Total No. of Pages: 04

B. Tech. [MC] Roll No. ... .

End Semester Examination 6th Semester

MC-302 Database Management System (May-2018)

Time 3h **00 min.** Max. Marks: 40

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

Q1. A) Consider a university database for the scheduling of classrooms for final exams. This database could be modelled as the single entity set exam, with attributes course-name, section-number, room-number, and time. Alternatively, one or more additional entity sets could be defined, along with relationship sets to replace some of the attributes of the exam entity set, as

- course with attributes: name, department, and c-number
- section with attributes: s-number and enrolment, and dependent as a weak entity set on course
- room with attributes: r-number, capacity, and building

Show an E-R diagram illustrating the use of all three additional entity sets listed. [5 marks]

B) What is an entity type? What is an entity set? Explain the differences among an entity, an entity type, and an entity set. [3 marks]

Q2. A) Consider the following Resort, Suite, Reservation and Visitor schemas in a DBMS. [6 marks]

RESORT (resortNo, resortName, resortType, resortAddress, resortCity, numSuite)

SUITE (suiteNo, resortNo, suitePrice)

RESERVATION (reservationNo, resortNo, visitorNo, checkIn, checkout, totalVisitor, suiteNo)

Visitor (visitorNo, firstName, lastName, visitorAddress)

P.T.O

i) Write the SQL to list full details of all the resorts in Jaipur.

ii) Write the SQL to list full details of all the resorts having number of suites more than 30.

iii) Write the SQL to list visitors in ascending order by first name

B) How does SQL allow implementation of the entity integrity and referential integrity constraints? [2 marks]

Q3. A) Consider the relation: BOOK (Book_Name, Author, Edition, Year). With the data: [5 marks]

Book Name	Author	Edition	Copyright Year
DB fundamentals	Navathe	4	2004
DB fundamentals	Elmasri	4	2004
DB fundamentals	Elmasri	5	2007
DB fundamentals	Navathe	5	2007

a) Based on the common sense understanding of the above data, what are the possible candidate keys for this relation?

b) Justify that this relation has the MVD *{Book_Name}* $\twoheadrightarrow$ *{Author}*| {Edition, Year}.

c) What would be the decomposition of this relation based on the above MVD? Evaluate each resulting relation for the highest normal form it possesses.

B) Consider the universal relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = {{A, B} -> {C}, {A} -> {D, E}, {B} -> {F}. {F} -> {G, H}, {D} -> {I, J}}. What is the key for R? Decompose R into 2NF, then 3NF relations. [3 marks]

Q4. A) Consider a disk with block size B=512 bytes. A block pointer is P=6 bytes long, and a record pointer is PR =7 bytes long. A file has r=30,000 EMPLOYEE records of fixed-length. Record size R = 115 bytes long.

(a) Calculate the blocking factor *bfr* and the number of file blocks b assuming an unspanned organization.

(b) Suppose the file is ordered by the key field SSN of size 9 bytes and we want to construct a primary index on SSN. Calculate

(i) the index blocking factor bfr_i (which is also the index fan-out fo);

(ii) the number of first-level index entries and the number of first-level index blocks;

(iii) the number of levels needed if we make it into a multi-level index;

(iv) the total number of blocks required by the multi-level index; and

(v) the number of block accesses needed to search for and retrieve a record from the file--given its SSN value--using the primary index. [6 marks]

B) A STUDENT file with Rollno as the key field includes records with the following Rollno values: 70, 15, 20, 35, 18, 55, 43. Suppose that the search field values are inserted in the given order in a B+ tree of order p=3; show the tree after inserting these values. [2 marks]

Q5. A) List the ACID properties. Explain the usefulness of each. [4 marks]

B) When a transaction is rolled back under timestamp ordering, it is assigned a new timestamp. Why can it not simply keep its old timestamp? [2 marks]

C) Under what conditions is it less expensive to avoid deadlock than to allow deadlocks to occur and then to detect them? [2 marks]

