

Roll No: _____



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2018

Programme: B.Tech (All SOCS Programs)

Course Name: Mathematics II

Course Code: MATH 1005

No. of page/s:3

Semester – II

Max. Marks : 100

Duration : 3 Hrs

Section A (Attempt all questions)

		MARKS
1.	If the mean of the Poisson distribution is 2, find $P(r \geq 1)$.	[4] CO2
2.	Let $A = \{1, 2, 3, 4, 6, 8, 9, 12, 18, 24\}$ be ordered by the relation R defined by ' $xRy \Leftrightarrow x \text{ divides } y$ '. Draw the Hasse diagram of the poset (A, R) .	[4] CO5
3.	Can $\sqrt{2}$ be approximated through fixed-point iteration formula $x_{n+1} = \emptyset(x)$? If so, find the function $\emptyset(x)$.	[4] CO3
4.	The first four moments of a distribution about the value 4 of the variable are $-1.5, 17, -30$ and 108. State whether the distribution is leptokurtic or platykurtic.	[4] CO2
5.	Solve the initial value problem $4y'' - y = 0, y(0) = 2, y'(0) = \beta$. Then find β so that the solution approaches zero as $t \rightarrow \infty$.	[4] CO1

SECTION B (All questions are compulsory, Q10 has internal choice)

6.	The following data was collected when a large oil tanker was loading:	[08] CO4												
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>$t, \text{ min}$</td><td>0</td><td>15</td><td>30</td><td>45</td><td>60</td></tr> <tr> <td>$V, 10^6 \text{ barrels}$</td><td>0.5</td><td>0.65</td><td>0.73</td><td>0.88</td><td>1.03</td></tr> </table>	$t, \text{ min}$	0	15	30	45	60	$V, 10^6 \text{ barrels}$	0.5	0.65	0.73	0.88	1.03	
$t, \text{ min}$	0	15	30	45	60									
$V, 10^6 \text{ barrels}$	0.5	0.65	0.73	0.88	1.03									
7.	Calculate the flow rate (<i>i.e.</i> , $\frac{dV}{dt}$) at $t = 5$.	[08] CO1												
8.	Solve $x^3 \frac{d^3y}{dx^3} + 3x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = x + \log x$.	[08] CO5												
	Consider the poset $(\{\{1\}, \{2\}, \{4\}, \{1,2\}, \{1,4\}, \{2,4\}, \{3,4\}, \{1,3,4\}, \{2,3,4\}\}, \subseteq)$.													
	(a) Find the maximal elements (b) Find the minimal elements (c) Find all the upper bounds of $\{\{2\}, \{4\}\}$ and the least upper bound, if it exists. (d) Find all the lower bounds of $\{1,3,4\}$ and the greatest lower bound, if it exists.													

The following system of equations is designed to determine concentrations in a series of coupled reactors as a function of the amount of mass input to each reactor:

$$\begin{aligned} -3c_1 + 18c_2 - 6c_3 &= 1200 \\ 15c_1 - 3c_2 - c_3 &= 3800 \\ -4c_1 - c_2 + 12c_3 &= 2350 \end{aligned}$$

[08] CO3

Obtain the concentration values correct to 2 decimals by using Gauss-Seidel iterative technique with initial approximate solution as $[c_1^{(0)}, c_2^{(0)}, c_3^{(0)}] = [300, 220, 310]$.

The following table gives the values of the probability integral $f(x) = \frac{1}{\sqrt{2\pi}} \int_0^x e^{-x^2} dx$ for certain equidistant values of x . Find the value of $\frac{1}{\sqrt{2\pi}} \int_0^{0.543} e^{-x^2} dx$ using the data given below:

x	0.51	0.52	0.53	0.54	0.55
$f(x)$	0.5292	0.5379	0.5465	0.5549	0.5633

(OR)

10 A reservoir discharging water through sluices as a depth h meter below the water surface, has a surface area A for various values of h as given below:

$h(\text{meter})$	10	11	12	13	14
$A (\text{sq. meter})$	950	1070	1200	1350	1530

If t denotes time in minutes, the rate of fall of surface area is given by $\frac{dh}{dt} = \frac{-48\sqrt{h}}{A}$. Using Simpson's 1/3rd rule, estimate the time taken for the water level to fall from 14 to 10 meters above the sluices.

