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Roll No. MC153

6th Semester

B. Tech. [MC]

Mid Semester Examination

(March-2019)

MC302 Database Management System

Time 1h 30 min.

Max. Marks: 30

NOTE: *Attempt all Questions. Assume suitable missing data if any.*

Q1. A) What is the difference between primary key and unique constraints? [2]

B) What is the difference between delete and truncate command in SQL? [2]

C) What are the disadvantages of DBMS (any two)? [2]

D) Explain different data anomalies with example. [4]

Q2. Consider the following database schema to write queries in SQL

Supplier (Sid, name, city) [2 * 2.5 = 5 marks]

Parts (pno, pname, pdescription)

Supply (Sid, pno, cost)

i) Find the names of the parts supplied by "RamRaj".

ii) Find the cheapest cost of every part. You can use part number (pno).

Q3. A university registrar's office maintains data about the following entities:

a) Courses, including number, title, credits, syllabus, and prerequisites;

b) Course Offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;

c) Students, including student-id, name, and program;

d) Instructors, including identification number, name, department, and title.

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Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints. [6 marks]

Q4. For each of the following relations, tell which normal form it is (none, 1NF, 2NF, 3NF, or BCNF) and why? If it is less than 3NF, give an equivalent 3NF schema. [2 * 2 = 4 marks]

a) **Rentals** [SailorId, SailorName, BoatId, Date]

[SailorId, BoatId, Date] is the primary key.

SailorId → SailorName.

b) **Customers** [Id, Name, Address, PhoneNumber]

PhoneNumbers is a comma-delimited list. Id and Name are keys.

There are no other FDs.

Q5. Suppose we have a database for an investment firm, consisting of the following attributes: [2 * 2.5 = 5 marks]

B – Broker, O – Office of a broker,

I – Investor, D – dividend paid by a stock,

Q – Quantity of stock owned by an investor, S – Stock.

Hence, the overall schema is R = (B, O, I, S, Q, D).

Assume that the following FDs are required to hold on this database

I → B, IS → Q, B → O, S → D.

1) List all the candidate keys for R.

2) Give a lossless-join decomposition of R into 3NF preserving FD.

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Roll No. MC/53

SIXTH SEMESTER

B.Tech[MC]

MID SEMESTER EXAMINATION *March-2019*

MC304 THEORY OF COMPUTATION

Time: 1:30 Hours *Max. Marks : 25*

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

Q.1 [a] Choose the correct answer. Justify (3)

i. Which of the following is a regular expression for binary strings with no consecutive 1's ?

a) $(01 + 10)^*$

b) $(1 + \Lambda)(01 + 0)^*$

c) $(0 + 1)^*(0 + \Lambda)$

d) $(10 + 0)^*(1 + \Lambda)^*$

ii. Which of the following is the language of the grammar:

S →bS|aA|b ; A→bA|aB ; B →bB|aS|a

a) Number of a's is more than three times the number of b's.

b) Number of b's is more than three times the number of a's.

c) Number of a's is multiple of 3.

d) Number of b's is multiple of 3.

iii. The smallest finite automata that accepts all non-negative binary numbers divisible by 3 has:

a) 2 states

b) 3 states

c) 4 states

d) 5 states

[b] What is the length of output string if the length of input string is n, in case of Mealy and Moore machine.Explain. (2)

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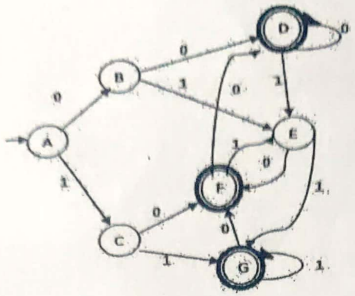
Q.2 [a] Construct a minimum state automata equivalent to the transition diagram below: (5)

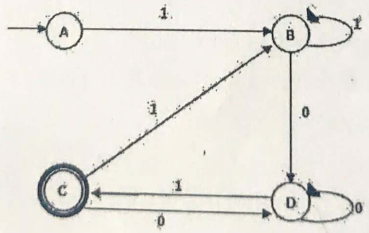


[b] Construct a Finite Automata that accept the set of all inputs that are binary numbers divisible by 4 or by 6. (5)

Q.3 [a] Show that all the language under Chomsky classification are closed under concatenation. (4)

[b] If R is a regular expression over $\sum$ representing $L \subset \Sigma^*$, construct an NDFA M with Λ-moves such that L= T(M), where last operator in R is concatenation. (3)

[c] Find the regular expression corresponding to the automata given below: (3)



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Roll No. MC/53

6th SEMESTER

B.Tech (MC- Engg.)

