[Total Marks: 80]

(3 Hours)

N.B. : 1) Question No.1 is **compulsory.**
2) Attempt any **three** from the remaining **five** questions.

Write a short note on following (any Four)

1. (a) Role of DBA (5)
   (b) Weak Entity Set and Strong Entity Set (5)
   (c) Primary and Secondary Index (5)
   (d) Deadlock Handling (5)
   (e) ADT (5)
   (f) Structured Data Types in ODBMS (5)

2. (a) A university Registrar's office maintains data about the following entities: (10)
   i. courses, including number, title, credits, syllabus, and prerequisites;
   ii. course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
   iii. students, including student-id, name, and program;
   iv. instructors , including identification number, name, department, and title.

   Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

   (b) Explain the architecture of database system. Explain how it is different from conventional file system. (10)

3. (a) Explain the architecture Of distributed databases? (10)
   (b) Define 1NF, 2NF and 3NF with help of an example consider the following relational schema (10)

EMP_PROJ

Ssn	Pnumber	Hours	Ename	Pname	Plocation

FD1

FD2

FD3

SSN- Social Security Number of Employee
Pnumber- Project Number
Hours- Number Of Hours an employee works on project
Ename- Name of Employee
Pname – Name Of Project
Plocation- Location of Project

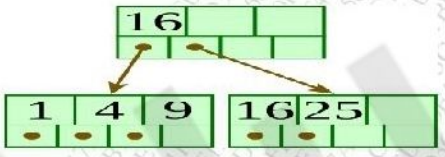
Decompose the above relation into 3NF

4. (a) For a given relation R(A,B,C,D,E,F,G) following functional dependencies hold (10)
A→B
BC→DE
AEF→G
Prove that ACF →DG

(b) Explain Hash based indexing with the help of an example? (10)

5. (a) (i)What is B+ tree ? Explain with the help of an example . (05)

(ii)Consider the following B+ tree (05)



Perform following operations on B+ tree assuming maximum node capacity to hold 3 elements

A. Insert 20
B. Insert 13

(b) (i) Consider the following schedules involving two transactions. (05)
S1: $R_1(X), R_1(Y), R_2(X), R_2(Y), W_2(Y), W_1(X)$
S2: $R_1(X), R_2(X), R_2(Y), W_2(Y), R_1(Y), W_1(X)$
Which one of the above schedules is conflict serializable? Justify your answer.

(ii) Explain the following terms with the help of an example (05)
A. Dirty Read
B. Lost Update

6. (a) Explain various locking protocols . (10)
(b) Differentiate between Object Relational Database management system and Object Oriented Database management system. (10)

****

Q. P. Code: 38716

[Total Marks: 80]

(3 Hours)

N.B.: 1) Question No.1 is **compulsory.**
2) Attempt any **three** from the remaining **five** questions.

Q. 1. Attempt ***any four*** :- 20

(a) Explain Custom tags in JSP

(b) Explain Wrapper Class

(c) Differentiate between Java and c++

(d) Explain concept of Object Serilization and Deserilization

(e) Explain Servlet Life cycle

Q. 2. (a) What is Cookie? Write a servlet program to count number of page visits using cookie. (10)

(b) Explain Lambda Expression with suitable example. (10)

Q. 3. (a) Explain Event Delegation model. Explain ActionListener and MouseListener interface. (10)

(b) Describe steps involved for User defined exception with suitable example. (10)

Q. 4. (a) Why do we need Generics? Explain with an example of how Generics make a program more flexible? (10)

(b) Describe Spring Framework in detail. (10)

Q. 5. (a) Explain JSP architecture with diagram. (10)

(b) List out available drivers in JDBC. Explain in detail. (10)

Q. 6. (a) Explain Thread Lifecycle with neat labeled diagram. Write a program to demonstrate thread lifecycle. (10)

(b) Why java doesn't support multiple inheritances? Write a program to demonstrate use of interface. (10)

Duration: 3 Hrs Total Marks: 80

N.B : (1) Question 1 is compulsory.
(2) Attempt any Three out of remaining five questions.
(3) Assume any additional data, if required but justify the same.
(4) Figure to the right indicate full marks for that question.
(5) Use of calculator is allowed.

Q.1) a) A farmer is engaged in breeding pigs. The pigs are fed on various products grown on the farm. Because of the need to ensure nutrient constituents, it is necessary to buy additional one or two products, which we shall call A and B.
The nutrients constituents (vitamins and proteins) in each of the product are given below:

Nutrient Constituents	Nutrient in the Product		Minimum Requirement of Nutrient constituents
	A	B	
X	36	06	108
Y	3	12	036
Z	20	10	100

Product A costs Rs. 20 per unit and product B costs Rs. 40 per unit. Determine how muchof products A and B must be purchased so as to provide the pigs nutrients not less than minimum required, at the lowest possible cost. Solve graphically. (10)

b) A company has three factories N1, N2, N3 with production capacities of 11,13,19 units (in thousands). It has four warehouses G1, G2, G3 and G4 with demands of 6, 10, 12 and 15 units (in thousands).Unit cost (Cost in Rs.) of transportation is given from each factory to each warehouse. (10)

From\To	G1	G2	G3	G4
N1	42	32	50	26
N2	34	36	28	46
N3	64	54	36	82

Based on the above information,
(1) Construct a Transportation table.
(2) Find Initial Feasible Solution by:
(a) North-West Corner Method (NWCM)
(b) Least Cost Method (LCM)
(c) Vogel's Approximation Method (VAM)

Q.2) a) A company has 4 sales Executive which need to be appointed on one to one basis in 3 sales Territories Profit potential for each Executive Territory combination is given in Rs. thousands. Find optimal Assignment of Executives and Territories to maximize total profit. Which sales executive will remain idle? (10)

Executive\Territory	T1	T2	T3
E1	60	67	90
E2	80	83	95
E3	70	72	82
E4	85	95	110

Profit (in Rs.'000)

b) Max.Z =100 X1+80 X2 (10)
Subject to constraints:
$6X1+4X2 \leq 7200$
$2X1+4X2 \leq 4000$
$X1, X2 \geq 0$
Find optimal solution by simplex method.

