DEPARTMENT OF

INFORMATION TECHNOLOGY

II B.TECH II SEMESTER QUESTION BANK 2017-18
# LIST OF SUBJECTS

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R15A0506
FORMAL LANGUAGE AND AUTOMATA THEORY
PART – A  

1. (a) Define Alphabet .  
   (2M).
(b) What is the significance of $\varepsilon$ -Moves.  
   (3M).
(c) Explain any finite automata with output ?  
   (2M).
(d) Give English description of the language : $b(a^*b)^*a^*$ 
   (3M).
(e) Define a right linear grammar with an example.  
   (2M).
(f) How do we say that the given grammar is ambiguous?  
   (3M).
(g) List out application of pumping lemma.  
   (2M).
(h) How do we show the acceptance of CFL?  
   (3M).
(i) Define turning machine. How a TM accepts a language? 
   (2M).
(j) Explain about Counter Machine. 
   (3M).

PART – B  

SECTION – I 

2. Design a DFA for the following language  
   \[ L = \{ 0^m 1^n \mid m \geq 0 \text{ and } n \geq 1 \} \] 
   (OR)

3. Find DFA equal to NFA described by the following state transition table ,intital state =p, 
f={q,s} 

<table>
<thead>
<tr>
<th>States</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>q,s</td>
<td>q</td>
</tr>
<tr>
<td>q</td>
<td>r</td>
<td>q,r</td>
</tr>
<tr>
<td>r</td>
<td>s</td>
<td>p</td>
</tr>
<tr>
<td>s</td>
<td>-</td>
<td>p</td>
</tr>
</tbody>
</table>

SECTION – II 

4. Convert the following regular expression into equivalent NFA with $\varepsilon$-transitions R=$(10^*)^*$
5. Convert the R.E. = (a|b)* into DFA

SECTION – III

6. Construct right-linear and left-linear grammars for the following regular expression.

\[ 0^* (1(0+1))^* \]

(OR)

7. Construct the left-most and right-most derivations and parse trees for the following grammar

\[
\begin{align*}
S & \rightarrow aB \mid bA \\
A & \rightarrow aS \mid bAA \mid a \\
B & \rightarrow bS \mid aBB \mid b
\end{align*}
\]

which accepts the string “aaabbabba”.

SECTION – IV

8. Construct PDA accept the language \( L=\{a^n b^n \mid n \geq 0\} \)

(OR)

9 Construct CFG, \( G=\{S,A,B\}, \{a,b\},P,S\) with production set \( P \) as

\[
\begin{align*}
S & \rightarrow aAbB \mid A \rightarrow Ab/b \quad \mid B \rightarrow Ba/a \text{ to CNF}
\end{align*}
\]

SECTION – V

10. Explain about Chomsky hierarchy of languages.

(OR)

11. Explain about Decision properties of DCFL’s.
MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech II Semester supplementary Examinations
Formal Language and Automata Theory
Model Paper -2
(Information Technology)

Roll No

Time: 3 hours
Max. Marks: 75

Note: This question paper contains two parts A and B
Part A is compulsory which carries 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART – A (25 Marks)
1. (a) Define the terms alphabet, string, prefix, suffix, language give examples (2M)
(b) Compare NFA & DFA. (3M)
(c) Define regular grammar with example. (2M)
(d) Define unit production. (3M)
(e) Define Chomsky Normal Form (CNF). (2M)
(f) Define CFG and what its advantages are. (2M)
(g) What are Universal Turing Machines? (2M)
(h) Explain the acceptance of PDA. (3M)
(i) Define computations of a TM. (2M)
(j) State Arden’s theorem. (3M)

PART – B (50 Marks)
SECTION – I
2. Construct DFA and NFA accepting the set of all strings containing 10 as a substring. (OR)
3. Define NFA with epsilon with an example.

SECTION – II
4. Write regular expressions for each of the following languages over an alphabet \{0, 1\}
a) The set of all strings not containing “111”
b) The set of all strings in which every pair of adjacent 0’s appears before any pair of adjacent 1’s (OR)
5. Prove pumping lemma of regular sets?

SECTION – III
6. Explain left & right derivations and left & right derivation trees with examples
7. What is meant by ambiguous grammar? Test whether the grammar is ambiguous or not. 
   \[ S \rightarrow A \mid B \]
   \[ A \rightarrow aAb \mid ab \]
   \[ B \rightarrow abB \mid \epsilon \]

**SECTION – IV**

8. Obtain PDA to accept all strings generated by the language \( \{ a^n b^m a^n \mid m, n \geq 1 \} \)

(OR)

9. Explain the equivalence of CFL and PDA.

**SECTION – V**

10. What are the various variations of TM? How to achieve complex tasks using TM.

(OR)

11. Design Turing Machine to increment the value of any binary number by one. The output should also be a binary number with value one more the number given.

******
PART – A (25 Marks)

1. (a) Define Finite State Machine. (2M)
   (b) List out the applications of a Finite Automata. (3M)
   (c) Show whether \((0+1)^* \text{100} \) is regular or not. (2M)
   (d) State Pumping lemma for Regular Sets. (3M)
   (e) Define a right linear grammar with an example. (2M)
   (f) How do we say that the given grammar is ambiguous? (3M)
   (g) Define PDA. (2M)
   (h) How do we show the acceptance of CFL? (3M)
   (i) Define turning machine. How a TM accepts a language? (2M)
   (j) Explain the classes P and NP. (3M)

PART – B (50 Marks)

SECTION – I

2. Design a DFA for the following language
   \( L = \{ 0^m 1^n | m \geq 0 \text{ and } n \geq 1 \} \) (OR)

3. Find DFA equivalent to NFA, described by the following state transition table. I.S=p, F.S={q, s}

<table>
<thead>
<tr>
<th>Q</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>{q, s}</td>
<td>Q</td>
</tr>
<tr>
<td>q</td>
<td>R</td>
<td>{q, r}</td>
</tr>
<tr>
<td>r</td>
<td>S</td>
<td>p</td>
</tr>
<tr>
<td>s</td>
<td>-</td>
<td>p</td>
</tr>
</tbody>
</table>
SECTION – II

4. Consider the following regular expression and construct the finite automaton

   a) \( a + b \)  
   b) \((a + b)^*\)  
   c) \(a(a + b)^*\)  
   d) \(a(a + b)*b\)

   (OR)

5. Convert the R.E. = \((a|b)^*\) into DFA

SECTION – III

6. Construct right-linear and left-linear grammars for the following regular expression.

   \( 0^* (1(0+1))^* \)

   (OR)

7. Construct the left-most and right-most derivations and parse trees for the following grammar

   \[
   S \rightarrow aB | bA \\
   A \rightarrow aS | bAA | a \\
   B \rightarrow bS | aBB | b
   \]

   which accepts the string “aaabbabba”.

SECTION – IV

8. Construct PDA accept the language \(L = \{a^n b^n \ n \geq 0\}\)

   (OR)

9 Construct CFG, \(G=\{S,A,B\}, \{a,b\},P,S\) with production set \(P\) as

   \[
   S \rightarrow aAbB; A \rightarrow Ab/b; B \rightarrow Ba/a \text{ to CNF}
   \]

SECTION – V

10. Design a Turing Machine that recognizes any palindrome of digits \(\{0, 1\}\). Give its state transition diagram and table.