Q6. A) Consider the two tables T1 and T2 shown in figure. Show the results of the following questions: [4 marks]

Table $T1$

P	Q	R
10	a	5
15	b	8
25	a	6

Table $T2$

A	B	C
10	b	6
25	c	3
10	b	5

i) $T1 \bowtie_{T1.P=T2.A} T2$

ii) $T1 \cup T2$

iii) $T1 \bowtie_{T1.P=T2.A} T2$

iv) $T1 \bowtie_{T1.P=T2.A \text{ AND } T1.R=T2.C} T2$

B) Consider the transactions T1, T2, and T3 and the schedules S1 and S2 given below. Draw the serializability (precedence) graphs for S1 and S2 and state whether each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s). [4 marks]

T1: r1(X); r1(Z); w1(X); w1(Z)
T2: r2(Y); r2(Z); w2(Z)
T3: r3(Y); r3(X); w3(Y)
S1: r1(X); r3(Y); r3(X); r2(Y); r2(Z);
w3(Y); w2(Z); r1(Z); w1(X); w1(Z)
S2: r1(X); r3(Y); r2(Y); r3(X); r1(Z);
r2(Z); w3(Y); w1(X); w2(Z); w1(Z)

Q7. Write short note on any two of the following: [8 marks]

a) Primary Index

b) Secondary index

c) View Serializable Schedule

Total No. of pages. 03
SIXTH SEMESTER

Roll No.....9a.....

END SEMESTER EXAMINATION

B.TECH (MC)

MAY 2018

MC 304 THEORY OF COMPUTATION

Time: 3 Hours

Max.Marks: 50

Note:Answer **ALL** by selecting any **TWO** parts from each question. All questions carry equal marks.

Q1(a). $M = (\{q_1, q_2, q_3\}, \{0,1\}, \delta, q_1, \{q_3\})$ is a nondeterministic finite automaton, where δ is given by

$$\delta(q_1,0) = \{q_2,q_3\}, \quad \delta(q_2,0) = \{q_1,q_2\}, \quad \delta(q_3,0) = \{q_2,\}$$

$$\delta(q_1,1) = \{q_1\}, \quad \delta(q_2,1) = \emptyset, \quad \delta(q_3,1) = \{q_1,q_2\}$$

Construct an equivalent DFA.

(b) Construct a nondeterministic finite automaton accepting the set of all strings over $\{a, b\}$ ending in aba. Use it to construct a DFA accepting the same set of strings.

(c) Construct a Moore machine equivalent to the Mealy machine M defined by Table below:

Present State	Next State			
	$a = 0$		$a = 1$	
	State	output	state	output
$\rightarrow q_1$	q_1	1	q_2	0
q_2	q_4	1	q_4	1
q_3	q_2	1	q_3	1
q_4	q_3	0	q_1	1

Q2(a). State whether the statements are true or false. Give reason for the answer.

i. If a grammar G has three productions $S \to aSa, S \to bSb, S \to c$ then $abcba$, $bacab \in L(G)$.

ii. $\{a^n b^n : n \geq 1\}$ is regular

iii. If $G = (V_n, \Sigma, P, S)$ and $P \neq \emptyset$, then $L(G) \neq \emptyset$

iv. Two grammars of different types can generate the same language.

v. If a grammar G has productions $S \to aS, S \to bS, S \to a$, then $L(G)$ is the set of all strings over $\{a, b\}$ ending in a.

(b) Define equivalent grammars. Show that $G_1 = (\{S\}, \{a, b\}, P_1, S)$, where $P_1 = \{S \to aSb, S \to ab\}$ is equivalent to $G_2 = (\{S, A, B, C\}, \{a, b\}, P_2, S)$, where P_2 consists of $S \to AC$, $S \to AB, C \to SB, A \to a, B \to b$.

(c) Define context-free grammar. Construct CFG to generate the set of all strings over {0,1} containing twice as many 0's as 1's.

