*Total No. of Pages: 01* *Roll No:* 69

***FIFTH SEMESTER*** ***B.Tech.***

MID *SEMESTER EXAMINATION* *(Sep. 2016)*

## MC-301, Modern Algebra

*Time:* 1 *Hr.* 30 *min* *Max. Marks: 20*

Note: Attempt **all**questions
All questions carry equal marks.

(1) *Give example for a non-cyclic abelian group. Let $G$ be a group in which*

$$(ab)^3 = a^3b^3$$
$$(ab)^5 = a^5b^5.$$

*Show that $G$ is abelian.*

(2) *Show that $HK$ is a subgroup of $G$ iff $HK = KH$ whenever $H$ and $K$ are subgroups of a group $G$.*

(3) *Define a cyclic group with an example. Show that the set $S_3$ of permutations on $\{1, 2, 3\}$ with composition of mappings forms a non-abelian group.*

(4) *State and prove Lagrange's theorem, whether the converse is true? Justify your answer.*

(5) *Define Kernel of a homomorphism with an example. Let $H$ and $K$ be two subgroups of a group $G$, where $H$ is normal in $G$, then show that:*
*(i) $H \cap K$ is normal in $H$ and*
*(ii)*

$$\frac{H}{H \cap K} \cong \frac{HK}{K}.$$

.....

*Total No. of Pages: 02*

*Roll No.* 69

**B. Tech. [MC]**

***Fifth Semester***

**MID SEMESTER EXAMINATION**

***(Sept.-2016)***

**MC-302 Operations Research**

***Time:*** 1.30 ***Hours***

***Max. Marks: 20***

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

1. A freight plane has three large compartments to carry cargo. Weight and volume of these compartments are

| Compartment | Weight (tons) | Volume $m^3$ |
|---|---|---|
| Front | 10 | 6800 |
| Center | 16 | 8700 |
| Rear | 8 | 5300 |

There are four cargos waiting to be loaded in this plane. Properties of these cargos are shown on the table below:

| Cargo | Total weight (tons) | Total volume $m^3$ | Profit (RS/Ton) |
|---|---|---|---|
| K1 | 18 | 8640 | 310 |
| K2 | 15 | 9750 | 380 |
| K3 | 12 | 4680 | 285 |
| K4 | 23 | 13340 | 350 |

Furthermore, the weight of the cargo in the respective compartments must be the same proportion of that compartment's weight capacity to maintain the balance of the plane. If any proportion of these cargos can be accepted, formulate a LP model to maximize the profit by choosing how many tons of which cargo to load on the plane under these circumstances. Solve this problem by simplex method (5)

2. Consider the Linear programming problem Max $Z = x_1 + 5x_2 + 3x_3$, subject to $x_1 + 2x_2 + x_3 = 3$, $2x_1 - x_2 = 4$, $x_1, x_2, x_3 \geq 0$, find the dual of the problem. Determine the optimal solution of this problem either using dual or from the primal. (5)

3. Solve the Linear programming problem using the appropriate method taught to you.

Maximize $Z = -12.5x_1 - 14.5x_2$, subject to $x_1 + x_2 \geq 2000$, $40x_1 + 75x_2 \geq 100000$, $75x_1 + 100x_2 \leq 200000$, $x_1, x_2 \geq 0$. (5)

4. Solve the linear programming problem using Dual Simplex method $\min Z = 3x_1 + 4x_2 + 5x_3$, subject to $2x_1 + 2x_2 + x_3 \geq 6$, $x_1 + 2x_2 + 3x_3 \geq 5$, $x_1, x_2, x_3 \geq 0$. (5)

5. Write statements of the strong duality theorem, weak duality theorem and verify the weak duality theorem with a suitable example. (5)

Total no. of pages :1

Roll No. 69

5th SEMESTER

B.Tech ( MC- Engg.)

MID SEMESTER EXAMINATION

SEP 2016

# MC – 303 Financial Engineering

Time : 90 mins

Max. Marks: 20

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

1. Let $A(0)$ =\$ 90 and $A(1)$ =\$ 99 , $S(0)$ = \$75 and

$$S(1) = \begin{cases} \$90 & \text{with probability } 0.8, \\ \$70 & \text{with probability } 0.2 \end{cases}$$

Compute the expected return and risk for the portfolio (60,40).

2. If S(0) = A(0), then prove that $S^d < A(1) < S^u$, or else an arbitrage opportunity would arise.

3. Derive the expression for risk neutral probability .

4. Describe the options in detail by defining various types, positions and their respective payoffs. Which option would you suggest to an investor if stock price is expected to go down.

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.

*Total No. of Pages: 1*
VTH SEMESTER
MID SEMESTER EXAMINATION

*Roll No.* 69
B.Tech.(MC)
(Sept – 2016)

Paper Code: **MC-304**
Subject: **Information and Network Security**
**Time: 1:30 Hours**
**Max. Marks: 20**

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

Ques1: A block of address is granted to small organization with one of the address is 167.199.170.82/27. Find

i) The number of addresses in a block.
ii) First address.
iii) Last address. 2+1+1

Q2: a) what is meant by information security? Discuss the three aspects of information security.

b) What is cryptography and how it is different from steganography? 3+3

Q3: a) Using Euclidean/Extended Euclidean algorithm, compute following:

(i) $367^{-1} \bmod 551$
(ii) GCD(245, 1267)

b) Define the term: Authentication, Integrity, Privacy, authorization and non-repudiation. 3+3

Q4: Write short note (any two):

i) Cryptanalysis
ii) Replay attacks
iii) Active and Passive attacks 2+2

*Total No. of Pages* 1 Roll No. 69.....

**VTH SEMESTER** **B.TECH. [MC]**

**MID SEMESTER EXAMINATION** **(September 2016)**

# MC-305 DATABASE MANAGEMENT SYSTEM

**Time: 1:30 Hours** **Max. Marks : 20**

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

Q 1. (a) What are the characteristics of a DBMS system? What the advantages of using DBMS over file processing systems? 2

(b) Name four different DBMS systems available. Differentiate between DBMS and RDBMS. 2

Q 2. (a) An organization purchases items from a number of suppliers. Suppliers are identified by SUP-ID. It keeps track of the number of each item type purchased from each supplier. It also keeps a record of supplier's addresses. Supplied items are identified by ITEM-TYPE and have description (DESC). There may be more than one such addresses for each supplier and the price charged by each supplier for each item type is stored. Identify the entites and relationships for this organization and construct an E-R diagram. From the E-R diagram. 3

(b) What are the responsibilities of a DBA? 1

Q.3 (a) Define the following with examples: 2

(i) Strong Entity (ii) Database schema.

(b) Define different types of constraints 2

Q.4. (a) What is functional dependency. 1

(b) Consider the universal relation R ={ A, B, C, D, E, F , G, H , I, J} and set of functional dependencies F = ( {A,B} → {C} → {B, D} → {E,F }, {A,D} → {G, H}, {A} → {I}, {H} → {J}). What is the key of R? Decompose R into 2NF and 3NF relations. 3

Q5. Write short notes 4

(a) Data Models

(b) Data Abstraction