2016-17
B.TECH. (AUTUMN SEMESTER) EXAMINATION
COMPUTER ENGINEERING
COMPILER DESIGN
CO406

Maximum Marks: 60
Credits: 04
Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No. | Question | M.M.
-- | -- | --
1(a) | Give an unambiguous grammar for arithmetic expression using operators +, -, *, /.
     | Give left-most and right-most derivation of the string id+id-id/id using your grammar. | [7.5]
1(b) | Give regular definition for following tokens of C language – | [7.5]
     | • Identifier
     | • Numeric Constant
     | • Literal
2(a) | What kind of tokens can be selected as synchronizing tokens to incorporate error handling in predictive parsing table? | [7.5]
2(b) | Give definition of followings – | [7.5]
     | • FOLLOW of a variable
     | • Handle
     | • FIRST of a string
3(a) | List different forms or types of three address instruction. | [7.5]

Contd... 2.
3(b) Consider the statement `iffalse` whose syntax and semantics is as given below –

```c
iffalse (B) then S1 else S2
iffalse (B) then S1
```

Simulate when boolean expression $B$ is false otherwise $S_2$ executes. Give backpatching based translation scheme to translate above to three address code.

OR

3′(a) Give type expression for `node`, `ptr`, `xyz` and `abc` in following declaration of C Language –

```c
struct node { int data; struct node * next; } *ptr;
struct node xyz[20];
int (*abc) (struct node *);
```

3′(b) Consider the statement `ON .... GOTO...` whose syntax and semantics is explained in following example –

```
ON K GOTO 100, 200, 300
```

It performs jump to statement number 100 if $K$ is 1. If $K$ is 2, it performs jump to statement number 200 and if $K$ is 3, it performs jump to statement number 300. Give syntax directed translation scheme to translate this statement to three address code.

4(a) How next-use and liveness information is collected from three address code. Write steps.

4(b) Write a short node on induction variable.

OR

4′(a) What is the purpose of Register Descriptor and Address Descriptor? Explain.

4′(b) Give data flow equation for Reaching Definition Analysis. Also give the definition of each parameter used in data flow equation.
<table>
<thead>
<tr>
<th>Q.No.</th>
<th>Question</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(a)</td>
<td>Answer in one word:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. What is the range of reserved port number?</td>
<td>[03]</td>
</tr>
<tr>
<td></td>
<td>ii. Proxy Server belongs to which layer of TCP/IP Protocol Suite?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii. Firewall may filter the traffic on the basis of IP address and TCP port number. (True/False)</td>
<td></td>
</tr>
<tr>
<td>1(b)</td>
<td>Discuss various approaches used by Content Delivery Networks to distribute the content efficiently?</td>
<td>[07]</td>
</tr>
<tr>
<td>1(c)</td>
<td>What is Network Address Translation? What are its uses?</td>
<td>[05]</td>
</tr>
<tr>
<td>2(a)</td>
<td>Answer in one word:</td>
<td>[03]</td>
</tr>
<tr>
<td></td>
<td>i. IP is connectionless but a reliable protocol. (True/False)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii. What is the minimum and maximum size of TCP header?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii. What standard is used by SMI (Structure of Management Information) to encode data?</td>
<td></td>
</tr>
<tr>
<td>2(b)</td>
<td>Explain the various Error Reporting messages of ICMP.</td>
<td>[07]</td>
</tr>
<tr>
<td>2(c)</td>
<td>How a multicast router monitors the membership of a host in a group? Explain.</td>
<td>[05]</td>
</tr>
<tr>
<td>2'(c)</td>
<td>What are cookies? How can cookies be beneficial? Explain with an example.</td>
<td>[05]</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>3(a)</td>
<td>Distinguish between:</td>
<td>[03]</td>
</tr>
<tr>
<td></td>
<td>i. Cryptography and Steganography</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii. Active and Passive Attacks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii. Substitution and Transposition Cipher</td>
<td></td>
</tr>
</tbody>
</table>
3(b) What is the number of rounds in DES? What is double DES? What kind of attack on double DES makes it useless? [05]

3(c) What is Cryptanalysis? Explain Playfair Cipher and Vigenere Cipher with their Cryptanalysis. [07]

OR

3'(b) What are four kinds of Cryptanalysis attack? Explain with example. [05]
3'(c) Given the super increasing tuple= [7, 11, 19, 39, 79, 157, 313], r=29, and modulus n = 700, encrypt and decrypt the letter "a" using the knapsack cryptosystem. Use [4 2 5 3 1 7 6] as the permutation table. [07]

4(a) i. For measuring characteristics associated with fingerprints the two most common methods are __________ and __________. [03]
   ii. Write one difference between Digital Signature and Cryptosystem.

