Total Number of Pages 1 Roll No. 2K12/MC/009

FIFTH SEMESTER B.E. (MC)

MID SEM EXAMINATION SEP 2014

MC-301 MODERN ALGEBRA

Time: 1.30 Hr *Max. Marks: 20*

Note: Answer **ALL** questions by choosing any two parts from each question. Assume suitable missing data, if any

1. **a)** Define Klein 4 group. State and prove laws of exponents that are true in a group.

   b) Let G be a semi group with $a, b \in G$. Show that the equations $ax = b$ and $ya = b$ have unique solutions in G *iff* G is a group.

   c) Let G be a group and $(m, n) = 1$ s.t. $a^m b^m = b^m a^m$ and $a^n b^n = b^n a^n$ for all $a, b \in G$ then show that G is abelian.

   (7)

2. **a)** Let G be group and $a, b \in G$ with $0(a) = 5$ and $aba^{-1} = b^2$. Then show that $o(b) = 31$.

   b) Define a binary for prime residue classes modulo n to show that it forms a group under it, consequently state and prove Euler's and Fermat's theorems.

   c) Define isomorphism with an example and show that any group of order 4 is abelian.

   (6)

3. **a)** Define kernel of a homomorphism with an example. Show that a homomorphism $f: G \to G'$ of G onto G' is an isomorphism *iff* $\text{Ker} f = \{e\}$

   b) Show that homomorphic image of i) an abelian group is abelian ii) a cyclic group is cyclic and iii) a finite group is finite.

   c) Define a quotient group with an example. State and prove first fundamental theorem of isomorphism.

   (7)

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Roll no. 2K12/MC1009

Fifth Semester

MID SEMESTER EXAMINATION

September 2014

MC 302 OPERATIONS RESEARCH

Time: 1 hr 30 min

Max Marks:20

Note:

1. Answer any *FIVE* questions.
2. All questions carry equal marks.
3. Assume suitable missing data, if any.

1. A furniture maker has 6 units of wood and 28 hr. of free time, in which he will make decorative screens. Two models have sold well in the past, so he will restrict himself to those two. He estimates that model I requires 2 units of wood and 7 hrs. of time, while model II require 1 unit of wood and 8 hrs. of time. The prices of the model are Rs. 1200 and Rs. 800 respectively. How many screen of each model should the furniture maker assemble if he wishes to maximize his sales revenue? Solve the problem graphically.
2. Solve

$$\begin{aligned} Max\ z &= 2x_1 + x_2 \\ s.t.\ \ 4x_1 + 3x_2 &\le 12 \\ 4x_1 + x_2 &\le 8 \\ 4x_1 - x_2 &\le 8 \\ x_1, x_2 &\ge 0 \end{aligned}$$

3. Use dual simplex method to solve:

$$\begin{aligned} Min\ z &= 2x_1 + x_2 \\ s.t.\ x_1 + x_2 &= 4 \\ 2x_1 - x_2 &\ge 4 \\ x_1, x_2 &\ge 0 \end{aligned}$$

4. Use duality to solve the following LPP

$$\begin{aligned} Min\ z &= x_1 + x_2 + x_3 \ldots\ldots + 6 \\ s.t\ \ x_1 &\qquad\qquad + x_6 \ge 7 \\ x_1 + x_2 &\qquad\qquad \ge 20 \\ x_2 + x_3 &\qquad\qquad \ge 14 \\ x_3 + x_4 &\qquad\qquad \ge 20 \\ x_4 + x_5 &\qquad\qquad \ge 10 \\ x_5 + x_6 &\ge 5 \\ x_i \ge 0, i &= 1, \ldots\ldots, 6 \end{aligned}$$

5. Solve the following LPP using Two Phase method

$$\begin{aligned} Max\ z &= x_1 + 2x_2 + 3x_3 - x_4 \\ s.t\ \ x_1 + 2x_2 + 3x_3 &= 15 \\ 2x_1 + x_2 + 5x_3 &= 20 \\ x_1 + 2x_2 + x_3 + x_4 &= 10 \qquad x_i \ge 0, i = 1,2,3,4 \end{aligned}$$

6. Solve the following LPP using Big M method

$$Max\ z = 4x_1 + 6x_2$$
$$s.t.\ x_1 - 2x_2 \geq -4$$
$$2x_1 + 4x_2 \geq 12$$
$$x_1 + x_2 \geq 9$$
$$x_1 and\ x_2 are\ unrestricted$$

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Roll No. 2K12/MC/009

5th SEMESTER

B.Tech (MC- Engg.)

