

NATIONAL INSTITUTE OF TECHNOLOGY, Raipur
VIth Semester, B.Tech (IT)

Subject: Software Engineering
Class Test-I

Duration: 1.15 hrs

Max Marks: 15

Attempt all the questions.

- Q1. Write down the differences between waterfall and spiral development models? (3)
Q2. Draw block diagram and explain the each phase of Unified Process model in detail? (5)
Q3. Draw the Use case diagram for Online Shopping System? Write down Use Case Scenario for Order Item? (5)
Q4. Differentiate between Throwaway Approach and Evolutionary Approach? (2)

NATIONAL INSTITUTE OF TECHNOLOGY, Raipur
VIth Semester, B.Tech (IT)
Subject: Software Engineering
Class Test-II



Duration: 1.15 hrs

Max Marks: 15

Attempt all the questions.

- Q1. Write down the differences between waterfall and spiral development models? (3)
Q2. Draw block diagram and explain the each phase of Unified Process model in detail? (5)
Q3. Draw the Use case diagram for Online Shopping System? Write down Use Case Scenario for Order Item? (5)
Q4. Differentiate between Throwaway Approach and Evolutionary Approach? (2)

NATIONAL INSTITUTE OF TECHNOLOGY, Raipur

Vth Semester, B.Tech (IT)

Subject: Software Engineering

Class Test-I

Duration: 1.15 hrs

Max Marks: 15

Attempt all the questions.

- Q1. Explain the prototype software development life cycle model in detail? (4)
- Q2. Write down the differences between waterfall and spiral development models? (3)
- Q3. Write down the examples of functional and nonfunctional requirements? (2)
- Q4. Write down Use case scenario for the ATM withdrawal? (4)
- Q5. Differentiate between Throwaway Approach and Evolutionary Approach? (2)

NATIONAL INSTITUTE OF TECHNOLOGY, Raipur

Vth Semester, B.Tech (IT)

Subject: Software Engineering

Class Test-II

Duration: 1.15 hrs

Max Marks: 15

Attempt all the questions.

1. What is Context diagram? Draw the context diagram of Student Result Management System? (3)
2. Explain the process of each phase in the Design model? (5)
3. Explain 3-tier and MVC architecture models? (3)
4. Draw the Class diagram of Student Result Management system?
(or)
Draw the sequence diagram of Order item in the Online Shopping system? (4)

Duration: 1.15 hrs

Max Marks: 35

Attempt all the questions.

1. What is cohesion and coupling? (2)
2. Explain the process of each phase in Object Oriented Design? (4)
3. Explain the component and connector view model? (3)
4. What is difference between software support and software configuration management? (2)
5. Design Boundary Value Analysis test cases for the following? (4)

A program classifies a triangle, its input is a triple of positive integers (x,y,z) and input parameters ensure $0 < i \leq 100$. The output may be the one of [Scalene, Isosceles, Equilateral, not a triangle].

National Institute of Technology (NIT) Raipur
Information Technology Department
Software Engineering II Examination March 2016 B.Tech. VI Semester Total Marks: 15 Time: 1hr 15 min

Question No. 1 is compulsory. Attempt any two from remaining three. All questions carry equal marks. All notations have their usual meanings.

```
1. read (z)
2. x = 0
3. y = 0
4. if (z ≥ 0)
   {
      x = sqrt (z)
      if (0 ≤ x && x ≤ 5)
         y = f (x)
      else
         y = h (z)
   }
5. y = g (x, y)
6. print (y)
```

1. Find DU chains for the variables x and y in the given program
2. Give two differences between a mature and an immature software organization. Define *software process capability*, *software process maturity* and *capability maturity model*. (2 + 3)
3. Mention the three different ways of calculating cyclomatic complexity. Draw the CFG, find cyclomatic complexity and find a basis set from the given program. (1.5 + 1.5 + 1 + 1)
4. Define Baseline. Write short notes on SCM. (1 + 4)

y
Cohesion

NATIONAL INSTITUTE OF TECHNOLOGY, Raipur
VIth Semester, B.Tech (II)
Subject: Software Engineering
Class Test-III

Duration: 1.15 hrs

Max Marks: 15

Attempt all the questions.

