

Roll No.

TCS-451

B. TECH. (CSE) (FOURTH SEMESTER) MID SEMESTER EXAMINATION, 2019

VIRTUALIZATION AND CLOUD COMPUTING

Time : 1 : 30 Hours

Maximum Marks : 50

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks/True-False : (1×5=5 Marks)

(a) Cloud computing is a model for enabling ubiquitous convenient, on-demand, network access to a shared pool of configurable computing resources.

(True/False)

(b) SOAP stands for

(c) A cloud environment can be accessed from anywhere in the world as long as the user has access to the Internet.

(True/False)

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- (d) Access to a cloud environment always costs more money compared to a traditional desktop environment.

(True/False)

- (e) describes a distribution model in which applications are hosted by a service provider and made available to users.

2. Attempt any *five* parts : (3×5=15 Marks)

- (a) Define TCO with suitable example.
- (b) Explain Web 2.0 with suitable diagram.
- (c) Explain AWS with suitable services examples.
- (d) Define Xen.
- (e) Explain types of virtualization.
- (f) Explain the challenges in cloud computing technology adoption by their stakeholders.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

- (a) Define Cloud computing as per NIST. What are the advantages and disadvantages of cloud computing ?
- (b) Explain taxonomy of virtualization with suitable example.
- (c) Discuss the architecture of Hyper-V and discuss its use in cloud computing.

(3)

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Describe any *two* cloud computing stakeholders and their perspectives of using cloud computing services with suitable example.

(b) Explain the cloud computing characteristics as per NIST.

(c) Evaluate the pros and cons of the virtualization.

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Describe the service oriented computing and utility oriented computing with suitable examples.

(b) Differentiate between Full Virtualization using binary translation, Full Virtualization using hardware-assisted technology and Paravirtualization.

(c) Briefly explain the benefits of cloud computing with its disadvantages.

Roll No.

TCS-471

**B. TECH. (CSE-BDA)
(FOURTH SEMESTER)**

MID SEMESTER EXAMINATION, 2019

STATISTICAL DATA ANALYSIS WITH R

Time : 1 : 30 Hours

Maximum Marks : 50

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks/True-False : (1×5=5 Marks)

(a) If you are concerned with the proportion less than or greater than a certain value on a distribution, you should use
(absolute/relative) frequencies.

(b) "Lurking variable are factors that could influence the relationships we measure between two or more variables."

(True/False)

- (c) When using a sample to make inferences about a population we do not expect the average to be exactly equal to the average of the population. The difference between the sample and population averages is known as

(sampling error/statistical decision error/population differences)

- (d) "In a negatively skewed distribution scores with lowest frequencies are on the left side of the distribution." (True/False)

- (e) In general, when we visualize data with histograms, as we make the bin size bigger, the frequency gets

(larger/smaller)

2. Attempt any *five* parts : (3×5=15 Marks)

(Define/Short Numerical/Short Programming/Data)

- (a) A golf team's 6 members had the scores below in their most recent tournament :

70, 72, 74, 76, 80, 114

Between mean and median which is the better measure of centre ? Why ?

- (b) For the dataset 4, 4, 10, 11, 15, 7, 14, 12, 6 find the interquartile range.

- (c) Find the standard deviation of the dataset 31, 33, 36, 41, 34.
- (d) Consider the following vector of values stored in a variable called x :
7, 12, 9, 15, NA, 8, 14, NA, 2, 9, NA, 8
(comma is used just to show the different values). Write an R program to return the positions of the missing values in x . Write an R program to count the number of non-missing values in x .
- (e) Define construct. Define operational definition. Which of the following are constructs ? How Hungry is someone, annual income in Indian rupees, your personality, your age in years, your height, the fuel efficiency of a car in km per litre, the price of a MacBook.
- (f) Do all values in a dataset affect the mode ? Give an example to justify your answer.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
- (a) Explain the following terms :
- (i) Population
 - (ii) Sample
 - (iii) Variable