[08] CO4

SECTION C

(Q11 is compulsory and Q12A, Q12B have internal choice)

11.A Solve $\frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + (4x^2 - 1)y = -3e^{x^2} \sin 2x$ by the removal of the first derivative (reducing it into normal form) method.

[10] CO1

11.B Consider the following table

x	1	3	4	5
$f(x)$	0	1.0986	1.3865	1.6094

[10] CO4

Construct the interpolating polynomial using Newton's divided difference interpolation formula and hence obtain the values of $f(1.5)$ and $f(4.5)$.

In a sample of 1000 cases, the mean of a certain test is 14 and S.D is 2.5. Assuming the distribution to be normal, find

- (i) How many students score between 12 and 15?
- (ii) How many score above 18?

12.A

Given that the area under the standard normal curve between $z = 0$ and $z = 0.8$ is 0.2881, between $z = 0$ and $z = 0.4$ is 0.1554 and between $z = 0$ and $z = 1.6$ is 0.4452

[10] CO2

(OR)

If 10% of the bolts produced by a machine are defective, determine the probability that out of 10 bolts chosen at random (i) 1 is defective (ii) at most 2 will be defective.

Consider the initial value problem

$$\frac{dy}{dx} = xy^{\frac{1}{3}}, \quad y(1) = 1.$$

Using step size $h = 0.1$, Find the value of $y(1.1)$ by

12.B

- (i) Taylor series method (considering derivatives up to third order)
- (ii) Modified Euler's method.

[10] CO3

(OR)

Solve the following initial value problem to obtain $y(1)$ using fourth order Runge-Kutta method with step size $h = 0.5$.

$$\frac{dy}{dx} = yx^2 - 1.2y, \quad y(0) = 1$$

Enrolment No: R110217145



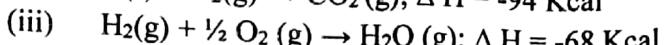
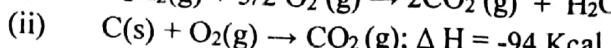
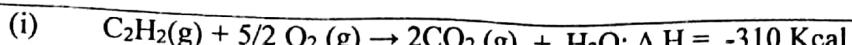
Course: CHEM-1001 (Chemistry) (End Semester Examination)
Programme: B.Tech. . APE- UP, Civil, Mechanical, Mechatronics, ADE, GSE, GIE, Mining, FSE, CS-CCVT, CS-Big Data, CS-O&G, CS-IOT, CS-MFT, CS-OSS, CS-MC, CS-GG

Semester: II (2017-18)**Time: 03 hrs.****Max. Marks:100****Instructions: Read all the below mentioned instructions carefully and follow them strictly:**

- 1) Write your Enrolment No. at the top of the question paper
- 2) Do not write anything else on the question paper except your roll number
- 3) **ATTEMPT ALL THE PARTS OF A QUESTION AT ONE PLACE ONLY**
- 4) Internal choice is given for question number 12
- 5) CO1, CO2, CO3, CO4 & CO5 mentioned in the last column stand for course outcomes and are for official use only

Section - A (Attempt all FIVE Questions)

1.	At 291K, the conductivity of saturated solution of $ZnCl_2$ is $3.86 \times 10^{-5} S\text{cm}^{-1}$ and that of water used for solution is $0.15 \times 10^{-5} S\text{cm}^{-1}$. The ionic conductances of Zn^{+2} and Cl^- at infinite dilution are 51.0 and $47.0 S\text{cm}^2 \text{eq.}^{-1}$, respectively. Calculate the solubility of $ZnCl_2$ in solution.	[4]	CO3
2.	Complete the following reaction with mechanism: $\begin{array}{ccc} \text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{C}_6\text{H}_4-\text{CH}_2-\text{C}_3\text{H}_5\text{Br} & \xrightarrow{\text{Alc. KOH}} & \text{A(major)} + \text{B (Minor)} \end{array}$	[4]	CO2
3.	Solutions of two electrolytes 'C' and 'D' are diluted. The molar conductance of D increases 2.0 times while that of C increases 30 times. Which of the two is a stronger electrolyte? Justify your answer.	[4]	CO2
4.	In the following: $(\text{CH}_3)_2\text{CHI} + \text{OH}^- \xrightarrow{\text{CH}_3\text{COCH}_3} (\text{CH}_3)_2\text{CHOH}$ $(\text{CH}_3)_2\text{CHI} + \text{OH}^- \xrightarrow{\text{H}_2\text{O}} (\text{CH}_3)_2\text{CHOH}$ specify the mode of reaction in both the cases along with proper justification.	[4]	CO2
5.	Classify the polymers on the basis of chemical structure (type of monomeric unit used).	[4]	CO1
SECTION - B (Attempt all FIVE Questions)			
6.	Calculate the bond energy of $C \equiv C$ in C_2H_2 from the following data:	[8]	CO3