Q.3) a) A company has four plants with capacities of 5000, 10000,7000,3000 units. It has three warehouses with demands of 5000,8000 & 10000 units.
Transportation cost per unit(in Rs.)

Plant\WH	P	Q	R
A	14	6	12
B	8	12	16
C	10	16	8
D	16	8	6

Find optimal transportation schedule & optimal cost. (10)

b) For the following Project:
(1) Draw network diagram.
(2) Find critical path and project completion time.
(3) Find earliest and latest starting and finishing times of each activity.
(4) Find total float, free float, independent float and interfering float for each activity. (10)

Activity	Time (days)
A(1-2)	3
B(1-3)	4
C(1-4)	6
D(2-5)	5
E(3-6)	6
F(4-7)	5
G(5-8)	4
H(6-8)	7
I(7-8)	4

Q.4) a) Solve by Artificial variable method. (10)
Min.Z =4X1+3X2
Subject to :
$200X1+100X2 \geq 4000$
$1X1+ 2X2 \geq 50$
$40X1+ 40X2 \geq 1400$

b) i)Write the difference between an Event and an Activity.
ii) What is operations research? What are the characteristics of operation research? (10)

Q.5) a) A small project consist of seven activities. Optimistic, most likely and pessimistic time estimates are given for each activity. (10)

Activity	Preceding Activity	Time(days)		
		Optimistic	Most likely	Pessimistic
A	-	2	5	8
B	-	2	5	14
C	A	4	6	14
D	A	5	7	15

E	B,C	2	3	10
F	D	3	3	3
G	E	1	2	3

(1) Draw the PERT network and find expected completion time of project.
(2) What is the probability that project will be completed in?
  (a) 18 days
  (b) 21 days
  (c) 16 days
(3) If the project manager wants an assurance of 95% that the project is completed on time, how many days before the scheduled date he should start the project.

b)Find the optimum solution of the following transportation problem using Least Cost/Matrix Minima Method and MODI method, where cells shows the transportation costs in rupees. (10)

	W1	W2	W3	W4
O1	6	4	1	14
O2	8	9	2	16
O3	4	3	6	5
Demand	6	10	15	

Q.6) a) In a factory there are 5 employees and 5 jobs are to be done on a one to one basis. Time required (in Minutes) is given for each Employee-Job combination. Find optimal assignment of employees & Jobs to minimize total time. (10)

Time (in minutes)

Employees\Job	A	B	C	D	E
I	160	130	175	190	200
II	135	120	130	160	175
III	140	110	155	170	185
IV	50	50	80	80	110
V	55	35	70	80	105

b) Solve the following game using Principle of Dominance: (10)

	Player B					
Player A	I	II	III	IV	V	VI
1	4	2	0	2	1	1
2	4	3	1	3	2	2
3	4	3	7	-5	1	2
4	4	3	4	-1	2	2
5	4	3	3	-2	2	2

****

Q.P. Code: 40274

Total Marks: 80

(3 Hours)

N.B. : 1) Question No.1 is **compulsory.**
2) Attempt any **three** from the remaining questions.
3) Figures to the right indicate full marks.

Q1. (a) Discuss the RSA with a suitable example [10]

(b) What is Denial of service attack? Explain its type. How we can defenses against Denial of service attack. [10]

Q2. (a) Explain the four Phases operation of IEEE 802.11i in detail [10]

(b) Explain mutual authentication and reflection attack with the help of diagram [10]

Q3. (a) What are algorithm modes uses for secret key cryptography? [10]

(b) What are the needs for DB security? Explain Inference in brief. [10]

Q4. (a) Explain how SET ensures a secure E-commerce transaction. [10]
(b) Define Firewall. What are the different types of Firewalls? Explain in brief. [10]

Q5. (a) What do you mean by IDEA algorithm? Explain the detailed working principles of IDEA. [10]

(b) Explain MD5 in detail. Compare SHA1 and MD5. [10]

Q6. Short Note (Solve Any Four) [20]
a) SOAP
b) Intrusion detection and it's type
c) TKIP
d) XML
e) Digital Signature

****

(3 Hours) Marks: 80

N.B.:
1) Question No.1 iscompulsory.
2) Attempt any three from the remaining five questions.
3) Answer to sub-questions should be grouped together.

1. a) Explain with a neat labeled diagram structure of V Model. **(10)**
b)Explain the various principles of software testing. **(10)**

2 a) Explain the different activities involved in planning a test. **(10)**
b) What is Static testing? Discuss data flow analysis with an example. **(10)**

3 a) Explain equivalence partitioning and boundary value analysis with an example **(10)**
b) What are the different test tool selection criteria? Give steps required to select a tool? **(10)**

4 (a)Explain statement coverage and branch coverage technique with suitable example? **(10)**
(b)Discuss testing of Object oriented systems. **(10)**

5. (a) What are the generic requirements for test tools /frameworks? **(10)**
(b) Explain in detail SQA planning. **(10)**

6. Writeshortnoteson(**anyfour**) **(20)**
a) Testing & debugging
b) System testing
c) ISO 9126 characteristics
d) Reviews
e) Metrics for software maintenance

****