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Roll No:...M.S/059.....

FIFTH SEMESTER **B.Tech.**

MID SEMESTER EXAMINATION (Sep. 2015)

MC-301, Modern Algebra

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

Note: Attempt allquestions
All questions carry equal marks.

(1) Define the binary for the class of addition modulo n and multiplication modulo n and show that both form an abelian group under the binary defined in it.

(2) Let H and K be finite subgroups of a group G such that HK is also a subgroup of G. Then show that
a) $o(HK) = \frac{o(H)o(K)}{o(H \cap K)}$
b) if $o(H) > o(G)$ and $o(K) > o(G)$ then $o(H \cap K) > 1$.

(3) Define a cyclic group with an example. Let G be a finite cyclic group of order n. Then show that G has $\phi(n)$ generators.

(4) Define normal subgroup with an example. If H is a normal subgroup of G then show that the set of left(right) cosets of H in G forms a group for the operation $(aH)(bH) = abH$.

(5) Define Kernel of a homomorphism with an example. State and prove the first fundamental theorem of homomorphism.

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B. Tech. 5th SEMESTER (MATHEMATICS AND COMPUTING)

MID-SEMESTER EXAMINATION SEPTEMBER-2015

MC-302 OPERATIONS RESEARCH

Time: 1:30 Hours Max. Marks: 20

Note- Question No. 1 is compulsory. Attempt any two questions from rest.

Assume suitable missing data, if any.

Q.1 Write the dual of the following LPP

$$\min w = 3x + 4y + 5z$$

Subject to

$$6x + 7y + 8z \geq 9$$

$$10x + 11y + 12z \geq 13$$

$$x, y, z \geq 0$$

and then solve it. Also write the solution of primal LPP from the dual problem.**(8)**

Q.2 A firm buys castings of P and Q type of parts and sells them as finished product after machining, boring and polishing. The purchasing costs for castings are Rs. 3 and Rs. 4 each for parts P and Q and selling costs are Rs. 8 and Rs. 10 respectively. The per hour capacity of machines used for machining, boring and polishing for two products is given below:

Capacity per hour	Parts	
	P	Q
Machining	30	50
Boring	30	45
Polishing	45	30

The running costs for machining, boring and polishing are Rs. 30, Rs. 22.5 and Rs. 22.5 per hour respectively. Then formulate the linear programming problem and solve graphically. **(6)**

Q.3 Solve the following LPP using Big-M method:

$$\min z = 2x_1 + 3x_2$$

Subject to

$$0.5x_1 + 0.25x_2 \leq 4$$
$$x_1 + 3x_2 \geq 20$$
$$x_1 + x_2 = 10$$
$$x_1, x_2 \geq 0.$$

(6)

Q.4 Solve the following LPP by Two phase method:

$$\max w = 3x - y + 2z$$

Subject to

$$x + 3y + z \leq 5$$
$$2x - y + z \geq 2$$
$$4x + 3y - 2z = 5$$
$$x, y, z \geq 0$$

(6)

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Roll No. 059

5th SEMESTER

B.Tech (MC- Engg.)

MID SEMESTER EXAMINATION

SEP 2015

MC – 303 Financial Engineering

Time : 90 mins

Max. Marks: 20

Note: Attempt **All** questions. All question carry equal marks. Assume missing data , if any. Use of Statistical table is allowed.

1. Let $A(0)$ =Rs. 80 and $A(1)$ =Rs. 100 , $S(0)$ = Rs.75 and $S(1) = \begin{cases} \text{Rs. } 110 & \text{with probability } 0.6, \\ \text{Rs. } 60 & \text{with probability } 0.4 \end{cases}$ For the above stock and bond prices, design a portfolio with initial wealth of Rs.50, 000, split in ratio 3:2 between stock and bonds. Compute the expected return and risk of the portfolio.

2. Write the expression for the value of a Forward contract at time $= \tau$, $0 < \tau < T$, where T is delivery time, and prove it.

3. Let $S(0)$ = Rs.110, $u = 0.4$, $d = 0.1$ *and* $r = 0.2$ consider a call option with strike price Rs.120. Find the option price and replicating strategy in two time steps.

4. The present value of a stock is Rs.100 with volatility 30%. Continuously compounded risk free interest rate is 3%. Find the price of European call option with strike price Rs90 and time to expiration 3-years taking two time steps.

5. The present value of a non-dividend paying stock is Rs.50 with volatility 20%. Continuously compounded risk free interest rate is 10%. Find the Black Scholes price of European call option with strike price Rs80 and maturity time 4-years.

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Vth SEMESTER **B.Tech.[MC]**

MID SEMESTER EXAMINATION **(Sept-2015)**

MC-304 **INFORMATION & NETWORK SECURITY**

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

Note: Answer any FOUR questions.

Assume suitable missing data, if any.

Q.1 Describe TCP/IP Protocol Suite with suitable diagrams. **(5)**

Q.2 Briefly Explain Data Link layer and Media Access Sub layer protocols. **(5)**

Q.3 Describe the conventional Encryption model with the help of suitable diagram and types of Security services offered. **(2+3)**

Q.4 Find the cipher text of the following plain text using Vignere cipher- **(5)**

Key: MEDITATION

Plaintext :"YOGA IS GOOD FOR HEALTH".

Q.5 Write a short note on any Two: **(2.5+2.5)**

(a) Switching methods

(c) Steganography

(d)Virus and related Threads

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5TH SEMESTER **B.Tech. (MCE)**

MID SEMESTER EXAMINATION **(September– 2015)**

MC 305 Database Management System

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

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

6. Answer any 4 of the following: [4]

(g) What is logical data independence?

(h) $S \bowtie R = S \times R$, if S and R don't share any attributes, and $S \bowtie R = S \cup R$, if S and R have the same attributes. True/False, specify the reason?

(i) In SQL, relations are sets of tuples and can't have any duplicates .True/False, specify the reason?

(j) Define primary key. Give an example.

(k) Describe in brief the three levels of data abstraction?

(l) What do you mean by functional dependency?

7. What is ER Diagram? Construct an ER diagram for a company which sells and services cars. The company keeps information about customers who purchase one or more cars, the sales person who is responsible for the sale and service details for each car. [4]

8. Consider the following airline database schema:

- Flights(flno, from, to, distance, departs)
- Aircraft(aid, aname, range)
- Certified(eid, aid)
- Employees(eid, ename, salary)

By definition, pilots are those employees who are certified on at least one aircraft. An aircraft can be used for any flight provided it has sufficient range. Pilots can pilot any flight provided they

are certified on an aircraft with sufficient range. Write the following queries in Relational Algebra.

(e) Find eid's of pilots who are certified on Boeing aircraft.
(f) Find names of pilots who are certified on Boeing aircraft.
(g) Find aid's of aircraft that can fly non-stop from LA to NY. Assume you don't already know the distance.
(h) Find eid of employee(s) with the highest salary. [4]

9. What is data independence? Discuss various database languages. [4]

10. Consider the relation R {A,B,C,D,E,F}and set of functional dependencies F= {A → BC, B → E, CD →EF }
(e) Prove that AD → F?
(f) Determine $(AD)^+$?
(g) Is AD the super key?
(h) Is AD the candidate key? [4]