- (iv) Quantitative Variable
 - (v) Qualitative Variable
 - (vi) Discrete Variable
 - (vii) Continuous Variable
- (b) Write a function in R that computes the mode (ensure that you handle the case for multi-modal data).
- (c) Differentiate between Descriptive Statistics and Inferential Statistics. What are the *four* types of statistical measures used to describe data ?
4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
- (a) What is the relationship between mean, mode and median in a Normal Distribution ? What is the relationship in a positively skewed distribution ?
- (b) Consider the following vector :
- ```
> text = c('cat 122', 'dog 213', '721 horse', 'cow 42', '893 duck')
```
- Use regular expressions for the following :
- (i) Write an R program to create a vector like text, with the number in each element appearing before the animal name.



- (ii) Write an R program to create a vector containing just the animal names in text.
- (iii) Write an R program to produce a vector containing the position of the blank in each element of text.
- (iv) Write an R program to remove the first three characters in each of the elements of text.
- (c) What do you understand by categorical variable ? Given the following dataset write code in R to encode the categorical data :

| Gender | Age | Purchased |
|--------|-----|-----------|
| Male   | 37  | Yes       |
| Male   | 26  | No        |
| Female | 34  | Yes       |
| Male   | 31  | No        |
| Female | 28  | No        |

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

- (a) What is the significance of standard deviation for a normal distribution ? If the

mean is 60 and the standard deviation is 13, what are the values (i) One  $\sigma$  below the mean, (ii) Two  $\sigma$  above the mean, (iii)  $\bar{X}-2\sigma$ .

- (b) What is Bessel's correlation in variance and standard deviation calculations ? How is it useful ?
- (c) Explain the statement with an example "Correlation does not imply causation."

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**TCS-491**

**B. TECH. (CSE)**  
**(FOURTH SEMESTER)**  
**MID SEMESTER EXAMINATION, 2019**  
**INTRODUCTION TO CRYPTOGRAPHY**

**Time : 1 : 30 Hours**

**Maximum Marks : 50**

**Note :** (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

**Section—A**

1. Fill in the blanks : (1×5=5 Marks)

- (a) What does CIA stand for \_\_\_\_\_ ?
- (b) The ciphertext for “modern cryptography” using rail fence cipher is \_\_\_\_\_.
- (c) We can use \_\_\_\_\_ attack to break additive ciphers.
- (d) \_\_\_\_\_ is a pseudorandom bit generator.
- (e) A \_\_\_\_\_ is a cipher in which the letters of the plaintext remain the same, but their order is rearranged.

2. Attempt any *five* parts : (3×5=15 Marks)
- (a) Find the gcd of (21,300) using the Euclid Algorithm.
  - (b) Give the neat diagram of a modern crypto system.
  - (c) Differentiate between substitution and transposition ciphers giving example of one cipher of each type.
  - (d) Define integrity and non-repudiation.
  - (e) Why is "One time pad" considered to be a perfect cipher ?
  - (f) Differentiate between cryptography and steganography.

### Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
- (a) In order to have a secure communication system, we require a sequence of random numbers to be used as session keys. List the various methods to generate random numbers, explaining any *one* in detail.
  - (b) Show that the following integer pairs are relatively prime to each other : (91, 200), (625, 999).

- (c) Use a Brute Force attack to decipher the following message encrypted by Chhota Bheem using an additive cipher. Suppose that Bheem always uses a key close to his birthday, which is on 13th of the month :

NCJAEZRCLASJLYODEPRLYZRCLAS  
JLCPEHZDTOPDZQLNZT

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

- (a) Distinguish between active and passive security attacks giving examples.
- (b) Use Playfair cipher with the Key QUESTION to decrypt the given ciphertext :

LNFUMBHKS YUBHPGYGZ.