Q3 (a) State and prove Kleene's theorem.

(b) State Pumping lemma for regular set. Prove that $L = \{0^i 1^i : i \geq 1\}$ is not regular.

(c) By constructing transition system, prove that $(a + b)^* = a^*(ba^*)^*$

Q4 (a) Given the grammar $S \to AB, A \to a, B \to C/b$, $C \to D, D \to E$, $E \to a$, Find an equivalent grammar which is reduced and has no unit productions.

(b) Reduce the following grammar to CNF:

$S \to S+S$, $S \to S * S$, $S \to a$, $S \to b$.

(c) Reduce the following grammar to GNF:

$S \to AB, A \to BSB, A \to BB, B \to aAb, B \to a, A \to b$.

Q5(a) Prove that if a pda $A = (Q, \Sigma, \Gamma, \delta, q_0, Z_0, F)$ accepts L by final state, then we can construct a pda B accepting L by empty store.

(b) Construct a pda A equivalent to the following CFG:
$S \rightarrow 0BB, B \rightarrow 0S \,/\, 1S \,/\, 0$. Test whether 010000 is in N(A).

(c) Consider the Turing machine M described by the transition table below. Describe the processing of (i) 011, (ii) 0011, (iii) 001 using ID's. Which of the above are accepted by M.

Present State			Tape Symbol		
	0	1	x	y	b
$\rightarrow q_1$	xRq_2				bRq_5
q_2	$0Rq_2$	yLq_3		yRq_2	
q_3	$0Lq_4$		xRq_5	yLq_3	
q_4	$0Lq_4$		xRq_1		
q_5				yRq_5	bRq_6
(q_6)					

END

Total no. of pages :2 Roll No. MC10-5

6th SEMESTER B.Tech (MC- Engg.)

END SEMESTER EXAMINATION May 2018

MC – 306 Financial Engineering

Time : 3 hrs Max. Marks: 50

Note: *Q.No.1 is compulsory, answer any other three questions.* All questions carry equal mark. Statistical table is allowed. Assume missing data , if any.

1 (a) The current price of silver is $Rs.5000$ per 100gm. The storage cost is $Rs.0.60$ per gm per year payable quarterly in advance. Assuming that constant interest rate of 9% compounded quarterly, calculate the forward price of silver for 1kg for delivery in 6 months.

(b) Consider purchase of 100 units of 3-month Rs.25-strike European call option. It is given that the stock is currently selling for Rs.20; the continuous compounding risk free interest is 5%; the stocks volatility is 24% per annum. If the stock pays dividends continuously at the rate of 3% per annum, determine the price of block of 100 call options, assuming the Black-Scholes framework.

(c) Let $X(t) = \mu t + \sigma W(t), -\infty < \mu < \infty, 0 < \sigma < \infty$. Prove that $\{X(t), t \geq 0\}$ is a martingale for $\mu = 0$.

(d) Prove that if short sales are not allowed then the risk of the portfolio can not exceed the greater of the risks of the individual components of the portfolio.

2 (a) State and prove Put-Call parity formula.

(b) Consider a stock whose value S(t) follows sde $dS = r.Sdt + \sigma.SdW$ and has a current price S(0). What is the probability that a call option is in the money based on a strike price $K = 1.25\ S(0)$ at time of expiration T? Given that $T = 0.5, r = 0.04$ and $\sigma = 0.10$.

3. (a) Find the stochastic differential of $W^2(t)$.

(b) Use the first version of Ito-Doeblin formula to evaluate $\int_0^T 3W^3(t)dW(T)$

4. (a) Let $B(0) = Rs.100, B(1) = Rs.110$ *and* $S(0) = Rs.82$.

$$S(1) = \begin{cases} Rs.95, & with\ probability\ p = 0.80 \\ Rs.70, & with\ probability\ p = 0.20. \end{cases}$$

For K = Rs.90 and T = 1 year, determine P(0).