MID SEMESTER EXAMINATION

SEP 2014

MC – 303 Financial Engineering

Time : 90 mins

Max. Marks: 20

Note: Attempt **any four** questions. All question carry equal marks. Assume missing data , if any.

1. Let $A(0)$ =\$ 100 and $A(1)$ =\$ 110 , $S(0)$ = \$80 and

$$S(1) = \begin{cases} \$100 & \text{with probability } 0.8, \\ \$60 & \text{with probability } 0.2 \end{cases}$$

Suppose that you have \$10,000 to invest in a portfolio. For the above stock and bond prices, design a portfolio with initial wealth of \$10, 000 split fifty-fifty between stock and bonds. Compute the expected return and risk.

2. Describe the assumption for the market in detail.

3. Let $A(0)$ = \$100, $A(1)$ = \$112 and $S(0)$ = \$34. Is it possible to find an arbitrage opportunity if the forward price of stock is F = \$38.60 with delivery date 1? Justify your answer.

4. Find the price of a bond with face value \$100 and \$5 annual coupons that matures in four years, given that the continuous compounding rate is a) 8% or b) 5%.

5. Find the stock price on the exercise date for a European put option with strike price \$36 and exercise date in three months to produce a profit of \$3 if the option is bought for \$4.50, financed by a loan at 12% compounded continuously.

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FIFTH SEMESTER **B. Tech. (MC)**

MID SEMESTER EXAMINATION ***September-2014***

MC-304 Information and Network Security

Time: 1 Hour 30 Minutes **Max. Marks: 20**

Note: Answer any **Four** questions.
Assume suitable missing data, if any.

Q1. Write short notes on: (Any 5) 5

1. Network Security Model
2. Steganography
3. Ipv4 and Ipv6
4. Logic Bomb and Trojan Horse
5. Cryptanalysis
6. Intruders
7. Virus

Q2. Describe Security Services and Mechanisms in detail, and give the relation between both. 5

Q3. (a) What are the functions of Physical, Datalink and Network Layer in OSI Model? 3

(b) Explain Audit Records in context to Intrusion Detection. 2

Q4. Explain Intrusion Detection in detail. 5

Q5. (a) Describe any three Substitution Techniques. How is it different from Transposition Technique? 3

(b) Differentiate between Block Cipher and Stream Cipher. 2

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FIFTH SEMESTER **B. Tech. (MC)**

MID SEMESTER EXAMINATION
September-2014

MC-305 DATABASE MANAGEMENT SYSTEM

Time: 1 Hour 30 Minutes **Max. Marks: 20**

Note: Answer any **Four** questions.
Assume suitable missing data, if any.

Q1. (a) What is DBMS? What are the advantages of DBMS over File Processing System? 3

(b) Describe the three levels of Data Abstraction? 2

Q2. What is E-R model? Draw E-R diagram of any one of the following

1. Hospital
2. University 5

Q3. Let the following relation schemas be given:

R = (A,B,C)

S = (D,E, F)

Let relations r(R) and s(S) be given. Give an expression in SQL that is equivalent

to each of the following queries.

a. $\Pi_A(r)$

b. $\sigma_{B=17}(r)$

c. $r \times s$

d. r-s

e. $\Pi_{A,F}(\sigma_{C=D}(r \times s))$ 5

Q4. Consider the relational database of an employee:

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.

a. Modify the database so that Jones now lives in Newtown. 1

b. Find the names of all employees in this database who live in the same city as the company for which they work. 2

c. Give all managers of First Bank Corporation a 10 percent raise. 2

Q5. Short notes on: (Any 5) 5

1. Instance vs Schema
2. Procedural DML vs Non Procedural DML
3. Primary Key and Foreign Key
4. DDL and DML
5. DBA
6. **Except** operation
7. Mapping Cardinality