- (c) What conditions are required to be fulfilled to make an algorithm to be computationally secure ?
5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
- (a) Find the Euler Totient function value for the given numbers :
- (i) 41

(ii) 15

(iii) 75

(iv) 32

(v) 29

(b) Solve the following congruence equations using the CRT :

$$x \equiv 2 \pmod{3}$$

$$x \equiv 3 \pmod{5}$$

$$x \equiv 4 \pmod{11}$$

$$x \equiv 5 \pmod{16}$$

(c) Find the multiplicative inverse of each non-zero element in  $\mathbb{Z}_5$ .

15/03/2019  
9:00 AM  
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**TCS-408**

**B. TECH. (CSE/IT)  
(FOURTH SEMESTER)  
MID SEMESTER EXAMINATION, 2019  
JAVA PROGRAMMING LANGUAGE**

**Time : 1 : 30 Hours**

**Maximum Marks : 50**

**Note :** (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

(iii) Programs should be properly indented, commented and must have expected output.

**Section—A**

1. Fill in the blanks/True-False : (1×5=5 Marks)

(a) In the statement `System.out.println("Hello World")`, `out` is an object of \_\_\_\_\_ class and "Hello World" is an object of \_\_\_\_\_ class.

(b) \_\_\_\_\_ package is imported by default by Java compiler.

(c) True and false are literals in Java.



(d) `const int MAX=20;` is a valid statement in Java.

(e) `int data = 0 × 1010;` is a valid statement in Java.

2. Attempt any *five* parts : (3×5=15 Marks)

(a) List out the steps involved in creating arrays in Java. Provide the typical statements/code to justify your answer.

(b) Write a Java program to print "Hello World" and list out keywords, identifiers and separators used in your program.

(c) What are interfaces ? Define an interface and all possible contents that it can have. Can an interface inherit a class ? Justify.

(d) Explain the concept of widening and narrowing in Java with the help of typical examples. Which primitive data types are compatible and which are not ?

(e) List out any *two* IDEs used for Java Programming. Explain any *five* features provided by IDE that help programmers in developing applications.

(f) What are wrapper classes ? Which is the immediate super class of these classes ? List out any *four* wrapper classes and show usage of any *one* method of each of these classes.

## Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

- (a) List out any *six* features of Java Language and explain each.
- (b) Write *two* separate programs to explain usage of :
  - (i) break with labelled and unlabelled variations and
  - (ii) continue with labelled and unlabelled variations

Provide appropriate explanation to the concept and show the output printed by your program.

- (c) What are the different data types supported by expression in switch statement ? Further, write a program using switch statement to read day of the week in number from the user and display the day. e.g. if user enters 1 print Sunday.
4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
- (a) With reference to a programming language, what do you understand by the terms Platform Independent and Portable ? Explain with appropriate examples. Elaborate on how Java achieves this.

- (b) Write a program to read two strings say str1 and str2 from user and print whether str1 is less than, greater than or equal to str2.
- (c) List out advantages of inheritance in a programming language. Write a program demonstrating multiple inheritance in Java, using appropriate concepts.

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

- (a) Why does a class have multiple constructors ? Write a code demonstrating the various types of constructors available in Java and how these can be used in creating objects.
- (b) What do you understand by method overloading ? Can we achieve method overloading in super-sub relationship ? Justify your answer with the help of a code.
- (c) List out any *three* packages of Java API and at least *two* classes in each of the packages mentioned. Provide typical code and steps involved in creation of package (through command prompt) in Java.

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**TCS-404**

**B. TECH. (CS/IT)**  
**(FOURTH SEMESTER)**

**MID SEMESTER EXAMINATION, 2019**

**COMPUTER ORGANIZATION**

**Time : 1 : 30 Hours**

**Maximum Marks : 50**

**Note :** (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

**Section—A**

1. Fill in the blanks : (1×5=5 Marks)

(a) In 6 bit 2's complement representation, when we subtract the decimal number + 6 from + 3, the result (in binary) will be .....

(b) The autoincrement and autodecrement addressing modes are special cases of ..... addressing mode.