(b) Derive the expression for line which converts into Capital Market line. Explain the condition of CML with respect to efficient frontier.

5. (a) Find the expression for feasible region of 'n' asset portfolio in (σ, μ) – plane , and describe it.

(b) Suppose the portfolios are constructed using three securities al, a2, a3 with expected returns, $\mu_1 = 20\%$, $\mu_2 = 13\%$, $\mu_3 = 4\%$ standard deviations of returns, $\sigma_1 = 25\%$, $\sigma_2 = 28\%$, $\sigma_3 = 20\%$, and the correlation between returns, $\rho_{12} = 0.3$, $\rho_{13} = 0.15$ and $\rho_{23} = 0.4$. What are the weights of the three securities in this portfolio with minimum risk, While desired expected return is 20%.

Total No. of Pages: 2

6th Semester

End Semester Examination

Roll No. MCI 90

B. Tech.

(May-2018)

MC 310: Software Engineering

Time: 3 Hours

Max. Marks: 50

Note: Attemt any five questions. Each question carries equal marks.

1. **(a)** What do you understand by a software life cycle model? What problems might occur if a software development organization does not use any specific life cycle model?

   (b) Discuss quality function deployment technique of requirements elicitation. Why an importance or value factor is associated with every requirement?

2. **(a)** Discuss the prototype model. What is the effect of designing a prototype on the overall cost of the software project?

   (b) What are size metrics? How is function point metric is advantageous over LOC metric?

3. Given the following, create a context-level DFD for a university library system.

The system must record the books owned by the library. The library manager will update this list of books on a regular basis. The system must record who has borrowed what books, and which books have been returned. Before someone can borrow a book, they must show a valid ID card that is checked to ensure that it is still valid against the student database maintained by the Registrar's Office (for student borrowers), the faculty/staff database maintained by the Personnel Office (for faculty/staff borrowers), or against the library's own guest database (for individuals issued a "guest" card by the library). The system must also check to ensure the borrower does not have any overdue books or unpaid fines before he or she can borrow another book. Every Monday, the library prints and mails postcards to those

people with overdue books. If a book is overdue by more than two weeks, a fine will be imposed. Sometimes books are lost or are returned in damaged condition. The manager must then remove them from the database and will sometimes impose a fine on the borrower.

4. (a) Explain, with an example, how an intermediate COCOMO provides more accurate estimates as compare to basic COCOMO.

(b) Explain with examples, top down, bottom up and hybrid approaches of software design.

5. (a) Define module cohesion and explain defferent types of cohesion. If a module has logical cohesion, what kind of coupling is this module likely to have with others?

(b) For a program with number of unique operators $\eta_1 = 30$ and number of unique operands $\eta_2 = 50$, compute the program volume, effort and time, program length and program level.

6. (a) Define the terms 'software reliability' and 'software quality'. How can these be measured ?

(b) Differentiate between alpha testing and beta testing and explain black box testing.

7. (a) Explain Boehm software quality model.

(b) Explain equivalence class testing and integration testing.

Total No. of Pages: 4

6th SEMESTER

END SEMESTER EXAMINATION

Roll No.....

B. Tech.

(May-2018)

MC 320: WEB TECHNOLOGY

Time: 3:00 Hours

Note: Answer any five questions.

Max. Marks: 50

Q1. Explain different network topologies with their advantages and disadvantages. (10)

Q2. a) Describe 7-layered OSI model of networking. (7)

b) Explain the concept of DNS. (3)

Q3. a) What is CSS? How to Insert CSS, explain all types with example. (6)

b) How does JDBC work? (4)

Q4. a) What is PHP global variable $_REQUEST? (1)

b) Define basic PHP Syntax with an example (2)

c) Write the output of the given code: (2)

```
<? php
$sum=0;
for($x=1; $x<=5; $x +=1)
$sum = $sum + $x;
echo($sum);
echo("<br>");
echo($x);
?>
```

d) Rewrite the following code after removing errors with each correction underlined. (2)