Bond energy of C-H bonds = 99 Kcal

Heat of sublimation of C = 171 Kcal and bond energy of H-H = 52 Kcal

7. i. The K_p for the reaction $N_2O_4 \leftrightarrow 2NO_2$ is 640 mm at 775K. Calculate the percentage dissociation of N_2O_4 at equilibrium pressure of 160 mm.

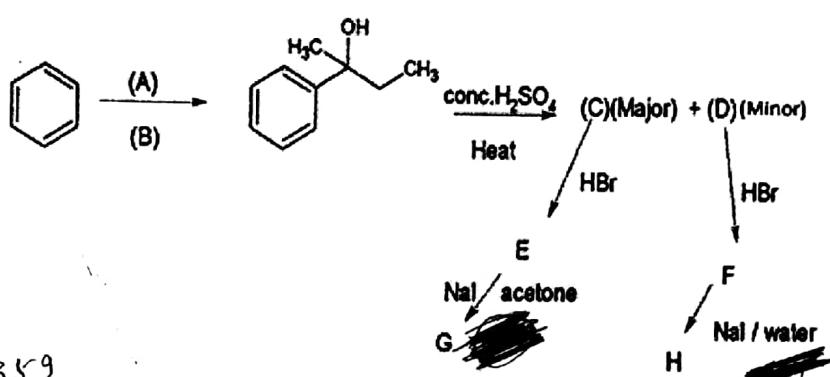
ii. For a homogeneous gaseous reaction, $A \rightarrow B + C + D$, the initial pressure was P_0 while pressure after time 't' was P. Derive an expression for rate constant K in terms of P_0 , P and t, assuming it to be a first order reaction.

[8] CO3

8. A solution of $CuSO_4$ was electrolyzed between copper electrodes. Before electrolysis, 10.09g of the solution contained 0.01790g of $CuSO_4$. After the experiment, 20.12g of the anodic solution contained 0.06230g of $CuSO_4$. At the same time, 0.011894g of copper was deposited in the copper coulometer placed in series. Calculate the transport numbers of Cu^{2+} and SO_4^{2-} ions. ($Cu=63.5$, $O=16$ and $S=32$)

[8] CO3

9. Identify all the missing reagents / products / reactants in the given sequence of reaction. Also give the mechanism for each step.



[8] CO2

10. i. Calculate the number of particles of 10 nm radius formed from spherical particle having radius of 150 nm.

ii. Calculate the wavelength of X-rays, which produces a diffraction angle 2θ equal to 16.80° for a crystal. Assume first order diffraction with inter particle distance in crystal of 0.2 nm.

[4+4] CO1

SECTION - C

(Question No. 11 is Compulsory; Attempt any one from question numbers 12A & 12B)