- (c) Assume that for a full adder implementation, the delay for sum and carry generation are 6 nsec and 4 nsec respectively. The worst-case delay of a 16-bit ripple carry adder will be .....
- (d) Two's complement of a number is 10110011, the number is .....
- (e) In Reverse Polish notation, expression  $W * X + Y * Z$  is written as .....
2. Attempt any five parts : (3×5=15 Marks)
- (a) Give the flowchart for sign magnitude addition and subtraction.
- (b) How positive infinity and negative infinity are represented in IEEE 754 ?
- (c) Represent ( - 23) using sign magnitude, 1's complement and 2's complement notation. What do you understand by standard organizations ?
- (d) The stage delays in a 4-stage pipeline are 800, 500, 400 and 300 picoseconds. The first stage (with delay 800 picoseconds) is replaced with a functionally equivalent design involving two stages with respective delays 600 and 350 picoseconds. Find the throughput increase of the pipeline.

- (e) Write an program to evaluate  $(A + B) * (C + D)$  using zero address instructions.
- (f) Consider a RISC machine where each instruction is exactly 4 bytes long. Conditional and unconditional branch instruction use PC-relative addressing mode with Offset specified in bytes to the target location of the branch instruction. Further the Offset is always with respect to the address of the next instruction in the program sequence. Consider the following instruction sequence :

| Instr. No. | Instruction     |
|------------|-----------------|
| i          | add R2, R3, R4  |
| i + 1      | sub R5, R6, R7  |
| i + 2      | cmp R1, R9, R10 |
| i + 3      | beq R1, offset  |

If the target of the branch instruction is i, then what is the decimal value of the offset ?

### Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
- (a) Explain Von Neumann architecture with neat diagram. Why is it required ?

(b) A computer has 32 bit instructions and 12 bit addresses. If there are 250 two address instructions how many one address instructions can be formulated ?

(c) Suppose we have made the following measurements :

Frequency of FP (Floating Point)

operations = 25%

Average CPI of FP operations = 4.0

Average CPI of other instructions = 1.33

Frequency of FPSQR = 2%

CPI of FPSQR = 20

Assume that the two design alternatives are to decrease the CPI of FPSQR (floating point square root) to 2 or to decrease the average CPI of all FP operations to 2.5. Compare these two design alternatives using the processor performance equation.

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) State Amdahl's law. A Compiler designer in trying to decide between two code sequences for a particular machine. Based



on the hardware implementation, there are three different classes of instructions :

Class A, Class B and Class C and they require one, two and three cycles (respectively).

The first code sequence has 5 instructions :  
2 of A, 1 of B and 2 of C

The second sequence has 6 instructions :  
4 of A, 1 of B and 1 of C

(i) Which sequence will be faster ? How much ?

(ii) What is the CPI for each sequence ?

(b) With the help of neat and clear diagram, describe in detail the single bus processor architecture.

(c) Describe various generations of computer in detail.

5. Attempt any *two* parts of choice from (a), (b) and (e). (5×2=10 Marks)

(a) Briefly discuss special values that are represented in IEEE 754 Standard Floating-point representation. Create the

32-bit single-precision IEEE standard representation of the decimal number  $- (0.525)$ .

- (b) Multiple  $(+ 12)$  and  $(- 20)$  using Booth's algorithm.
- (c) Explain the importance of different addressing modes in computer architecture with suitable example.

Roll No. ....

**TCS-403**

**B. TECH. (CSE)  
(FOURTH SEMESTER)**

**MID SEMESTER EXAMINATION, 2019**

**MICROPROCESSORS**

**Time : 1 : 30 Hours**

**Maximum Marks : 50**

**Note :**(i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

**Section—A**

1. Fill in the blanks/True-False : (1×5=5 Marks)

(a) LDA address has 3 machine cycles.

(True/False)

(b) Vector location 002CH is of RST 6.

(True/False)

(c) Total number of address lines required to express 4GB memory are .....

- (d) In 8085 demultiplexing of AD bus is done by using an external address latch and ..... signal.
- (e) The status of flags after executing PCHL instruction is .....