   (OR)

11. Find whether the post correspondence problem \(P = \{(10, 101), (011, 11), (101, 011)\}\) has a match. Give the solution.
MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester supplementary Examinations, November/December 2017
Formal Language and Automata Theory
(CSE)

Roll No

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART – A (25 Marks)

1. (a) Define Deterministic Finite Automata.
   (2M)

(b) Explain Moore and Mealy machines.
   (3M)

(c) List any 5 identity rules for regular sets.
   (2M)

(d) Obtain a regular expression to accept strings of a’s and b’s where number of a’s and b’s are odd.
   (3M)

(e) Define Chomsky Normal Form (CNF).
   (2M)

(f) Define a left linear grammar with an example.
   (2M)

(g) Differentiate PDA and non-deterministic PDA.
   (2M)

(h) Explain the acceptance of PDA.
   (3M)

(i) Explain any 2 techniques for Turing Machine Construction.
   (2M)

(j) State Arden’s theorem.
   (3M)

PART – B (50 Marks)

SECTION – I

2. Design DFA over = {a, b} for
   i) \((ab)^n\) with \(n \geq 0\).
   ii) \((ab)^n\) with \(n \geq 1\).

   (OR)

3. Construct a Moore and Melay Machine to accept modulo 5 counter for binary inputs.

SECTION – II

4. Write regular expressions for each of the following languages over an alphabet \(\{0, 1\}\)
   a) The set of all strings not containing “111”
   b) The set of all strings in which every pair of adjacent 0’s appears before any pair of adjacent 1’s

   (OR)

5. Show that \(\{a^n b^{2n} | n > 0\}\) is not a regular set, using pumping lemma.
SECTION – III

6. Construct right-linear and left-linear grammars for the following regular expression.
   
   \[(0 + 1)^* 11(1 + 0)^*\]

   (OR)

7. What is meant by ambiguous grammar? Test whether the grammar is ambiguous or not.

   \[
   S \rightarrow A | B \\
   A \rightarrow aAb | ab B \\\n   abB | \epsilon
   \]

SECTION – IV

8. Obtain PDA to accept all strings generated by the language \{a^n b^m a^n | m, n \geq 1\}

   (OR)

9. Explain the equivalence of CFL and PDA.

SECTION – V

10. Design a Turing Machine to accept the strings having equal number of 0’s and 1’s.

    (OR)

11. Show that the PCP with two lists \(x = (b, bab^3, ba)\) and \(y = (b^3, ba, a)\) has a solution. Give the solution sequence.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD B.Tech II Year II Semester Examinations
FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 hours
Max Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A
1) a) Define the terms alphabet, string, prefix, suffix, language give examples to each. (2M)
b) Give DFA & NFA which accept the language \{ (10)^n : n \geq 0 \} (2M)
c) Define a linear grammar (2M)
d) Define an ambiguous CFG (2M)
e) Construct a CFG for the set of all strings over the alphabet \{a,b\} with exactly twice 10 as many a’s and b’s. (2M)
f) Distinguish between DPDA and NPDA (3M)
g) Explain the operations of a NPDA with diagram? (3M)
h) Define unrestricted grammar. (3M)
i) What is the modified version of PCP (3M)
j) Differentiate between PDA and TM with respect to: halt state and final state (3M)

PART-B
2) Construct a Mealy machine which is equivalent to the Moore machine given in table. (10M)

<table>
<thead>
<tr>
<th>Present State</th>
<th>Next State</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>\rightarrow q_0</td>
<td>q_3 q_1 0</td>
<td></td>
</tr>
<tr>
<td>q_1</td>
<td>q_1 q_2 1</td>
<td></td>
</tr>
<tr>
<td>q_2</td>
<td>q_2 q_3 0</td>
<td></td>
</tr>
<tr>
<td>q_3</td>
<td>q_1 q_0 0</td>
<td></td>
</tr>
</tbody>
</table>

(OR)

3) Construct the corresponding Mealy machine to the Moore machine described by the transition table given. (10M)

<table>
<thead>
<tr>
<th>Present State</th>
<th>Next State</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>\rightarrow q_1</td>
<td>q_2 q_2 0</td>
<td></td>
</tr>
<tr>
<td>q_2</td>
<td>q_1 q_3 1</td>
<td></td>
</tr>
</tbody>
</table>

4) a) Construct an equivalent unambiguous grammar on the below production rules.(5M)
b) Construct an unambiguous grammar for all arithmetic expressions with no redundant parenthesis.
A set of parenthesis is redundant if its removal does not change the expressions.

\[ E \rightarrow E + E / E \cdot E / E / id \]  (5M)

(OR)

5) Explain left & right derivations and left & right derivation trees with examples? (10M)

6) State and prove pumping lemma for CFG? (10M)
(OR)
7) Explain CNF with example? (10M)
8) Design Turing Machine to increment the value of any binary number by one. The output should also be a binary number with value one more the number given. (10M)

(OR)

9) Explain LBA with example? (10M)
10) a) Design Turing Machine over \( \{0, 1\}, \ L = \{w \mid \text{w is a multiple of 3}\} \). b) Draw the transition diagram for above language. (10M)

(OR)

11) a) Explain un decidability of posts with example (5M)
12) b) Explain universal Turing machine? (5M)
1) a) What are Universal Turing Machines (2M)
   b) Define computations of a TM? (2M)
   c) Define CFG and What are its advantages (2M)
   d) Define unit production.(2M)
   e) Find all strings in \( L = (a+b)^* b (a+ab)^* \) of length less than four (3M)
   f) Compare NFA & DFA (2M)
   g) Write a note on applications of formal languages and automata.(3M)
   h) Define regular expression ,Give a regular expression for \( L = \{a^n b^m : n \leq 4, m \leq 3\} \) (3M)
   i) Prove or disprove the following for regular expressions \( r, s, \) and \( t \) \( (rs+sr)^n = r(sr+r)^n \) (3M)
   j) Give the formal definition of TM? What are the different types of TMs? (3M)

2) a) Construct DFA and NFA accepting the set of all strings containing 10 as a substring.
   b) Draw the transition diagram of a FA which accepts all strings of a’s and b’s in which both the number of b’s and a’s are even.
   c) Define NFA with epsilon with an example. (10M)

(OR)

3) a) Construct a DFA with reduced states equivalent to the regular expression \( 10 + (0 + 11)0^* 1 \) (5M)
   b) Prove \( (a + b)^* = a^*(ba*)^* \) (5M)

4) prove pumping lemma of regular sets? (10M)

(OR)

5) Explain left & right derivations and left & right derivation trees with examples? (10M)

6) Convert the following Push down Automata to Context Free Grammar (10M)
   \[ M = (\{q_0, q_1\}, \{a, b\}, \{z_0, za\}, \delta, q_0, z_0, \varphi) \]
   \( \delta \) is given by
   \[ \delta(q_0, a, z_0) = (q_0, za, z_0) \]
   \[ \delta(q_0, a, za) = (q_0, za, za) \]
   \[ \delta(q_0, b, za) = (q_1, \varepsilon) \]
   \[ \delta(q_1, b, za) = (q_1, \varepsilon) \]
   \[ \delta(q_1, \varepsilon, z_0) = (q_1, \varepsilon) \]

OR

7) Convert the following grammar to Greibach Normal Form \( G = (\{A_1, A_2, A_3\}, \{a, b\}, P, S) \) Where \( P \) consists of the following
   \[ A_1 \rightarrow A_2 \ A_3 \]
   \[ A_2 \rightarrow A_3 \ A_1 \mid b \]
   \[ A_3 \rightarrow A_1 \ A_2 \mid a \]

8) Design Turing Machine to increment the value of any binary number by one. The output should also be a binary number with value one more the number given. (10M)

(OR)

9) Explain counter machine (10M)

10) What are the various variations of TM? How to achieve complex tasks using TM (10M)

(OR)
11) a) Explain correspondence problem? (5M)
   b) Explain P and NP problems?(5M)

Code No: XXXXX

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD B.Tech II Year II Semester Examinations
FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 hours                                                                 Max Marks: 75

Note: This question paper contains two parts A and B.
   Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5
   Units. Answer any one full question from each unit. Each question carries 10 marks and may
   have a, b, c as sub questions.