11.	i. (A) Discuss the formation of various types of films prepared by chlorine with tin and silver. (B) Explain why? a) Bolts and nuts are preferred to be of same metal.	[8+8+4]	CO2 CO3 CO1
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	<p>b) Corners of metal furniture are more prone to corrosion.</p> <p>ii. Discuss the following:</p> <p>(a) Addition of chlorine to cis-2-butene produces racemic mixture as product.</p> <p>(b) Partial racemisation is achieved in S_N1 reaction.</p> <p>How can we get the nanoparticles of ZnO by micro-emulsion method?</p>		
12A.	<p>i. 2.56g coal sample was weighed in a silica crucible. The weight of the silica crucible is 20g. After heating for an hour at 105°C, the residue weighed 2.18g. The crucible was covered with a lid and heated to 7 min at 950°C. The residue weighed 1.628g. The crucible was then heated without lid at 725°C and weight of silica crucible was found to be 20.265g. Calculate the percentage of moisture, volatile content, ash and fixed carbon content in the sample.</p> <p>ii. In Arrhenius's equation for a certain reaction, the value of A and E (activation energy) are $4 \times 10^{13} \text{ s}^{-1}$ and 98.6 kJ/mol respectively. If the reaction is of first order, at what temperature will its half-life period be 10 minutes?</p> <p>iii. Give two examples each of addition polymerization and condensation polymerization.</p>	[8+8+4]	CO4 CO2 CO1
12B.	<p>i. (a) The enthalpies of combustion of two fuels, ethane and butane are -484.8 kJ/mole and -797.4 kJ/mole, respectively. Which of the two is better fuel? (b) 0.151 g of the organic compound and barium chloride gave 0.466 g of barium sulphate. Calculate the percentage of Sulphur.</p> <p>ii. $\text{NOCl} + \text{O}_3 \rightarrow \text{NO}_2\text{Cl} + \text{O}_2$ Mechanism for this reaction is given as,</p> $\begin{aligned} \text{N}_2\text{O}_5 &\xrightarrow{K_1} \text{NO}_2 + \text{NO}_3 \\ \text{NO}_2 + \text{NO}_3 &\xrightarrow{K_2} \text{N}_2\text{O}_5 \\ \text{NO}_2 + \text{O}_3 &\xrightarrow{K_3} \text{NO}_3 + \text{O}_2 \\ \text{NOCl} + \text{NO}_3 &\xrightarrow{K_4} \text{NO}_2\text{Cl} + \text{NO}_2 \end{aligned}$ <p>Answer the following with respect to above:</p> <p>a) Write the rate law in terms of NOCl. b) Identify actual intermediates. c) Write rate laws in terms of intermediates. d) Prove that:</p> $-\frac{d[\text{NOCl}]}{dt} = (K_1 K_3 K_4 / K_2)^{1/2} [\text{NOCl}]^{1/2} [\text{O}_3]^{1/2} [\text{N}_2\text{O}_5]^{1/2}$ <p>iii. Discuss the role of vulcanization in improving the quality of natural rubber.</p>	[8+8+4]	CO4 CO2 CO1

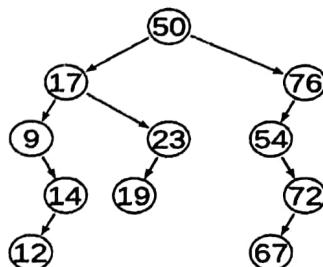
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2018		
Program	: B.Tech(CSE)-All IBM courses	Semester - II
Subject (Course): Advanced Data Structures		Max. Marks :
100		
Course Code : CSEG1004		Duration : 3
Hrs		
No. of page/s : 02		

Note: Answer the following questions

Section - A

- 1. Explain call by reference and call by value with C++ program. 5 Marks
- 2. Write a C++ program for calculating the area of rectangle and circle using run time polymorphism 5 Marks
- 3. Represent the following tree using array and single linked list. 5 Marks



- 4. Write a C++ program to represent weighted graph in computer memory using linked list. 5 Marks

Section - B

- 5. What is heap tree? arrange the following data in ascending order using heap sort: H E A P S O R T 10 Marks

OR

What is the ambiguity that arises in multiple inheritance? How it can be overcome. Explain with example.

- 6. Explain the role of seekg(), seekp(), tellg(), tellp(), function in the process of random access in a binary file. 10Marks

- 7. What is the benefit of copy constructor? Explain the necessity of defining your own copy constructor? 10 Marks

8. Define an AVL tree. Obtain an AVL tree by inserting one integer at a time 10 Marks
 in the following sequence. And show all the steps
 150, 155, 160, 115, 110, 140, 120, 145, 130, 147, 170, 180.

Section - C

- 9A. Write a C++ program to implement the following equation and find the value of C(7,4) 10 Marks

$$C(n, k) = \begin{cases} 1, & \text{if } k = 0 \text{ or } k = 1 \\ C(n - 1, k - 1) + C(n - 1, k), & \text{for } n > k > 0 \end{cases}$$

- 9B. Construct the binary search tree using the following order. 10 Marks
 In order: 9, 12, 14, 17, 19, 23, 50, 54, 67, 72, 76
 Preorder: 50, 17, 9, 14, 12, 23, 19, 76, 54, 72, 67

OR

Define a class Date, use overloaded + operator to add two dates and display the result. Assume non leap year dates.