2. Attempt any *five* parts : (3×5=15 Marks)

- (a) What is the function of (i) ALE (ii)  $S_1S_0$  (iii) IO/M in microprocessor 8085 ?
- (b) Write about the various registers in 8085.
- (c) Describe the Instruction Set of 8085.
- (d) Evaluate the content of accumulator and flags while executing each of the instructions of the following program :

XRA A,

MVI A 5FH

XRI B4H

CMA

HLT

- (e) Explain the differences between a JMP instruction and CALL instruction.

- (f) What are the differences between memories mapped I/O and I/O mapped I/O ?

### Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
- (a) Draw the internal block diagram of 8085 and briefly explain each block.
- (b) Write a program in 8085 which adds two 8 bit numbers which are stored in a memory address starting at 2050H. Store the result at consequent memory address starting from 3050H.
- (c) What are flags in 8085 ? How are they affected ? Explain with examples. If register A has data 5AH, give the status of flags after executing each instruction separately :
- (i) ADI 6EH
  - (ii) ORI F5H
  - (iii) XRA A

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
- (a) Generate distinct control signals to Read and Write from memory and I/O devices.
  - (b) Describe the stack operation of 8085 with relevant instructions.
  - (c) Write about addressing modes of 8085, with distinct example of each.
5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
- (a) Explain the instruction cycle of 8085. Draw the instruction cycle of instruction MVI A, FFH stored at memory address starting from 2000H.
  - (b) Explain the interrupt structure in 8085.
  - (c) Two bytes are stored consequently in memory starting at memory location 2050H. Write an Assembly language program in 8085 to find the largest of the two numbers and store it in memory at address 3050H.

Roll No. ....

## **TCS-402**

### **B. TECH. (CS/IT) (FOURTH SEMESTER) MID SEMESTER EXAMINATION, 2019**

#### **FINITE AUTOMATA AND FORMAL LANGUAGES**

**Time : 1:30 Hours**

**Maximum Marks : 50**

**Note :**(i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

#### **Section—A**

1. Attempt all multiple choice questions choosing the correct option : (1×5=5 Marks)

(a) Transition function maps :

(i)  $Q \times \Sigma \rightarrow \Sigma$

(ii)  $Q \times \Sigma \rightarrow Q$

(iii)  $\Sigma \times \Sigma \rightarrow \Sigma$

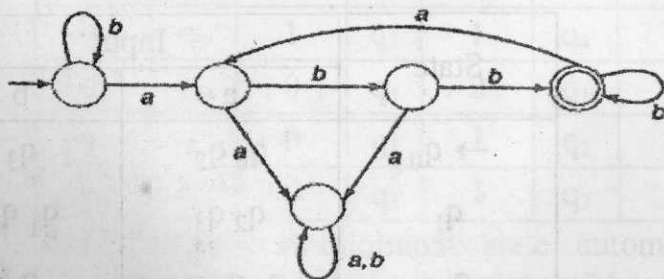
(iv)  $Q \times Q \rightarrow Q$



- (b) Number of states required to accept all the string ends with 10 over input (0, 1) :
- (i) 2
  - (ii) 1
  - (iii) 3
  - (iv) None of the above
- (c) A finite automata requires minimum ..... number of stacks.
- (i) 0
  - (ii) 1
  - (iii) 2
  - (iv) 3
- (d) For which of the following applications regular expressions can be used ?
- (i) Designing compilers
  - (ii) Developing text editors
  - (iii) Simulating sequential circuits
  - (iv) All of the above
- (e) A Regular expression for all strings starts with ab and ends with bba is :
- (i)  $aba*b*bba$
  - (ii)  $ab(ab)*bba$
  - (iii)  $ab(a+b)*bba$
  - (iv) All of the mentioned

2. Attempt any *five* parts : (3×5=15 Marks)

- (a) Explain Chomsky Hierarchy.
- (b) Compare DFA and NFA using *two* suitable examples.
- (c) Give basic steps for construction of NFA from NFA with  $\epsilon$ -transition.
- (d) Find a regular expression to the language of all string over input (a, b) containing abb as substring.
- (e) Identify one string with minimum length "8", which get accepted by the following FSA. Provide instantaneous description (ID) for the same.