MID SEMESTER EXAMINATION

MAR 2019

MC – 306 Financial Engineering

Time : 90 mins

Max. Marks: 25

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

1. Let $B(0) = Rs.100, B(1) = Rs.105$ *and* $S(0) = Rs.75$. Also, let
$$S(1) = \begin{cases} Rs.88, & with\ probability\ p = 0.60 \\ Rs.69, & with\ probability\ p = 0.40. \end{cases}$$
Design a portfolio with initial wealth of Rs.5, 000, split in the ratio of 2:3 between stock and bond. Compute the expected return and the risk of the portfolio so constructed.

2. Let $S(0) = Rs.110, u = 1.1, d = 0.9$ *and* $r = 5\%$. Consider a call option with strike price $K = Rs.130$ *and* $T = 2$. Find the option price and the replicating strategy.

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

4. A non-dividend paying stock is currently selling at $Rs.125$ with annual volatility 18%. Assume the continuously compounded risk free interest rate is 5%. Using a two period CRR binomial option pricing model find the price of one European call option on this stock with a strike price of $Rs.160$ and time to expiration 3 years.

5. The stock price is $Rs.80$. The annual continuously compounded risk free interest rate is 7% and the annual volatility relevant for the Black-Scholes formula is 14%. Call options are written with a strike price of $Rs.75$ and time to expiration of 3 years. Use Black-Scholes formula to find the price of one such call option.

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SIXTH SEMESTER **B.Tech.[Elective]**

MID SEMESTER EXAMINATION March, 2019

MC324, Big Data Analytics

Time: 1.5 Hours M.M.: 25

Note: *Attempt **ALL** questions. Assume suitable missing data, if any. Write your answer concisely.*

1. Discuss briefly the following Characteristic of the Big Data:
   (a) Volume
   (b) Velocity
   (c) Veracity [2+2+1]
2. Discuss the Challenges to the Conventional systems of Data Management. [5]
3. Discuss the followings: Stream computing and Filtering Streams [3+2]
4. The weight of certain type of a truck tyre is known to be distributed normally with mean 200 pounds and standard deviation 4 pounds. A random sample of 10 tyres is selected
   (a) What is the sampling distribution of sample mean? Also obtain the mean and variance of this distribution.
   (b) Find the probability that the mean of this sample is greater than or equal to 202 pounds [3+3]
5. Discuss central limit theorem with an example. [4]

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FIFTH SEMESTER

Roll No. MC/53

MID- SEMESTER EXAMINATION

B.Tech.

MAR-2019

HU304 Professional Ethics & Human Values

Time: 1.5 Hours

Max. Marks: 25

Note : There are two sections in this question paper.
Section A is compulsory question.
Attempt any four questions from Section B.

SECTION-A

(5Marks)

Q1. Study the given case carefully and answer the following:

A junior member of staff has just returned to work after taking special leave to care for her elderly mother. For financial reasons she needs to work full-time. She has been having difficulties with her mother's home care arrangements, causing her to miss a number of team meetings and to leave work early. She is very competent in her work but her absences are putting pressure on her and on her overworked colleagues. One of her male colleagues is beginning to make comments such as 'a woman's place is in the home', and is undermining her at every opportunity, putting her under ever greater stress.

You are her manager, and you are aware that the flow of work through the practice is coming under pressure. How should you proceed so as not to discredit yourself, your profession or the practice for which you work and at the same maintaining integrity and confidentiality in your actions?

SECTION- B (Attempt any four questions) (4x5=20 Marks)

Q.2 What do you mean by codes of ethics? Explain the need of ethical codes for professionals?

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Q.3 What do you understand by 'Morality' and 'Ethics'? Why there is a need to focus on ethics?

Q.4 Define the term "Professionalism"? A professional has an additional characteristics and responsibility in addition to that of a citizen. Explain it.

Q.5 There are many problems manifest today at the level of individual, family, society and the nature. Explain some of the ways to maintain happiness, harmony and prosperity in these different spheres of life.

Q.6 Define value education? Explain the importance of value education in our life?

Q.7 Explain and compare the three major ethical theories - Utilitarianism, Deontology, Virtue Ethics?

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