4(b) Explain Diffie-Hellman protocol and its purpose. [06]

4(c) How does Digital Signature ensures Nonrepudiation and Confidentiality of a message. [06]

OR

4'(b) Compare Data-origin Authentication and Entity Authentication. Define a Dictionary attack and how can it be prevented in case of Fixed password approach for entity authentication. [06]

4'(c) Explain the role of each phase in SSL Handshake Protocol. [06]
2016-17  
B.TECH. (AUTUMN SEMESTER) EXAMINATION  
COMPUTER ENGINEERING  
NETWORK SECURITY  
CO-445

Maximum Marks: 60  
Credits: 04  
Duration: Two Hours

Answer all the questions.  
Assume suitable data if missing.  
Notations used have their usual meaning.

<table>
<thead>
<tr>
<th>Q.No.</th>
<th>Question</th>
<th>M.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(a)</td>
<td>What is a logic bomb?</td>
<td>[02]</td>
</tr>
<tr>
<td>1(b)</td>
<td>What is the use of Fermat’s theorem?</td>
<td>[02]</td>
</tr>
<tr>
<td>1(c)</td>
<td>What do you mean by one-way property in hash functions?</td>
<td>[02]</td>
</tr>
<tr>
<td>1(d)</td>
<td>What is the disadvantage with ECB mode of operation?</td>
<td>[02]</td>
</tr>
<tr>
<td>1(e)</td>
<td>List out the requirements of Kerberos.</td>
<td>[02]</td>
</tr>
<tr>
<td>1(f)</td>
<td>State the significance of “Avalanche Effect” in the design of cryptography techniques.</td>
<td>[02]</td>
</tr>
<tr>
<td>2(a)</td>
<td>What is the difference between an unconditionally secure cipher and a computationally secure cipher?</td>
<td>[04]</td>
</tr>
<tr>
<td>2(b)</td>
<td>Explain the single round of DES algorithm.</td>
<td>[08]</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>3(a)</td>
<td>Describe AES key expansion technique.</td>
<td>[04]</td>
</tr>
<tr>
<td>3(b)</td>
<td>Briefly define the Galois fields (GF(p)). Also determine the gcd of the following pair of polynomials: ( x^3 + x + 1 ) and ( x^2 + x + 1 ) over GF(2).</td>
<td>[08]</td>
</tr>
<tr>
<td>4(a)</td>
<td>What types of attacks are addressed by message authentication?</td>
<td>[04]</td>
</tr>
<tr>
<td>4(b)</td>
<td>Explain Secure Hashing Algorithm (SHA)</td>
<td>[08]</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>4'(a)</td>
<td>What are the properties a digital signature should have?</td>
<td>[04]</td>
</tr>
<tr>
<td>4'(b)</td>
<td>List and describe techniques for the distribution of public keys.</td>
<td>[08]</td>
</tr>
<tr>
<td>5(a)</td>
<td>How does a behavior-blocking software work?</td>
<td>[04]</td>
</tr>
<tr>
<td>5(b)</td>
<td>Explain the different types of firewall and its configurations</td>
<td>[08]</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>5'(a)</td>
<td>What are typical phases of operation of viruses and worm?</td>
<td>[04]</td>
</tr>
<tr>
<td>5'(b)</td>
<td>Write a short note on Pretty Good Privacy.</td>
<td>[08]</td>
</tr>
</tbody>
</table>
Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No.  Question  M.M.
1(a)  Write the bubble sort algorithm to sort an array. What is its complexity? [6+1]
1(b)  Write an algorithm to delete a specific node having information "ITEM" from a linked list. [08]

OR

1(b') Write an algorithm to insert a student name "Raj" after the node having student name "Rahul" in a linked list? [08]

2(a)  Consider the following stack of 8 memory cells: [3+2+2]
STACK:  A, B, C, D, J, K, L, __.
Perform the following operations on the stack and show output after each operation:
i)  PUSH(STACK, L)
ii) PUSH(STACK, M)
iii) POP(STACK)

How to represent a tree in computer memory using an array? What will be the maximum size of a tree having depth-7?

2(b)  Define dequeue and priority queue. Write an algorithm to perform the evaluation of a postfix expression. [2+6]
2(b') The in-order and post-order traversals of a binary tree T are given below:

In-order: 20, 30, 35, 40, 45, 50, 55, 60, 70
Post-order: 20, 35, 30, 45, 40, 55, 70, 60, 50
Construct the tree T.

3(a) Differentiate between multiprocessor system and multi-programmed system.

Explain in detail about process control block.

3(b) Consider 4 processes P1, P2, P3 and P4 as shown in the table.

<table>
<thead>
<tr>
<th>Process</th>
<th>Arrival Time</th>
<th>Burst Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>P2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>P3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>P4</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Calculate the average waiting time under shortest remaining time first policy.