PART-A

1) a) Give a description about FA with empty moves (2M)
   b) Define regular grammar with example. (3M)
   c) Give the set and explain in English the sets denoted by following regular expressions.(3M)
      i) (11+0) (00+1)
      ii) (1+01+001)(0+00)
      iii) (0+1)00(0+1)
      iv) 0 1 2
      v) 00 11 22
d) Explain dependency graph & its applications in CFG.(2M)
e) Prove the substitution rule of context free grammar?(3M)
f) Give a CFG generating the following set that is the set of palindromes over
   alphabet{a,b}(2M)
g) Let G be the grammar S->aS | aSbS | epsilon. prove that L(G)={x| each prefix of x has atleast
   as many a’s and b’s} (3M)
h) Define Chomsky Normal form and Greibach Normal form? (3M)
i) Give the formal definition of TM? What are the different types of TMs?(2M)
j) What is left recursion? How to eliminate the left recursion?(2M)

PART-B

2) Design a Moore machine to determine the residue mod 5 for each binary string treated
   as integer.(10M)

(OR)

3) Draw the transition table, transition diagram, transition function of DFA
   a) Which accepts strings which have odd number of a’s and b’s over the alphabet {a,b}
   b) Which accepts string which have even number of a’s and b’s over the alphabet {a,b}
   c) Which accepts all strings ending in 00 over alphabet {0, 1}
   d) Which accepts all strings having 3 consecutive zeros?
   e) Which accepts all strings having 5 consecutive ones?
   f) Which accepts all strings having even number of symbols?(10M)

4) Convert the following finite automata to regular expressions:(10M)

(OR)
5) Find a Regular expression corresponding to each of the following subsets over \( \{0,1\}^* \).
   a) The set of all strings containing no three consecutive 0’s.
   b) The set of all strings where the 10th symbol from right end is a 1.
   c) The set of all strings over \( \{0,1\} \) having even number of 0’s & odd number of 1’s.
   d) The set of all strings over \( \{0,1\} \) in which the number of occurrences of is divisible by 3

6) Convert the following grammar into CNF.

\[
S \rightarrow aAD \\
A \rightarrow aB - B > bAB \\
D \rightarrow d
\]

7) Prove that the following language is not context-free
   language \( L = \{ w w w | w \in \{a,b\}^* \} \) is not context free.

8) a) Describe the TM that accepts the language
   \( L = \{ w a\{a,b,c\}_- | w \text{ contains equal number of a’s, b’s, an c’s} \} \)
   b) Explain in detail Church’s hypothesis.

(OR)

9) a) Design a Turing Machine that accepts the set of all even palindromes
    over \( \{0,1\} \).
   b) Given \( \_ = \{0,1\} \), design a Turing machine that accepts the language
    denoted by the regular expressions \( 00^* \).

10) a) What is decidability? Explain any two undecidable problems.
    b) Show that the following post correspondence problem has a solution and give the solution.

\[
\begin{array}{ccc}
\text{List} & \text{List A} & \text{B} \\
1 & 11 & 11 \\
2 & 100 & 001 \\
3 & 111 & 11
\end{array}
\]

(OR)

11) a) Find whether the post correspondence problem \( P = \{10,101,011,11\} \) has a match. Give the solution.
    b) Explain Turing reducibility machines.
    c) Show that if \( L \) and \( L^c \) are recursively enumerable, and then \( L \) is recursive.
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD B.Tech II Year II Semester Examinations
FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 hours
Max Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

1) a) Find the DFA that recognizes the set of all string on \( \Sigma = \{a,b\} \) starting with the prefix “ab” (2M)

b) Construct a DFA & NFA to accept all string in \( \{a,b\} \) such that every “a” has one “b” immediately 8 to its right ?(2M)

c) Find all strings in \( L((a+b)^*b(a+ab)^*) \) of length less than four(3M)

d) Prove the following identities for regular expression \( r,s \) and \( t \) here \( r=s \) means 6

\[ L(r)=L(s), \quad r+s=s+r, \quad (rs)t=r(st), (r+s)t=rt+st \] (3M)

e) Find the NFA that accepts the language \( L(ab*aa+bba*ab) \) (2M)

f) What are CFG’s Give CFG for the language \( L= \{a^n b^{2n} \mid n>0\} \) (2M)

g) Define context free grammars formally. Give some examples .(3M)

h) Why FAs are less powerful than the PDA’s (2M)

i) What is Unit Production? If you eliminate the unit productions from the given CFG, what will be the effect on the language by the resultant grammar (3M)

j) Give a CFG generating the following set that is the set of palindromes over alphabet \( \{a,b\} \) (2M)

PART-B

2) a) Construct DFA and NFA accepting the set of all strings not containing 101 as a substring.

b) Draw the transition diagram of a FA which accepts all strings of 1’s and 0’s in which both the number of 0’s and 1’s are even.

c) Define NFA with an example.(5M)

(OR)

3) a) Draw the transition diagram of a FA which accepts all strings of 1’s and 0’s in which both the number of 0’s and 1’s are even.

b) Construct NFA which accepts the set of all strings over \( \{0,1\} \) in which there are at least two occurrences of 1 between any two occurrences of 0. Construct DFA for the same set.(5M)

4) Represent the following sets by regular expressions(5M)

(a) \( \{0,1,2\} \)

(b) \( \{1^{2n+1} \mid n>0\} \)

(c) \( \{w \in \{a, b\}^* \mid w \text{ has only one } a \} \)

(d) The set of all strings over \( \{0,1\} \), which has at most two zeros

(OR)
5) Discuss about (5M)
   a) Context Free Grammar
   b) Left most derivation
   c) Right most derivation
   d) Derivation tree.

6) Which of the following are CFL's? Explain (5M)

7) a) Eliminate epsilon productions from the grammar 'G' given as (5M)
    \[ A \rightarrow aBb \mid bBa \]
    \[ B \rightarrow aB \mid bB \mid \varepsilon. \]

    b) Convert the following grammar to Greibach Normal Form
    \[ S \rightarrow ABA \mid AB \mid BA \mid AA \mid B \]
    \[ A \rightarrow aA \mid a \]
    \[ B \rightarrow bB \mid b. \]

8) Write a note on Turing Thesis. Define algorithm in terms of TM. (5M)

9) Write short notes on: (5M)
   a) Halting Problem of Turing Machine
   b) Application of CFG
   c) Multi Tape Turing Machine
   d) Post-Correspondence Problem

10) a) Find whether the post correspondence problem \( P=\{(10,101),(011,11),(101,011)\} \) has a match.
     Give
     the solution.

     b) Explain Turing reducibility machines.

     c) Show that if \( L \) and \( L^c \) are recursively enumerable, and then \( L \) is recursive. (5M)

11) Write brief about the following (10M)
    a) Decidability of problems
    b) RICE Theorem
    c) Undecidability of post correspondence problem.
PART - A (25 Marks)

1. a) Define a non-deterministic model with example. [2]
   b) State and explain Moore's Machine. [3]
   c) Give an example to explain the concept of regular set. [2]
   d) Discuss about right linear and left linear grammars. [3]
   e) Give an example for context-free language. [2]
   f) Write a context-free grammar for the language \( \{0^n1^n \mid n \geq 1\} \). [3]
   g) When do you say that the Turing machine accepts a string? [2]
   h) What are the components of a Turing machine? [3]
   i) State and explain universal Turing machine. [2]
   j) Give an example to explain NP hard and NP Complete problems. [3]

PART - B (50 Marks)

