

FIFTH SEMESTER

MID SEM EXAMINATION

MC-301 MODERN ALGEBRA

Roll No.....

B.E. (MC)

SEP 2013

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) Let H and K be finite subgroups of G such that HK is also a subgroup. Then show that
$$o(HK) = \frac{o(H)o(K)}{o(H \cap K)}.$$

b) Show that the set $G = \{\bar{m} \mid \bar{m} \in \mathbb{Z}_n, (m, n) = 1\}$ together with the binary operation defined by $\bar{i} \cdot \bar{j} = \bar{k}$ where $ij \equiv k \pmod{n}$ and $0 \leq k < n$ forms a group.

c) Show that G is abelian if and only if $(ab)^n = a^n b^n \quad \forall \quad a, b \in G.$

(7)
2. a) Let G be a finite cyclic group of order n then show that G has $\phi(n)$ generators.
- b) Show that any subgroup of an infinite cyclic group is also an infinite cyclic group
- c) Let $a, b \in G$ s.t $ab = ba$. If $o(a) = n$ and $o(b) = m$ with $(m, n) = 1$ then show that $o(ab) = mn.$

(6)

3. a) State and prove Lagrange's theorem. Is converse true? Provide an example where the converse is true and justify it.
- b) Show that if G is a group of order 10 then it must have a subgroup of order 5.
- c) (i) Prove that every group of prime order is cyclic
- (ii) State and prove Fermat's theorem.

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Mid Semester (2013)

B.Tech V Semester(Mathematics and Computing)

Course Name : Operations Research

Max Marks: 20

Total No. of pages-2

Roll No. 22.8.11/MC/

Course Code: MC-302

Time: 1.5 Hours

Note:1. Attempt any five questions. Each question carry equal marks.

2. Assume missing data, if any.

- Q 1. A used car dealer wishes to stock-up his lot to maximize his profit. He can select cars A, B and C which are valued wholesale at Rs 5000/-, Rs 7000/- and Rs 8000/- respectively. These can be sold at Rs 6000/-, Rs 8500/-, Rs 10500/- respectively. For each car type the probabilities of the sale are: _____

Type of car	A	B	C
Probability of sale in 90 days	0.7	0.8	0.6

For each two cars of B, he should buy one car of type A or C. If he has Rs 1,00,000/- to invest. Formulate the given above data to maximize his expected gain.

- Q 2. Solve the following problem by graphical method

$$\text{Max } z = 4x_1 + 3x_2$$

subject to :

$$x_1 + x_2 \leq 8$$

$$x_1 + x_2 \leq 0$$

$$x_1, x_2 \geq 0$$

Give the solution of dual also.

- Q 3. Write the dual of the following Linear Programming Problem:

$$\text{Min } z = 4x_1 + x_2 + 2x_3$$

subject to :

$$-x_1 + 3x_2 - 4x_3 = 5$$

$$x_1 - 2x_2 \geq 3$$

$$2x_2 - x_3 \geq 4$$

$$x_1, x_2 \geq 0 \text{ and } x_3 \text{ is unrestricted.}$$

- Q 4. Solve the following problem by simplex method .

$$\text{Max } z = 4x_1 + 14x_2$$

subject to :

$$2x_1 + 7x_2 \leq 21$$

$$7x_1 + 2x_2 \leq 21$$

$$x_1, x_2 \geq 0$$

Q 5. Solve the following problem.

$$\text{Min } z = 2x_1 - x_2 + 2x_3$$

subject to :

$$-x_1 + x_2 + x_3 = 4$$

$$-x_1 + x_2 - x_3 \leq 6$$

$$x_1 \leq 0, \quad x_2 \geq 0$$

x_3 unrestricted in sign.

Q 6. Solve the following problem by 2-phase method.

$$\text{Max } z = -2x_1 - x_2$$

subject to :

$$3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 - x_3 = 6$$

$$x_1 + 2x_2 + x_4 = 3$$

$$x_1, x_2, x_3, x_4 \geq 0$$

Q 7. Discuss the degeneracy in the following problem.

$$\text{Max } z = 2x_1 + x_2$$

subject to :

$$4x_1 + 3x_2 \leq 12$$

$$4x_1 + x_2 \leq 8$$

$$4x_1 - x_2 \leq 8$$

$$x_1, x_2 \geq 0$$

Roll No. 2K11/MC/D17
B.Tech (MC-)
SEP 2013

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5th SEMESTER

MID SEMESTER EXAMINATION

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. If $S(0) = A(0)$, then prove that

$$S^d < A(1) < S^u, \quad \text{or else an arbitrage opportunity would arise.}$$

3. Define Forward Contract and its various payoffs. Represent the payoffs by graphs. The risk-free rate of interest is 7% per annum with continuous compounding, and the dividend yield on a stock is 3.2% per annum. The current price of the stock is Rs.150. What is the six-month forward price?
 $F(0, T) = S(0) e^{(r - \delta)T}$

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.

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5TH SEMESTER

MID SEMESTER EXAMINATION

Roll No. 2K11/11

B.Tech.(MC)

(SEPTEMBER. – 2013)

MC-304

INFORMATION AND NETWORK SECURITY

Time: 1:30 Hours

Max. Marks: 20

Note: Answer any 4 questions.

Q1- Categorize the four basic Network topologies, and cite the advantage and disadvantages of each type.

(5)

Q2- How do the layer of TCP/IP correlate to the layer of OSI model?

(5)

Q3- How are OSI and ISO related to each other? What are the responsibilities of Data link layer in OSI model?

(5)

Q4- Compare and contrast between two approaches to packet switching.

(5)

Q5- Compare and contrast the fields in the main headers of IPv4 and IPv6.

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FIFTH SEMESTER

Roll No. 2011111111

B.Tech. (CO)

MID SEMESTER EXAMINATION

September-2013

MC-305 DATABASE MANAGEMENT SYSTEM

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

- Q1.(a) Draw E-R diagram for railway reservation system. 3
 (b) Write short notes on data abstraction. 2
- Q2.(a) Differentiate the following 3
 (i) Schema and instance (ii) 2-tier 3-tier architecture
 (b) What are the responsibilities of DBA? 2
- Q3.(a) What is DBMS? What are the advantages of DBMS over file processing system? 3
 (b) What is weak entity set? Give appropriate examples. 2
- Q4.(a) Define the terms multi-valued, composite, derived, key, single attributes. 2
 (b) Write the steps to convert E-R model to relational model. 3