OR

3(b') Consider a page reference string: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. Find the number of page-fault occurred in FIFO page replacement policy (Frame Size=3).

4 Write short notes on any three topics:
   a) Time-space trade-off
   b) Bootstrap Loader
   c) Embedded System
   d) Virtual Memory

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2016-17
B.TECH. (AUTUMN SEMESTER) EXAMINATION
COMPUTER ENGINEERING
EMBEDDED SYSTEMS
CO-448

Maximum Marks: 60 Credits: 04 Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No. Question M.M.

1. Attempt all parts

1(a) What are the typical non-functional requirements for Embedded Systems? [05]
1(b) Fill the requirement form for a typical microwave oven. [05]
1(c) Explain the working of an Automated Breaking System with suitable diagram. [05]

2. Attempt any two of the following:

2(a) Present a brief comparison of PIC families. [7.5]
2(b) Draw Architectural Block Diagram for PIC 12 series family. Also mention the BUS description for 12F508 in it. [7.5]
2(c) Classify the instructions of PIC 16 series family and give a brief description of any five instructions. [7.5]

3. Attempt 3 or 3'

3(a) Explain the basic interrupt mechanism with the help of block diagram. Explain interrupt priorities and interrupt vectors. [7.5]
3(b) What are the basic sources of CMOS power consumption? What are the power-saving strategies for each source of consumption? [7.5]

OR

3'(a) Discuss interrupt overheads. How ARM and SHARC respond to an interrupt. [7.5]
3'(b) Briefly discuss the three factors that can substantially influence program performance (CPU Performance). [7.5]

4. Attempt any two of the following:

4(a) Explain the process of code generation for procedures. Illustrate it with the help of ARM Procedure Call Standard (APCS). [7.5]
4(b) Compare Rate-Monotonic Scheduling and earliest-Deadline-First Scheduling. [7.5]
4(c) Explain I²C Bus system. Draw different typical bus transaction frames on the I²C bus. [7.5]
2016-17
B.TECH. AUTUMN (VII SEMESTER) EXAMINATION
COMPUTER ENGINEERING
COMPUTER NETWORK DESIGN
CO-451

Maximum Marks: 60
Credits: 04
Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No. Question M.M.
1(a) Implement IP addressing by geographical location for the network depicted below. [08]

1(b) Explain in detail the significance of a collision and a broadcast domain. Explain considering a hub, switch and router. [07]

OR

1(b') With the help of suitable network diagrams explain the design of networks based on core layer, distribution layer and access layer. What is the significance of implementing such a network design approach? [07]
2(a) Explain the different Ethernet technologies 1Base5, 10Base2, 10Base5, 10Broad36, 10BaseT, 10BaseFL, 10BaseFB, 100BaseT, 100BaseTX, 100BaseT4, 100BaseT2, 100BaseFX, 1000BaseT, 1000BaseSX, 1000BaseLX, 1000BaseCX, 10GBaseSR, 10GBaseLX4, 10GBaseLR, 10GBaseER, 10GBase-SW, 10GBase-LW, 10GBase-EW, 10GBaseT, 40GEthernet and 100GEthernet.

2(b) Consider the HFC network given below. How will you roll out data services on this network? What are the downstream and upstream frequencies and channel width for DOCSIS and Euro-DOCSIS?

OR

contd...
2(b') How is DSL implemented in a network? Consider the network diagram given below and explain the various components of a DSL network.

3(a) Consider the network diagram given below. With the help of a suitable IP scheme implement OSPF routing algorithm for this network.

3(b) Why do we implement uplink fast in a switching network? For a network with 3 switches in the distribution layer and 6 switches in the access layer explain the uplink fast implementation.

OR

3(b') Implement BGP routing for the network given below. Write down the BGP IOS command lines for the routers shown in the network.
4(a) Propose a server farm design for an ISP with the following servers:
HTTP, SMTP, FTP, DNS, DHCP and RADIUS  

4(b) Suppose you have to design a university LAN. This university also has two remote campuses. What technology you will implement for this network. Explain with the help of a suitable network diagram.

OR

4(b') What is the difference between an ISP and an IDC. Where are these types of networks used? Give suitable network diagrams to support your answer.
2016-17
B.TECH. (AUTUMN SEMESTER) EXAMINATION
DEPARTMENTAL ELECTIVE
ARTIFICIAL INTELLIGENCE & SOFT COMPUTING
CO-453

Maximum Marks: 60  Credits: 04  Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No.  Question  M.M.
1(a)  What do you mean by Turing test? What is the significance of Turing test in artificial intelligence? Explain Clearly.  [05]
1(b)  Write down the Minimax search algorithm for two-player games. What is the main problem with Minimax search? In what way, this problem is removed using Alpha-Beta pruning? Perform Minimax search with Alpha-Beta pruning on the game tree shown in Figure 1.  [10]

2(a)  Represent the following axioms in form of a formula using predicate logic and prove the formula for the conclusion using resolution.