2. Define DFA and Regular expression. DFA accepts all strings corresponding to the expression \( 1^*01(0+1)^* \). Also explain how to convert a regular expression to DFA. [10]
   OR

3. Convert the following regular expressions to NFA with epsilon transitions
   a) \( 0^*+1101 \)   b) \( (0+1)^* \) [5+5]

4. Show that if \( L \) is regular grammar the \( L \) is a regular set. [10]
   OR

5. Explain various components of context-free grammar and derivation tree in detail. [10]

6. When do you say a language \( L \) is unambiguous? Show that the language \( L=\{a^nb^n \mid n \geq 1\} \) is unambiguous. [10]
   OR

7. Show that the \( L \) is context free language, then there exists a Push down automata \( M \) such that \( L=N(M) \). [10]
8. Show that any non-trivial property of the recursively enumerable language is undecidable? [10]

OR

9. Design a Turing machine to accept the set of all palindrome over \( \{0,1\}^* \). Draw a transition diagram for the Turing machine of the above. [10]

10. State and explain in detail about P and NP problems. [10]

OR

11. Explain what undecidable problem is and post correspondence problem? [10]
MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
Java Programming
Model Paper – I (R15)
IT-II Year II Semester

Duration: 3hrs
Max Marks: 75

Answer all the following

PART-A
(Marks 25)

1. (a) What are the properties of object oriented programming?
   (b) What is method overriding?
   (c) Define an Exception. What is meant by Exception Handling?
   (d) List some of the classes available in collection?
   (e) List the components of Swing?
   (f) Discuss briefly about streams.
   (g) What is inheritance?
   (h) What is thread priority?
   (i) What are the steps involved in connecting the database?
   (j) What is an event?

Answer all the questions either (a) or (b)

PART –B
(Marks: 5*10 = 50)

2. (a) Discuss in detail about inheritance. Also write its benefits.
   (OR)
   (b) Describe about Type conversion. Also explain how casting is used to perform type conversion between incompatible types.

3. (a) What is inheritance? Explain different types of inheritance.
   (OR)
   (b) How a method can be overridden? Explain.

4. (a) Give the class hierarchy in Java related to exception handling. Briefly explain each class.
   (OR)
   (b) What is a thread? Explain the states of a thread with an example.

5. (a) Explain in detail about collection interfaces.
   (OR)
   (b) Explain in details about primary input and output operations.

6. (a) Explain in detail about the classification of swing components.
   (OR)
   (b) Explain in brief about events and event sources.
Answer all the following

PART-A (Marks 25)

1. (a) Discuss briefly about recursion.
   (b) Define package
   (c) Differences between multitasking and multithreading.
   (d) Discuss briefly about hash table class.
   (e) Explain in brief about layout manager.
   (f) What is an operator? List various types.
   (g) List different types of access specifier.
   (h) List the keywords used to handle exceptions.
   (i) Define character streams.
   (j) Define Applet.

PART-B (Marks 5*10 = 50)

Answer all the questions (Either (a) or (b))

2. (a) What is constraint explain the constant types with examples.
    (OR)
   (b) What is a method? How a method is used in the class? Explain.

3. (a) Explain the usage of Abstract classes and methods.
    (OR)
   (b) Discuss how inheritances are defined and implemented.

4. (a) What is multi-threading? Explain.
    (OR)
   (b) What is synchronization? Explain with suitable example.

5. (a) Write short notes on the following collection framework classes.
    1) Random  2) Scanner
    (OR)
   (b) Write a short notes on
    1) Connection interface  2) Statement object  3) Inner join  4) Execute Query Method.

6. (a) Write a simple swing application in java.
    (OR)
   (b) Write the difference between applets and applications.
Java Programming
ModelPaper–3(R15)
IT-II Year II Semester

Duration: 3hrs
Max Marks: 75

Answer all the following

PART-A
(Marks 25)

1. (a) List the data types present in java.
   (b) Explain in brief about interfaces.
   (c) What is meant by checked exception and unchecked exception.
   (d) How statements call can be used? Also list the types of methods in statement class.
   (e) Discuss about JFrame and JPanel.
   (f) Discuss briefly about enumerated data types.
   (g) What is CLASSPATH.
   (h) What is multithreading?
   (i) List the types of JDBC drivers present in java.
   (j) What are event sources?

PART-B
(Marks: 5*10=50)

Answer all the questions (Either (a) or (b))

1. (a) List the primitive data types of java. Explain each of them in detail. (OR)
   (b) What are the different types of array? List out the advantages of using arrays?

2. (a) Write in detail about super class and sub classes.
   (OR)
   (b) Write the differences between interfaces and abstract.

3. (a) How are finally statements used in java? Explain in detail.
   (OR)
   (b) Is it possible to interrupt a thread? Explain.

4. (a) Explain in detail about hash table class.
   (OR)
   (b) Explain in detail about the types of drivers in JDBC.

5. (a) Discuss in detail about swing components.
   (OR)
   (b) Explain about various event classes.
Answer all the following

PART-A (Marks 25)

1. (a) What are the OOPs features?
   (b) Compare Procedural and OOP Languages?.
   (c) Explain about control statements in java?.
   (d) Explain about method overloading with example?
   (e) Explain about the usage of super keyword with an example?
   (f) Explain how interfaces are implemented with an example?.
   (g) Explain the following: try, catch, throw, throws, finally
   (h) Explain the creation of threads with an example?
   (i) List the types of JDBC drivers present in java.
   (j) What are event sources? Explain the life cycle of an applet?

PART-B (Marks:5*10=50)

Answer all the questions(Either(a)or(b))

2. (a) What is type casting and conversion? When it is required?
   (b) What is an array? How arrays are declared in java with an example?
   (c) Explain about method overloading with example? Explain about constructor overloading with example?
   (OR)

3(a) What is method overriding? How methods overriding is achieved in Java, with an example?(OR)
   (b) How multiple inheritances are achieved in java with the interfaces? Explain with an example?

4(a) What are the checked Exceptions and Unchecked Exceptions? Explain some of these exceptions with an example and also give the difference between them.
   (OR)
   (b) How the priorities can be assigned to threads? Explain with example?

5(a) Explain the difference between: i) Vector and ArrayList. ii) Enumeration and Iterator.
   (OR)
   (b) Explain in detail about the types of drivers in JDBC.

6(a) Define event. Give examples of events. Define event handler. How it handles events?
   (OR)
   (b) Explain about layout manager? With an example?
PART A (25 Marks)

1. (a) What are OOPS concepts? (3M)
   (b) Explain about Method Overriding? (2M)
   (c) What is an abstract class? (3M)
   (d) Explain about Final Class and Methods? (2M)
   (e) What are checked exceptions? (3M)
   (f) Write about thread priorities? (2M)
   (g) What is Event Source? (3M)
   (h) How to pass parameters to applets? (2M)
   (i) What is Layout manager? (3M)
   (j) Explain about 'this' keyword? (2M)

PART B (50 Marks)

2. Explain about Java Buzzwords?

(OR)

3. Explain Constructor Overloading with an example program?

SECTION II

4. Define Inheritance and explain different types of Inheritance with example programs? (OR)

5. Explain steps for creating a package?

SECTION III

6. Explain Exception handling mechanism in java? (OR)

7. Explain thread life cycle? How to create threads using thread Class?
SECTION – IV

8. Explain life cycle of an applet?

(OR)

9. Explain file handling mechanism using FileInputStream and FileOutputStream?

SECTION – V

10. Explain about the below AWT controls
    a) Button (3M)  b) check box (4M)  c) scrollbar  (3M)
    (OR)

11. Explain the difference between AWT and Swings?
MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech II Semester supplementary Examinations, November/December 2017
Java Programming
(CSE)