(36) (35)

- 10A. Write a C++ program to add the following expression using oops concepts 10 Marks
 $p1(x) = a_0x^0 + a_1x^1 + a_2x^2 + \dots + a_{n-1}x^{n-1}$
 $p2(x) = b_0x^0 + b_1x^1 + b_2x^2 + \dots + b_{n-1}x^{n-1}$

- 10B. Find the binary tree for the following graph using DFS method starting from node C and show the stack content in each step. 10 Marks

(34)

Nodes	A	B	C	D	E	F
A	0	0	1	1	1	1
B	1	0	1	1	1	1
C	1	0	0		1	1
D	1	1	1	0	1	1
E	1	1	0	1	0	1
F	1	0	1	1	1	0

Name:

Enrolment No: R110217145



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, ~~April~~/May 2018

Course: Introduction to It Infrastructure Landscape
Program: B. Tech (CCVT) (CSIT1001)
Time: 03 hrs.

Semester: II

Max. Marks: 100

Instructions: All the questions are compulsory.

SECTION A
Attempt all the question

S. No.		Marks	CO
Q1	Discuss the Role of API and their types.	5	CO1
Q2	Explain the Server deployment and the steps to deploy it.	5	CO2
Q3	Explain partitioning, isolation, encapsulation and hardware independence.	5	CO1
Q4	Explain the role of Information technology by giving an example of wireless internet.	5	CO2

SECTION B
Attempt all question

Q5	Explain RAID and concept of mirroring, stripping and parity checking.	10	CO3
Q6	Explain the concept of LDAP and draw the architecture of LDAP.	10	CO3
Q7	Explain the disadvantages of star, tree and mesh topologies	10	CO2
Q8	Explain the public key encryption with diagram	10	CO2

SECTION-C
Attempt all question

Q 9	Explain Patch Management and Virtualization Security.	20	CO4
Q10	What is IBM WebSphere MQ and Explain the messaging technique with the proper diagram.	20	CO4

Name:

Enrolment No:

R110217195



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, ~~April~~/May 2018

Course: Database Management Systems

Program: B.Tech CSE (All IBM Branches)

Time: 03 hrs.

Semester: II

Max. Marks: 100

Instructions: All questions are compulsory.**SECTION A**

S. No.		Marks	CO
Q1	Differentiate between WHERE and HAVING clause in SQL. Define various aggregate functions used in SQL.	4	CO1
Q2	What are the different types of failures that can occurs in database.	4	CO1
Q3	What do you mean by normalization? What are the various anomalies that need to be taken care of?	4	CO2
Q4	"The fundamental part of any DBMS is query processing and optimization." Categories the multiple design dimensions based on Query Processing techniques.	4	CO4
Q5	What is DB2 catalog?	4	CO4

SECTION B

Q6	Explain why it is still necessary to have at least some familiarity with file processing systems even though it has become evident that traditional file processing systems have a number of shortcomings and limitations.	10	CO2
Q7	What are the pitfalls in relational database design? With a suitable example, explain the role of functional dependency in the process of normalization.	10	CO1
Q8	Consider a relation R(A, B, C, D, E) with FD's { AB → C, CD → E, C → A, C → D, D → B }	10	CO3
	List all the functional dependencies that violate 2NF, 3NF, BCNF. If any, then decompose R accordingly. Also answer that after BCNF conversion is dependency preserving or not?		
Q9	Write the SQL Queries for the following: Employee(EmpId, ename, designation, salary) i. Write a query to change designation of employees who have designation as 'Manager' to 'Advisors' and having salary either 30000, 25000, 15000.	10	CO2

- ii. Write a query to display the average salary of employees of a particular designation.
- iii. Write a query to display those employee details whose name begin with 'A' and ends with 'S' and having salary in the range 30000 to 50000.
- iv. Write a query to delete the records of the employees who have empid greater than 205.
- v. Write a query to add a new record for employee where only empid, ename is provided.