(i) Every child loves anyone who gives the child any present.
(ii) Every child will be given some present by Santa if Santa can travel on New-year eve.
(iii) It is foggy on New-year eve.
(iv) Anytime it is foggy, anyone can travel if he has some source of light.
(v) Any reindeer with a red nose is a source of light.
(vi) (Conclusion) If Santa has some reindeer with a red nose, then every child loves Santa.

2(b)  What do you mean by logical equivalence of two well formed formula or sentences in propositional logic? List six laws or rules of logical equivalence.

OR

2'(a)  Suppose a knowledge base KB contains three sentences S1, S2, S3 as follows-
S1 = P→(¬ Q ∨(R∧S))  S2 = P  S3 = ¬S  [05]

Contd...2
Suppose there is another sentence \( C = \neg Q \)
Prove using the resolution principle that \( KB \models C \)

2'(b) What do you mean by an intelligent agent? Design an intelligent agent for Wumpus World. Wumpus World is a cave consisting of rooms connected by passage ways. There is a Wumpus, a beast, which eats anyone who enters the room in the cave, where he is present. The Wumpus can be shot by an agent. But, the agent has only one arrow. There are some rooms containing bottomless pits that will trap anyone who wanders into the room except Wumpus who is too big to fall in. The only better part of the environment is to find a heap of gold.

3(a) Define Fuzzy Max-Min Composition. Consider a set \( P = \{P_1, P_2, P_3, P_4\} \) of four varieties of paddy plants, a set \( D = \{D_1, D_2, D_3, D_4\} \) of the various diseases affecting the plants and \( S = \{S_1, S_2, S_3, S_4\} \) be the common symptoms of diseases. Let \( \tilde{R} \) be a relation on \( P \times D \) and \( \tilde{S} \) be a relation on \( D \times S \),

\[
\tilde{R} = \begin{bmatrix}
0.6 & 0.6 & 0.9 & 0.8 \\
0.1 & 0.2 & 0.9 & 0.8 \\
0.9 & 0.3 & 0.4 & 0.8 \\
0.9 & 0.8 & 0.1 & 0.2
\end{bmatrix} \quad \text{and} \quad \tilde{S} = \begin{bmatrix}
0.1 & 0.2 & 0.7 & 0.9 \\
1 & 1 & 0.4 & 0.6 \\
0 & 0 & 0.5 & 0.9 \\
0.9 & 1 & 0.8 & 0.2
\end{bmatrix}
\]

Obtain the association of the plants with the different symptoms of the diseases using max-min composition.

3(b) What do you mean by an artificial neural network? Which of the artificial neural network is known as universal function approximator and why? Design an artificial neural network for solving the problem of recognizing the letters L, P, O, E, F, Q.

OR

3'(a) What do you mean by topology-conserving mapping? Discuss the unsupervised learning in Self-Organizing Maps.

3'(b) What do you mean by a decision table? For the decision table shown in Figure 2, compute the indiscernibility classes defined by \( R_1 = \{\text{Headache, Temp}\} \), \( R_2 = \{\text{Headache, Muscle-pain}\} \), and \( R_3 = \{\text{Temp, Muscle-pain}\} \). Also, find the lower and upper approximation of \( X_1 = \{u|\text{Flu}(u) = \text{yes}\} \) and \( X_2 = \{u|\text{Flu}(u) = \text{no}\} \) for \( R_1, R_2 \) and \( R_3 \).

Contd...
4(a) What do you mean by Swarm Intelligence? List the different popular Swarm Intelligence techniques and discuss any one of them in detail.

4(b) List different Evolutionary algorithms. Discuss general scheme of an Evolutionary algorithm in detail.

![Figure 1]

<table>
<thead>
<tr>
<th>u</th>
<th>Headache</th>
<th>Muscle-pain</th>
<th>Temp</th>
<th>Flu</th>
</tr>
</thead>
<tbody>
<tr>
<td>u1</td>
<td>no</td>
<td>yes</td>
<td>high</td>
<td>yes</td>
</tr>
<tr>
<td>u2</td>
<td>yes</td>
<td>no</td>
<td>high</td>
<td>yes</td>
</tr>
<tr>
<td>u3</td>
<td>yes</td>
<td>yes</td>
<td>very high</td>
<td>yes</td>
</tr>
<tr>
<td>u4</td>
<td>no</td>
<td>yes</td>
<td>normal</td>
<td>no</td>
</tr>
<tr>
<td>u5</td>
<td>yes</td>
<td>no</td>
<td>high</td>
<td>no</td>
</tr>
<tr>
<td>u6</td>
<td>no</td>
<td>yes</td>
<td>very high</td>
<td>yes</td>
</tr>
</tbody>
</table>

![Figure 2]