Roll No

Time: 3 hours
Max. Marks: 75

Note: This question paper contains two parts A and B
Part A is compulsory which carries 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART – A

1. (a) Differentiate object oriented programming and procedural programming. (3)
(b) Compare and contrast a method overloading and constructor overloading (3).
(c) What is the significance of final keyword. (2)
(d) What is an abstract class. (2)
(e) Explain checked and unchecked exceptions. (3)
(f) Demonstrate with an example thread priorities. (2)
(g) Illustrate with an example StringTokenizer. (3)
(h) Discuss the hierarchy of stream classes. (2)
(i) Differentiate AWTs and swing. (2)
(j) Demonstrate an event source and it’s listener with a suitable example. (3)

PART – B

SECTION – I

2. a) Explain garbage collection in Java. (5)
   b) Demonstrate two dimensional arrays with an example. (5)

   (OR)

3. a) Explain constructor overloading with an example. (5)
   b) Compare String and StringBuffer. (5)

SECTION – II

4. a) Illustrate abstract classes with an example. (5)
   b) Discuss static inner classes with an example. (5)

   (OR)

5. a) Discuss a scenario that demonstrates the significance of method overriding. (5)
   b) Demonstrate with an example how interfaces can be implemented and extended. (5)

SECTION – III

6. a) Discuss with an example multiple catch blocks. (5)
   b) Illustrate with an example the need of synchronization. (5)
Code No: 114CX
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, May - 2016
JAVA PROGRAMMING
(Common to CSE, IT)

Time: 3 Hours
Max. Marks: 75

Note: This question paper contains two parts A and B. Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A (25 Marks)

1. a) Differentiate between break and continue statement.
   b) What is type casting? Explain with an example.
   c) What is the use of super keyword?
   d) Distinguish between abstract class and concrete class.
   e) What are the advantages of multithreading?
   f) Explain the types of exceptions.
   g) List the hash table constructors.
   h) Explain the methods defined by Vector.
   i) Explain the use of layout managers.
   j) Explain the life cycle of an applet.

PART - B (50 Marks)

2. a) Write a Java program to find the factorial of a given number.
   b) Explain the different types of constructors with an example.

OR

3. a) Write a program to find the transpose of a given matrix.
   b) Explain the scope and life time of the variable.

4. a) Explain the different parameter passing mechanisms used in Java with an example.
   b) Write a runtime polymorphism program in Java by using interface reference variable.

OR

5. a) Design an interface called Shape with methods draw() and getArea(). Further design two classes called Circle and Rectangle that implements Shape to compute area of respective shapes. Use appropriate getter and setter methods. Write a Java program for the same.
   b) Explain the various access specifiers are used in java.

6. a) Write a program that demonstrate the priority setting in threads.
   b) Write a program that includes a try block and a catch clause which processes the arithmetic exception generated by division-by-zero error.

OR

7. a) Write a program that creates a thread that forces preemptive scheduling for lower-priority threads.
   b) Explain the checked and unchecked exception with an example.
8.a) Explain the types of drivers used in JDBC.

b) Write a program to implement the operations of random access file. [5+5]

9.a) Explain the file management using File class.

b) Write a program which stores a list of strings in an ArrayList and then displays the contents of the list. [5+5]

10.a) Describe about various components in AWT.

b) Write an applet program to handle all mouse events. [5+5]

11.a) Write a Java program to create AWT radio buttons using check box group.

b) Explain the various event listener interfaces. [5+5]

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Code No: 114CX

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May-2015

JAVA PROGRAMMING
(Common to CSE, IT)

Max. Marks: 75

Time: 3 Hours

Note: This question paper contains two parts A and B. Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

Part-A (25 Marks)

1. a) What is data abstraction?
   [2M]
   b) List string manipulation functions of Java String class.
   [2M]
   c) Differentiate between interface and abstract class.
   [3M]
   d) Explain the use of ‘final’ keyword.
   [2M]
   e) Differentiate between thread and process.
   [3M]
   f) List any six built-in exceptions in Java.
   [2M]
   g) What is the difference between array and vector?
   [3M]
   h) List the byte stream classes.
   [2M]
   i) What are the containers available in swing?
   [3M]
   j) Compare Applets with application programs.

Part-B (50 Marks)

2. a) Explain the basic concepts of object oriented programming.
   [5+5]
   b) What is the usage of enumerated data type? Give examples.
   OR

3. a) Discuss Java jump statements.
   [3+3+4]
   b) Write about garbage collection in Java.
   c) Explain the use of ‘this’ keyword.

4. a) Explain method overriding with a suitable example program.
   [5+5]
   b) With suitable program segments describe the usage of ‘super’ keyword.
   OR

5. a) What is a nested class? Differentiate between static nested classes and non-static nested classes.
   [5+5]
   b) How to define a package? How to access, import a package? Explain with examples.

6. a) With a suitable Java program explain user-defined exception handling.
   [5+5]
   b) What is meant by re-throwing exception? Discuss a suitable scenario for this.
   OR

7. a) Does Java support thread priorities? Justify your answer with suitable discussion.
   [5+5]
   b) Describe producer-consumer pattern using inter-thread communication.
8.a) Give an account of Random collection class
     b) Discuss the methods of Stack class
     c) What is the need of Generics? [3+3+4]

9.a) Discuss the four types of JDBC driver with suitable diagrams.
     b) Write a JDBC program to update the amount balance in an account after every withdrawal. Assume the necessary database table. [5+5]

10.a) What is the significance of layout managers? Discuss briefly various layout managers.
      b) Give an overview of JButton class. [5+5]

11.a) Explain delegation event model.
      b) Write an Applet to draw a smiley picture accept user name as a parameter and display welcome message. [5+5]
II B. Tech II Semester Regular Examinations, May/June – 2015
JAVA PROGRAMMING
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any THREE Questions from Part-B

PART-A

1. a) What is Object Oriented Programming? How it is different from Procedural concepts?
   b) What is an Object? How to allocate memory for objects?
   c) Can a method be overloaded based on different return type but same argument type?
   d) What is the purpose of `Alive()` function in Java.
   e) "Java class can be used both as an applet as well as an application" - Support this statement with an example.
   f) What are the different types of controls available in AWT?
   g) What are assertions?
   h) "Interfaces are able to extend more than one Interface but a Class can't extend more than one Class" - Why? (4M+4M+4M+2M+4M+4M+4M+4M)

PART - B

2. a) Explain briefly the following object oriented concepts.
   i) Abstraction     ii) Polymorphism
   b) "Java is called Machine Independent language" - Justify this statement with proper explanation. (8M+8M)

3. a) Write a Java program to sort a given set of strings in the alphabetical order where the strings are supplied through the command line.
   b) What do you mean by static class and static method? Can we make an instance of an abstract class? Justify your answer with an example? (8M+8M)

4. a) What are the different forms of inheritance? Explain.
   b) How Packages differ from Interfaces? Explain it with a suitable example program to calculate student marks statement. (8M+8M)

5. a) Write a Java program that prints numbers from 1 to 10 line by line after every 5 seconds
   b) What is thread synchronization? Discuss with an example. (8M+8M)

6. a) Write a Java program to create a combo box which includes list of subjects. Copy the subjects in text field on click using applet.
   b) Differentiate between `init()` and `start()` methods with examples. (8M+8M)

7. a) Write a Java program to illustrate the use of Flow Layout Manager.
   b) Write a short note on the following i) `JList` ii) `JScrollPane` (8M+8M)
II B. Tech II Semester Regular Examinations, April/May - 2016
JAVA PROGRAMMING
(Com. to CSE, IT)

Time: 3 hours
Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any THREE Questions from Part-B