OR

Suppose you are given a relation R with four attributes ABCD. For each of the following sets of FDs (1,2,3) given below,

1. $\{C \rightarrow D, C \rightarrow A, B \rightarrow C\}$
2. $\{B \rightarrow C, D \rightarrow A\}$
3. $\{ABC \rightarrow D, D \rightarrow A\}$

assuming those are the only dependencies that hold for R, do the following for each FDs:

- i. Identify the candidate key(s) for R.
- ii. Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF).
- iii. If R is not in BCNF, decompose it into a set of BCNF relations that preserve the dependencies.

SECTION-C

Q 10

Consider the following information about a university database:

- Professors have an SSN, a name, an age, a rank, and a research specialty.
- Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget.
- Graduate students have an SSN, a name, an age, and a degree program (e.g., M.S. or Ph.D.).
- Each project is managed by one professor (known as the project's principal investigator).
- Each project is worked on by one or more professors (known as the project's co-investigators). Professors can manage and/or work on multiple projects.
- Each project is worked on by one or more graduate students (known as the project's research assistants).
- ✓ When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one.

20

- Departments have a department number, a department name, and a main office.
- Departments have a professor (known as the chairperson) who runs the department.
- Professor's work in one or more departments and for each department that they work in, a time percentage is associated with their job.
- Graduate students have one major department in which they are working on their degree.
- Each graduate student has another, more senior graduate student (known as a student advisor) who advises him or her on what courses to take.

Design and draw an ER diagram that captures the information about the university. Use only the basic ER model here; that is, entities, relationships, and attributes. Be sure to indicate any key and participation constraints.

11

Consider the following schemas:

Suppliers (Sid: integer, sname: string, address: string)

Parts (pid: integer, pname: string, color: string)

Catalog (sid: integer, pid: integer, cost: number)

The key fields are underlined, and the domain of each field is listed after the field name. Therefore sid is the key for Suppliers, pid is the key for Parts, and sid and pid together form the key for Catalog. The Catalog relation lists the prices charged for parts by Suppliers.

State what the following queries compute:

1. $\pi_{sname}(\pi_{sid}((\sigma_{color='red'} Parts) \bowtie (\sigma_{cost < 100} Catalog)) \bowtie Suppliers)$
2. $\pi_{sname}(\pi_{sid}((\sigma_{color='red'} Parts) \bowtie (\sigma_{cost < 100} Catalog) \bowtie Suppliers))$
3. $(\pi_{sname}((\sigma_{color='red'} Parts) \bowtie (\sigma_{cost < 100} Catalog) \bowtie Suppliers)) \cap (\pi_{sname}((\sigma_{color='green'} Parts) \bowtie (\sigma_{cost < 100} Catalog) \bowtie Suppliers))$
4. $(\pi_{sid}((\sigma_{color='red'} Parts) \bowtie (\sigma_{cost < 100} Catalog) \bowtie Suppliers)) \cap (\pi_{sid}((\sigma_{color='green'} Parts) \bowtie (\sigma_{cost < 100} Catalog) \bowtie Suppliers))$
5. $\pi_{sname}((\pi_{sid, sname}((\sigma_{color='red'} Parts) \bowtie (\sigma_{cost < 100} Catalog) \bowtie Suppliers)) \cap (\pi_{sid, sname}((\sigma_{color='green'} Parts) \bowtie (\sigma_{cost < 100} Catalog) \bowtie Suppliers)))$

20

CO2

OR

Sate the following questions:

- a) The table shown below is susceptible to update anomalies. Explain insertion, deletion, and modification anomalies from the table with example.
- b) Describe and illustrate the process of normalizing the table shown below to 3NF. State any assumptions you make about the data shown in this table.
- c) Explain BCNF with example.

staffNo	dentistName	patientNo	patientName	appointment		surgeryNo
				date	time	
S1011	Tony Smith	P100	Gillian White	12-Aug-03	10.00	S10
S1011	Tony Smith	P105	Jill Bell	13-Aug-03	12.00	S15
S1024	Helen Pearson	P108	Ian MacKay	12-Sept-03	10.00	S10
S1024	Helen Pearson	P108	Ian MacKay	14-Sept-03	10.00	S10
S1032	Robin Plevin	P105	Jill Bell	14-Oct-03	16.30	S15
S1032	Robin Plevin	P110	John Walker	15-Oct-03	18.00	S13