and who can eat at least one dish at "GreenView" without allergy problem.
ii) Indicate the advantages and disadvantages of DBMS over conventional file system. 5

9. i) Draw the E-R diagram of the following :
A General Hospital consists of a number of specialized wards (such as Maternity, Paediatric, Oncology, etc.). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward.
- ii) Explain the difference between Primary key, Candidate key and Super key. 3
- iii) What do you mean by "Ternary relationship"? 2
10. i) Briefly explain different types of anomalies a designer has to consider when creating a database schema. 4
- ii) Find the canonical cover of the functional dependency set $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ ✓ 5
- iii) Consider the following relation, R with functional dependency set, F
R(ABCDEFGH)
 $F = \{ABC \rightarrow DE, E \rightarrow BCG, F \rightarrow AH\}$
Find the 3NF decomposition of the relation R. 6
11. i) Describe ACID property of a transaction with examples. 5
- ii) What is Two-Phase locking protocol and how does it ensure serializability? 5
- iii) How can you determine that a schedule is conflict serializable? Give one example. 5