PART - A

1. a) What is the significance of Java’s byte code? (3M)
   b) List the various ways of ‘static’ keyword usage. (4M)
   c) Differentiate class, abstract class and interface. (3M)
   d) How does Java support inter thread communication? (4M)
   e) What are the differences between applet and application programs? (4M)
   f) Give an overview of JButton class (4M)

PART - B

2. a) What are the drawbacks of procedural languages? Explain the need of object oriented programming with suitable program. (10M)
   b) Discuss the lexical issues of Java. (6M)

3. a) Illustrate constructor overloading. (8M)
   b) Explain precedence rules and associativity concept (8M)

4. a) With suitable code segments illustrate various uses of ‘final’ keyword. (8M)
   b) How to handle multiple catch blocks for a nested try block? Explain with an example. (8M)

5. a) Describe Java’s thread model. (7M)
   b) What is a stream? What is the difference between byte streams and character streams? How are they used to capture input from the user? (9M)

6. a) What is the role of event listeners in event handling? List the Java event listeners (8M)
   b) Write an applet to display the mouse cursor position in that applet window. (8M)

7. a) Discuss various AWT containers with examples. (8M)
   b) Construct an application to explain the use of JTabbedPane. (8M)

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II B. Tech II Semester Regular Examinations, April/May - 2016
JAVA PROGRAMMING
(Com. to CSE, IT)

Time: 3 hours
Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)
   2. Answer ALL the question in Part-A
   3. Answer any THREE Questions from Part-B

PART –A

1. a) Compare inheritance with polymorphism (4M)
    b) Write about garbage collection (3M)
    c) Give the basic keywords used in exception handling. (4M)
    d) List the thread states and give state transition diagram (4M)
    e) What is an adapter class? Give any two examples for it. (3M)
    f) Differentiate between swing components and AWT components. (4M)

PART –B

2. a) Compare procedural languages with object oriented languages (8M)
    b) Explain the important features of Java. (8M)

3. a) List various types of statements and quote suitable examples for each type. (9M)
    b) With a program illustrate the use of command line arguments. (7M)

4. a) Explain multilevel inheritance with the help of abstract class in your program. (8M)
    b) How to define a user exception in a program? Illustrate with an example. (8M)

5. a) Write a program to implement multi thread programming. (10M)
    b) Explain thread synchronization (6M)

6. a) Explain delegation event model in detail. (8M)
    b) Write an applet to display a smiley with a greeting message to the user. (8M)

7. a) What is the significance of Layout managers? Discuss briefly various layout managers. (10M)
    b) Write a note on split Pane. (6M)

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II B. Tech II Semester Regular Examinations, April/May - 2016
JAVA PROGRAMMING
(Com. to CSE, IT)

Time: 3 hours
Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)
     2. Answer ALL the question in Part-A
     3. Answer any THREE Questions from Part-B

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PART - A

1. a) List the applications of object oriented programming. (3M)
   b) Illustrate the usage of ‘this’ keyword. (4M)
   c) How to create and use a package in Java program? (4M)
   d) Write about thread suspension and resume (3M)
   e) Compare nested class with inner class. Give examples for each (4M)
   f) Differentiate between grid layout and gridbag layout managers. (4M)

PART - B

2. a) Discuss the principles of object oriented languages in detail. (10M)
     b) What is the role and responsibility of JVM in program execution? (6M)

3. a) What are the primitive data types in Java? Write about type conversions. (8M)
     b) What is a constructor? What is its requirement in programming? Explain with program. (8M)

4. a) Write a program to implement multiple inheritances. (8M)
     b) What is an exception? How are exceptions handled in Java programming? Explain (8M)

5. a) Describe the need of thread synchronization. How is it achieved in Java programming? Explain with a suitable program. (10M)
     b) Differentiate between FileReader and BufferedReader. (6M)

6. a) What is an applet? Explain its life cycle. (8M)
     b) Write a program to handle mouse events and mouse motion events. (8M)

7. a) Write a program to create a frame for a simple arithmetic calculator using swing components and layout managers. (10M)
     b) Compare the features of Applet with JApplet. (6M)

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II B. Tech II Semester Regular Examinations, April/May - 2016
JAVA PROGRAMMING
(Com. to CSE, IT)

Time: 3 hours
Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any THREE Questions from Part-B

PART –A

1. a) Differentiate between abstraction and information hiding. (4M)
   b) What are the naming conventions for Java identifiers? (4M)
   c) What is an assertion? What is its use in programming? (3M)
   d) Define thread. How is it different from a process? (3M)
   e) Give the sources of action event and item event (4M)
   f) List the features of Menu component of AWT. (4M)

PART –B

2. a) List and explain Java buzzwords. Which factors are making Java famous language? (10M)
   b) Give the program structure of Java. (6M)

3. a) How to create objects? Does Java support object destruction? Justify your answer. (8M)
   b) Write a Java program to find the sum of the squares of the diagonal elements of a square matrix. (8M)

4. What are the benefits of inheritance? Explain various forms of inheritance with suitable code segments. (16M)

5. a) Explain thread life cycle and thread creation in Java. (8M)
   b) Write a program to read user name from console and display some message for that user using streams. (8M)

6. a) Discuss the applet structure and compare it with application structure. (8M)
   b) Write a program to handle keyboard events. (8M)

7. a) Construct a frame with necessary components for bus reservation system of an agent. (10M)
   b) Write a note on dialog box usage in user interfaces. (6M)

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DESIGN AND ANALYSIS OF ALGORITHMS
Answer all the following

1. Define Algorithm.
2. What is recurrence relation? List the methods used to solve recurrence relations.
3. Describe how tree can be represented for sets.
4. Enumerate and explain the properties of strongly connected components.
5. Compare and contrast Greedy programming and Dynamic programming.
6. What is a multi stage graph? List out the techniques applied on multistage graph.
7. Describe Backtracking with illustration.
8. What is branch and bound problem?
9. List out some examples of NP-complete problems.
10. Define class P?

Answer all the questions either (a) or (b)

2. What is time complexity? Explain about how best case, average case and worst case analysis related to asymptotic notations.
2. OR

3. Illustrate and explain about quicksort with an example.
4. OR

4. Explain depth first search with example.
5. OR

5. Discuss about union and find algorithms.
6. OR

6. Write in detail about the job sequencing with deadlines problem with example.
7. OR

7. Enumerate about algorithms for minimum cost spanning tree and describe any one algorithm.
8. OR

8. Describe subset-sum problem and describe the possible solution strategies using backtracking.
9. OR

9. Express the solution for Travelling salesman problem using branch and bound.
10. OR

10. State and prove Cook’s Theorem
11. OR

11. Discuss the strategy to prove that a problem is NP-hard.
Answer all the following

1. a. What is pseudocode? Explain with an example.
b. Write pseudocode for Divide and Conquer Algorithm.
c. Define a connected and bi-connected component.
d. Define an articulation point
e. Define single source shortest path problem.
f. List the features of dynamic programming.
g. Write control abstraction for backtracking
h. Define solution states and answer state
i. Define deterministic problem.
j. Define maxclique problem

2. a) Use the step count method to analyze the time complexity of Insertion Sorting
b) Write the Binary search algorithm and derive the time complexity.

OR

3. Express the recurrence relation for merge sort and derive the Big-OH Notation with an Illustration.

4. Explain elaborately about AND/OR Graphs

OR

5. Discuss in detail about Game Trees

6. Illustrate the algorithm for knapsack problem with example.

OR

7. Describe all pairs shortest path problem with example.

8. Explain subset-sum problem and discuss the possible solution strategies using backtracking.

OR

9. Discuss principle of LIFO branch and bound

10. Explain deterministic and non-deterministic algorithms

OR

11. Explain how P and NP problems are related
Answer all the following

1. List the two different types of recurrence.
2. Write order of an algorithm and the need to analyze the algorithm.
3. Define spanning tree and minimal spanning tree.
4. Describe find operation on sets.
5. Define single source shortest path problem.
7. State the principle of Backtracking.
8. Define solution states and answer state?
9. What are NP-complete problem.