- (f) Provide an explanation for "why palindromes can't be recognized by any FSM".

## Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Design DFA for language L over  $\{0, 1\}$  such that every string in L start with 101 and end with 111.

(b) Construct DFA which reject set of all strings containing "1101" as a substring over input alphabet  $\Sigma = \{0, 1\}$ .

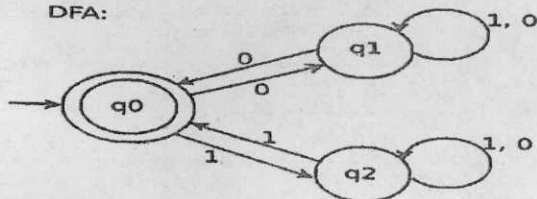
(c) Convert the NFA given in the following table to its corresponding DFA. Here  $q_0$  is initial and  $q_2, q_4$  are final states.

| State             | Input         |               |
|-------------------|---------------|---------------|
|                   | a             | b             |
| $\rightarrow q_0$ | $q_0 q_2$     | $q_3$         |
| $q_1$             | $q_2 q_3$     | $q_1 q_0$     |
| $q_2^*$           | $q_3 q_2 q_1$ | $q_4$         |
| $q_3$             | $q_0 q_1 q_2$ | $q_0 q_3 q_4$ |
| $q_4^*$           | $q_0 q_1$     | $q_4 q_2$     |

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

- (a) Find the regular expression corresponding to the finite automaton given below using Arden's theorem.

DFA:



- (b) Construct a Moore machine which is equivalent to the Mealy machine defined by table given below here  $q_1$  is initial state :

| Present States | For Input a |        | For Input b |        | For Input c |        |
|----------------|-------------|--------|-------------|--------|-------------|--------|
|                | State       | Output | Sate        | Output | State       | Output |
| $q_1$          | $q_3$       | 1      | $q_2$       | 1      | $q_4$       | 1      |
| $q_2$          | $q_1$       | 0      | $q_4$       | 2      | $q_1$       | 2      |
| $q_3$          | $q_2$       | 0      | $q_1$       | 1      | $q_2$       | 0      |
| $q_4$          | $q_4$       | 0      | $q_3$       | 1      | $q_3$       | 0      |

- (c) Construct a minimum state automaton equivalent to given automaton M whose transition table is defined by table given ahead. Her  $q_0$  is initial and  $q_6, q_7$  are final states :

| State          | Input          |                |
|----------------|----------------|----------------|
|                | a              | b              |
| q <sub>0</sub> | q <sub>1</sub> | q <sub>0</sub> |
| q <sub>1</sub> | q <sub>0</sub> | q <sub>2</sub> |
| q <sub>2</sub> | q <sub>7</sub> | q <sub>1</sub> |
| q <sub>3</sub> | q <sub>6</sub> | q <sub>7</sub> |
| q <sub>4</sub> | q <sub>7</sub> | q <sub>5</sub> |
| q <sub>5</sub> | q <sub>6</sub> | q <sub>4</sub> |
| q <sub>6</sub> | q <sub>5</sub> | q <sub>6</sub> |
| q <sub>7</sub> | q <sub>7</sub> | q <sub>0</sub> |

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) For the following regular expressions. Draw the  $\epsilon$ -NFA :

(i)  $(a+b)^*(abb+ababab)(a+b)$

(ii)  $(0+1)(10)^*(011)$

(b) Prove or disprove regularity of language  $L = \{0^n 1^n / n \geq 1\}$  using pumping lemma.

(c) Construct NFA for the set of all strings over the alphabet  $\{a, b, c\}$ , where 4th symbol from right is 'b'.