PTO

```
<?
value=5;
while($value!= =0)
{
$r_digit=$value%10;
$value/=10;
}
ECHO $r_digit;
?>
```

e) Give output of the following statements:

i) echo 10+3*2%3-6

ii) echo ltrim("Examination", "Ex")

iii) echo date("M-d-Y", mktime(0,0,0,14,1,2001)) (3)

Q5. Write the code to display a form as shown below along with the JavaScript code to achieve the specified task. User should be able to enter the number of calls and the total amount payable gets displayed when he presses "calculate" button.

NUMBER OF CALLS [ ]

Calculate

The total amount payable will be calculated based on the following rate list:

- Rs. 1.00 per call for the 1st 100 calls
- Rs. 1.20 per call for the next 100 calls
- Rs. 1.50 per call for the next 50 calls
- Rs. 2.00 per call for more than 250 calls. (4)

b) Write a JavaScript code to add two numbers. (4)

c) Explain Conditional operator in JavaScript with the help of an example. (2)

Q6. a) Define
 tag with example. (2)

b) Write the HTML code to generate a Web Page in the format given below : (8)

Consider the following while writing the HTML code

1. Title of the page should be "Save Girl Child"
2. Link colour should be "Maroon", visited link colour should be "Red" .
3. Heading of page is "violet"
4. Picture used in the page is the file "savegirl.jpg"
5. Table should have a border of width 1, border of table should be "green".
6. Background of first row is "yellow" and of second row is "cyan"
7. Pages linked to :
   At the National level as "national.html"
   At the State level as "state.html"
   At the District level as "district.html
8. Bottom message is of size 2 is linked to email-id savegirl@abc.com

Save girl child, educate girl child

Save girl child, educate girl child (Beti Bachao, Beti Padhao) is a Government of India scheme that aims to generate awareness and improving the efficiency of welfare services meant for women.

Project Implementation

1. At the National level
2. At the State level
3. At the District level

The objectives of this initiative are:		
Prevention of gender biased sex selective elimination	Ensuring survival & protection of the girl child	Ensuring education and participation of the girl child

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For Further Enquiries

Q7. Write a short note on any five of the following: (2*5=10)

i) Opinion Mining.
ii) Web Crawling.
iii) Search Engine Optimization.
iv) Web Mining.
v) Features of Web 3.0
vi) Limitations of Web 2.0

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Total No. of Page :1

Roll No. 40

SIXTH SEMESTER

B.Tech. (Mrng]

END SEMESTER EXAMINATION

MAY-2018

HU304 Professional Ethics &Human Values

Time: 3 Hours

Max. Marks :50

Attempt any five questions(10x5=50 Marks)

Q.1 What is professionalism? Explain any fourcharacteristics and four responsibilities of a professional?

Q.2 What is the importance of codes of ethics? Name few professional associations and codes prescribed by them.

Q.3 What do you understand by risk-benefit analysis in engineering project? How far should ethical considerations become part of it?

Q.4 Compare and explain in detail the major ethical theories (utilitarianism, deontology, virtue ethics)

Q.5 What are the major problems in Environmental ethics?What steps can be taken up to overcome ethical issues related to concerned field?

Q.6 What is computer ethics? What are the ethical problems related to computer ethics and what steps can be taken to minimize the problems associated to it?

Q.7 What are the rights of professionals? Explain the concept of 'whistle blowing"and IPR (intellectual property right).

Q.8 What is engineering ethics? What are the ethical issues(product specific) and ethical obligations in engineering ethics?

END

*Total No. of Pages :2_*

Roll No. 2K15/EL/02

FIFTH SEMESTER

B.Tech. (Mrng)

MID- SEMESTER EXAMINATION Nov-*2017*

HU-303 Professional Ethics &Human Values

Time: 3 Hours

Max. Marks :50

Note :There are two sections in this question paper.
Attempt both the questions (1.a and 1.b) from Section A.
Attempt any four questions from Section B.