Answer all the questions either (a) or (b)

2. Sort the list of numbers using quick sort: 77, 31, 42, 60, 97, 12, 34, 82.

OR

3. Describe Strassen’s matrix multiplication.

4. Discuss various tree traversal techniques with examples.

OR

5. Discuss about weighting rule for finding UNION of sets and collapsing rule.

6. Explain Prim’s algorithm with an example.

OR

7. Write an algorithm for optimal binary search tree Give example.

8. Write an algorithm for Hamiltonian cycle with an example.

OR


10. Write non deterministic algorithm for sorting and searching.

OR

11. Explain the strategy to prove that a problem is NP-hard.
Answer all the following

1. Define algorithm correctness.
2. If \( f(n) = 4n^2 + 5n + 3 \), then prove that \( f(n) \) is \( O(n^2) \).
3. Define an articulation point.
4. Define a connected and bi-connected component.
5. What is job sequencing with deadlines problem
6. List the features of dynamic programming
7. Define a dead node
8. Define state space tree
9. Define non-deterministic problem
10. Compare NP-hard and NP-completeness

Answer all the questions either (a) or (b)

2. Explain quick sort algorithm and simulate it for the following data 20, 35, 10, 16, 54, 21, 25

3. Enumerate the various methods of Amortized Analysis and Explain.
4. Write an algorithm for breadth first search. Give example

5. Discuss various tree traversal techniques with examples

6. Explain the concept multistage graphs with example

7. Describe the travelling salesman problem and discuss how to solve it using dynamic programming.

8. Describe graph coloring problem and write an algorithm for m-coloring problem

9. Explain the principle of FIFO branch and bound

10. Discuss about non-deterministic knapsack algorithm

11. What is chromatic number decision problem and clique decision problem
Answer all the following

1. 
   k. List the purpose of Database System.
   l. Define Data Independence.
   m. Define Relational Model.
   n. Define Query and Query language
   o. Define Relational Algebra.
   p. Define functional dependency
   q. Define normalization.
   r. Explain Serializability.
   s. Define RAID.
   t. Define Hash indices?

Answer all the questions either (a) or (b)

2. What is logical data independence and why is it important?
   OR

3. a) What is partial key? How is it represented in ER diagram? Give an example?
   b) What is a descriptive attribute? Explain?
   c) Discuss the usage of ISA feature in ER diagram?

4. Explain the following with examples.
   a) Key constraints.
   b) Foreign key constraints.
   OR

5. What is a view? Explain about views in detail?

6. Explain the following
   a) Lossless Join
   b) Lossless decomposition
   OR

7. What are the advantages of normalized relations over the unnormalized relations?
   OR

8. a) How the use of 2PL would prevent interference between the two transactions.
   b) Explain the difference between strict 2PL and rigorous 2PL?
   OR

9. Explain different recovery techniques used in transaction failure?

10. Explain all the operations on B+ tree by taking a sample example
    OR

11. Explain B+ Trees with examples?
Answer all the following

1. 
   k. List the drawback of normal File Processing System.
   l. Define Data Models and list the types of Data Model.
   m. List the role of DBA.
   n. Define Embedded SQL.
   o. List the properties of decomposition.
   p. Define First Normal Form.
   q. Define sparse index?
   r. Define Query processing?
   s. Define hash-table overflow?
   t. Define Functional Dependency.

Answer all the questions either (a) or (b)

2. 
   a) Describe storage manager component of database system structure?
   b) Explain levels of abstraction in DBMS

OR

3. Explain the E-R diagram components and notations with their extended features?

4. Explain the following.
   a) Types of Join Operations
   b) Set Operations

OR

5. 
   a) Define Relational Algebra, tuple and domain relational calculus?
   b) What are the differences between the two types of relational calculus?


OR

7. What is Redundancy? What are the different problems encountered by redundancy? Explain them.

8. What are the transaction isolation levels in SQL?

OR

9. Explain how concurrency execution of transactions improves overall system performance?

10. 
    a) What is the relationship between files and Indexes?
    b) What is the search key for an Index?
    c) What is Data entry in an Index

OR

11. Explain shadow-copy Technique for Atomicity and Durability.
Answer all the following

1. Define Data Abstraction and list the levels of Data Abstraction.
2. Discuss about Object-Based Logical Models.
3. List the different types of database-system users.
4. Define Second Normal Form.
5. Explain Optical Storage Device?
6. Define Triggers.
7. Define lock?
8. How the time stamps are implemented
9. What are the ACID properties
10. Define instance and schema?

Answer all the questions either (a) or (b)

2. Define DBMS? List Database system applications.

   OR

2. List four significant differences between a file processing system and a DBMS?
3. a) Write a detail note on participation constraints?
   b) What is the class hierarchy? How is it represented in the ER diagrams?

   OR

5. Explain FD and MVD with examples

   OR

6. What is Normalization? Discuss what are the types? Discuss the 1NF, 2NF, 3NF with example?
7. What are the types of failures of a system?

   OR

8. What are the two tables used in crash recovery along with log record? Explain with suitable example?
9. Explain about tertiary storage media in detail?

   OR

10. Explain
    a) Clustered Indexes
    b) Primary and Secondary Indexes
Answer all the following

1. Define DBMS.
2. Define E-R model.
3. Write about the role of Transaction manager.
4. Define BCNF.
5. Define disk controller?
6. Define file organization
7. List the pitfalls in Relational Database Design
8. What are the two methods for dealing deadlock problem?
9. What is a primary key?
10. What does the cardinality ratio specify?

Answer all the questions either (a) or (b)

2 . Explain key constraints with an example?

OR

3. Discuss the query processor of database system structure?
4. Explain different types of Join Operations with relevant examples.
5. Explain the following in SQL with examples.
   a) Nested Queries
   b) Correlated Queries   c) Group by and Having Clauses   d) Triggers
6. Explain about the fourth and fifth normal forms.

OR

7. Define Functional dependencies? How are primary keys related to functional dependencies?
8. Write the locking compatibility matrix used for multiple granularity? Explain with suitable examples?

OR

9. Define the concept of schedule for a set of concurrent transaction. Give a suitable example.
10. Explain about Tree based Indexing  and Hash based Indexing.

OR

11. Explain about fixed length file organization with an example? And also explain about byte-string representation in detail.
Part A - Answer all the following:

1. u. How has software evolved over the years?
   v. What is a process pattern?
   w. Define an Interface.
   x. Why is a context model used?
   y. When is an architectural style used?
   z. Write the golden rules of UI design.
   aa. What are the various levels of testing?
   bb. Define a process metric. Give example.
   cc. What is SQA?
   dd. Define software reliability.

Part B - Answer all the questions choosing one from each section.

2. Write about the CMMI model used for business organisations.
   OR
   Explain in detail about the Unified Process. Is it iterative and evolutionary?

3. What is the significance and characteristics of SRS? Write the template for it.
   OR
   How is Requirements Management done? Explain with relevant tables.

4. What are the various design model elements? Write about them.
   OR
   Explain the process of User Interface Analysis and Design.

5. a) What are the various types of system testing? Elaborate.
   b) Write about the debugging strategies used in a project.
   OR
   Define software quality. What are Mc Call’s quality factors?

6. a. Explain about the ISO 9000 quality standards. Who is the certifying authority?
   b. How is a formal technical review performed?
   OR
   What are the various SQA activities? Write about the SQA plan.
Part A - Answer all the following:

1. a. What are the implications of software myths?
   b. List the drawbacks of waterfall model.
   c. Give examples for functional and non-functional requirements.
   d. Define object model.
   e. What does a component refer to in software design?
   f. Name the various design concepts.
   g. What is the method used to test the structure of a program?
   h. What metric is used for maintenance of software?
   i. What are the types of risks?
   j. Why is ISO 9000 quality standard used?

Part B - Answer all the questions choosing one from each section.

2. How do evolutionary process models differ from other models? Explain the Spiral model.
   OR
   Why is S/E treated as a layered technology? Explain the software process framework.

3. Briefly explain the requirements elicitation process.
   OR
   Explain the context and behavior models with suitable illustrative examples.

4. How is transform mapping done in design phase? Explain with a diagram.
   OR
   a) Write any five design principles used in object-oriented design process.
   b) Explain the golden rules for UI design.

5. a) What is basis path testing? Explain with a graph.
    b) When and how is regression testing done?
    OR
    Explain the process of risk management employed in s/w development.

6. a) Define software reliability. How is it measured?
    b) What is the role of a formal technical review in a project?
    OR
    Explain the purpose and scope of software quality assurance.
R15A0061
MANAGERIAL ECONOMICS & FINANCIAL ACC’G
Answer all the following

1.
   ee. What is the scope of managerial economics.
   ff. Define demand.
   gg. What is Isocosts
   hh. Production function
   ii. Define different types of markets
   jj. Mention the methods of pricing
   kk. Define capital
   ll. Define the accounting
   mm. Explain the traditional methods of capital budgeting.
   nn. Define (i) Current ratio (ii)quick ratio (iii) acid test ratio?

   Answer all the questions

2. what is managerial economics explain its nature in detailed?
   OR

3. Define law of demand ? Discuss about its exceptional cases?

4. a) Cobb Douglas production function and its importance?
   b) Law of one variable returns?
   OR

5. explain the different cost concepts

6. Explain the different types of markets and also discuss about the features of perfect market
   OR

7. What is joint stock company and its advantages and disadvantages?

8. what is capital explain about different sources of capital?
   OR

9. explain about generally accepting accounting principles?

10. what is capital budgeting explain the importance of capital budget?
    OR

11. Discuss about different types of ratios?
1. a) Define managerial economics?
b) State the Law of demand?
c) Isoquants and its features?
d) BEP
e) Difference between perfect and imperfect competition
f) Features of Sole trading
g) Fixed capital Vs Working capital
h) What is trial balance
i) NPV
j) Capital structure ratios?

Answer all the questions

2. Define managerial economics and also explain various Micro and Macro economic concepts

OR

3. What is demand? Define the relation between demand and its determinants?

4. Write about Internal and External economics of scale?

OR

5. i) Break-even point in terms of sales value and in units.
   (ii) Number of units that must be sold to earn a profit of Rs. 90,000.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Factory Overheads Cost</td>
<td>60,000</td>
</tr>
<tr>
<td>Fixed Selling Overheads Cost</td>
<td>12,000</td>
</tr>
<tr>
<td>Variable Manufacturing Cost per unit</td>
<td>12</td>
</tr>
<tr>
<td>Variable Selling Cost per unit</td>
<td>3</td>
</tr>
<tr>
<td>Selling Price per unit</td>
<td>24</td>
</tr>
</tbody>
</table>

6. Discuss the advantages and disadvantages of partnership

OR

7. What do you mean by Monopoly and explain the reasons for creating the Monopoly?

8. What is capital? Explain the different types of capital?

OR

9. Write the format for Final Accounts

10. Explain the different types of capital Budgeting technique?

OR

11. The following is the Balance Sheet of a company as on 31st March:
<table>
<thead>
<tr>
<th>Liabilities</th>
<th>Rs</th>
<th>Assets</th>
<th>Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share Capital</td>
<td>2,00,000</td>
<td>Land and Buildings</td>
<td>1,40,000</td>
</tr>
<tr>
<td>Profit &amp; Loss Account</td>
<td>30,000</td>
<td>Plant and Machinery</td>
<td>3,50,000</td>
</tr>
<tr>
<td>General Reserve</td>
<td>40,000</td>
<td>Stock</td>
<td>2,00,000</td>
</tr>
<tr>
<td>12% Debentures</td>
<td>4,20,000</td>
<td>Sundry Debtors</td>
<td>1,00,000</td>
</tr>
<tr>
<td>Sundry Creditors</td>
<td>1,00,000</td>
<td>Bills Receivable</td>
<td>10,000</td>
</tr>
<tr>
<td>Bills Payable</td>
<td>50,000</td>
<td>Cash at Bank</td>
<td>40,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8,40,000</strong></td>
<td></td>
<td><strong>8,48,000</strong></td>
</tr>
</tbody>
</table>

Calculate:
1. Current Ratio
2. Quick Ratio
3. Inventory to working Capital
4. Debt to Equity Ratio
5. Proprietary Ratio
6. Capital Gearing Ratio
7. Current Assets to Fixed Assets
1. Write about
   a) Opportunity cost
   b) Cross elasticity of demand
   c) Skimming pricing
   d) Profit-Volume Ratio
   e) Profitability index
   f) Partnership
   g) What do you understand by Transaction based pricing
   h) Define a joint stock company.
   i) List out the advantages of Double entry system of accounting?
   j) What is meant by time value of money?

Answer all the questions
2. Define the term Managerial Economics? Explain the Nature and Scope of Managerial Economics.
   OR
21. Define price elasticity of demand? What are the different variants of Price Elasticity of demand.
22. What do you understand by the term “Marginal Rate of Technical substitution”.
   OR
23. Explain the Law of variable proportions with a neat diagram.
24. List out the Different pricing methods? Explain any three pricing methods.
   OR
25. What is a public enterprise? State the features of public enterprises?
26. What is budget? Explain about cash and capital budget?
   OR
27. What is trail balance? How to prepare trail balance?
28. XYZ Co. is considering two projects, A & B, with cash flows as shown below:

<table>
<thead>
<tr>
<th>period</th>
<th>CFA</th>
<th>CFB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-50,000</td>
<td>-100,000</td>
</tr>
<tr>
<td>1</td>
<td>20,000</td>
<td>60,000</td>
</tr>
<tr>
<td>2</td>
<td>20,000</td>
<td>25,000</td>
</tr>
<tr>
<td>3</td>
<td>20,000</td>
<td>25,000</td>
</tr>
<tr>
<td>4</td>
<td>20,000</td>
<td>25,000</td>
</tr>
</tbody>
</table>

The opportunity cost of capital for A is 14 percent. The opportunity cost of capital for B is 10 percent. Calculate the NPV and IRR for each project. Which project(s) should be accepted?
11. From the following information, calculate: (i) Gross Profit Ratio; (ii) Net Profit Ratio (iii) Inventory Turnover Ratio; (iv) Net worth to Debt Ratio.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>25,20,000</td>
</tr>
<tr>
<td>Cost of Goods Sold</td>
<td>19,20,000</td>
</tr>
<tr>
<td>Net Profit</td>
<td>3,60,000</td>
</tr>
<tr>
<td>Stock</td>
<td>8,00,000</td>
</tr>
<tr>
<td>Current Assets</td>
<td>7,60,000</td>
</tr>
<tr>
<td>Fixed Assets</td>
<td>14,40,000</td>
</tr>
<tr>
<td>Net worth</td>
<td>15,00,000</td>
</tr>
<tr>
<td>Debt</td>
<td>19,00,000</td>
</tr>
<tr>
<td>Current Liabilities</td>
<td>6,00,000</td>
</tr>
</tbody>
</table>