SECTION-A

(5x2=10Marks)

Q.1. Study the given cases carefully and answer the following questions.

(a) Mo and Jo are employees of Zip, Inc. and are zealous users of the computer network there. One evening after hours, in a spirit of fun, they begin writing comic phrases into the other's computer files. This "game" becomes a mutual challenge. They then tire of the game and decide to try accessing corporate files not normally open to them.

Mo and Jo then collaborate, Mo at the computer terminal and both suggesting commands to try. Through a relatively short sequence of simple attempts they finally succeed in entering the confidential files. Proud of their "computer virtuosity," they decide to leave a cartoon message in the files: "The Phantom was here." To their horror, part of the sequence of commends for this causes the files to be jumbled! Moreover, the chaotic action occurs over the entire network files.

At great cost to the company the system files must be purged and reloaded from backup sources. Mo and Jo are discovered and admit their act, but argue that it was not their intent. Both are fired.

(i) Is Zip justified in the firings? Mo and Jo did not mean to do this; it was a prank that misfired.

(ii) Mo argues that: It was ridiculously easy to access the files, the company should do a better job of protecting them. And Jo further argues that: They violated no law, because the act was internal to the company. Therefore, at most they should be disciplined and allowed to keep their jobs. Comment on this argument.

Q.1.(b) You are working as an Executive Engineer in the construction cell of a Municipal Corporation and are presently in-charge of the construction of a flyover. There are two Junior Engineers under you who have the responsibility of day-to-day inspection of the site and are reporting to you, while you are finally reporting to the Chief Engineer who heads the cell. While the construction is heading towards completion, the Junior Engineers have been regularly reporting that all construction is taking place as per design specifications. However, in one of your surprise inspections, you have noticed some serious deviations and lacunae which, in your opinion, are likely to affect the safety of the flyover. Rectification of these lacunae at this stage would require a substantial amount of demolition and rework which will cause a tangible loss to the contractor and will also delay completion. There is a lot of public pressure on the Corporation to get this construction completed because of heavy traffic congestion in the area. When you brought this matter to the notice of the Chief Engineer, he advised you that in his opinion it is not a very serious lapse and may be ignored. He advised for further expediting the project for completion in time. However, you are convinced that this was a serious matter which might affect public safety and should not be left unaddressed.

What will you do in such a situation? Some of the options are given below. Evaluate the merits and demerits of each of these options and finally suggest what course of action you would like to take, giving reasons.

(i) Follow the advice of the Chief Engineer and go ahead.

(ii) Make an exhaustive report of the situation bringing out all facts and analysis along with your own viewpoints stated clearly and seek for written orders from the chief Engineer.orCall for explanation from the Junior Engineers and issue orders to the contractor for necessary correction within targeted time.

SECTION- B

(Attempt any four questions) **(10x4=40 Marks)**

Q.2Whatis professionalism? Explain any four characteristics and four responsibilities of a professional?
Q.3What are codes of ethics for Engineers? Explain the importance of following these codes.
Q.4 What do you understand by risk-benefit analysis in engineering project? How far should ethical considerations become part of it?
Q.5Explain the following:
(i) Life skills that an Engineer should possess
(ii) Different roles of an Engineer
Q.6 Compare and explain major ethical theories (utilitarianism, deontology, virtue ethics)
Q.7What are the major problems in Environmental ethics/ Computer ethics? What steps can be taken up to overcome ethical issues related to concerned field?
(Explain any one of the field either environmental ethics or computer ethics.)
Q.8What are the rights of professionals? Explain the concept of 'whistle blowing"and IPR (intellectual property right).
Q.9 "The indirect and subtle effects of present day trends in technology are difficult to measure and qualify."- Explain the benefits and potential harm science and technology can have on society.
Q.10 What is engineering ethics? What are the issues and ethical obligations in engineering ethics?

-END-