1. Design Equivalence class test cases for the following? (5)
A program for determining the previous date. Its input is triple of day, month and year with the values in the range $1 \leq \text{day} \leq 31$, $1 \leq \text{month} \leq 12$, $1990 \leq \text{year} \leq 2025$.
2. Explain debugging techniques with suitable examples? (3)
3. What is Structural testing? Discuss the cyclomatic complexity with an example? (3)
4. Discuss different types of software maintenance? Explain how to measure the maintenance cost? (4)

NIT

Code: IT 605

B.Tech (Sixth Semester) Examination, April-May 2017**Subject: Software Engineering****Branch: Information Technology****Time: 3 Hours****IT - 605****Max. Marks: 70**

Note: Attempt any two parts from each question. Marks of each part are given in the right hand side margin.

Q1.

- a) What is process iteration? Explain software development process using Spiral model with figure? (7)
- b) Compare the following life cycle models based on distinguishing factors, strengths and weakness- Waterfall model, Incremental model, Prototyping model, and Spiral model? (7)
- c) Explain V-model with neat diagram for planning verification and validation process? (7)

Q2.

- a) With an example, explain the functional requirements and non functional requirements? (7)
- b) What is data flow model? Draw the Data Flow Diagram for Student Result Management System up to 3 levels? (7)
- c) Construct Use Case Diagram of Library Management System and write down the use case scenario for "Return Book"? (7)

Q3.

- a) Explain the general model of software design process? (7)
- b) Explain in detail about any four architectural styles? (7)
- c) Draw a sequence diagram for ATM Withdrawal? And also identify what are boundary, control and entity objects? (5+2)

Q4.

- a) Briefly describe the different stages of testing process? (7)
- b) Consider a simple program to classify a triangle. Its input is triple of positive integers (say x, y, z) and input parameters range from 1 to 100. The program output may be one of the following words. [Scalene, Isosceles, Equilateral, and not a triangle]. Design the equivalence class test cases? (7)
- c) Consider the following program:

```
1. #include<stdio.h>
2. int main()
3. {
4.     int n, first = 0, second = 1, next, c;
5.     printf("Enter the number of terms\n");
6.     scanf("%d",&n);
7.     printf("First %d terms of Fibonacci series are :-\n",n);
8.     for ( c = 0 ; c < n ; c++ )
9.     {
10.        if ( c <= 1 )
11.            next = c;
12.        else
13.        {
14.            next = first + second;
15.            first = second;
16.            second = next;
17.        }
18.        printf("%d\n",next);
19.    }
20.    return 0;
21. }
```

For the above program i) Draw Control Flow Graph

ii) Determine the cyclomatic complexity

iii) Determine the basis set of independent paths. (3+2+2)

Q5.

- a) A system has 12 external inputs, 24 external outputs, fields 30 different external queries, manages 4 internal logical files, and interfaces with 6 different legacy systems (6 EIFs). All of these data are average complexity and overall system is relatively simple. Compute Function Point (FP) for the system? (7)

b) Use the COCOMO II model to estimate the effort required to build software for a simple ATMs that produces 12 screens, 10 reports, and will require approximately 80 software components. Assume average complexity and average developer / environment maturity. Use the application composition model with object points. (7)

- c) Write short note on the following. (3.5+3.5)
- i) Reverse Engineering
 - ii) Reengineering

NIT

Code: IT 605

B.Tech (Sixth Semester) Examination, April-May 2017**Subject: Software Engineering****Branch: Information Technology****Time: 3 Hours****TT - 605****Max. Marks: 70**

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Q1.

- a) What is process iteration? Explain software development process using Spiral model with figure? (7)
- b) Compare the following life cycle models based on distinguishing factors, strengths and weakness- Waterfall model, Incremental model, Prototyping model, and Spiral model? (7)
- c) Explain V-model with neat diagram for planning verification and validation process? (7)

Q2.

- a) With an example, explain the functional requirements and non functional requirements? (7)
- b) What is data flow model? Draw the Data Flow Diagram for Student Result Management System up to 3 levels? (7)
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Q3.

- a) Explain the general model of software design process? (7)
- b) Explain in detail about any four architectural styles? (7)
- c) Draw a sequence diagram for ATM Withdrawal? And also identify what are boundary, control and entity objects? (5+2)

Q4.

- a) Briefly describe the different stages of testing process? (7)
- b) Consider a simple program to classify a triangle. Its input is triple of positive integers (say x, y, z) and input parameters range from 1 to 100. The program output may be one of the following words. [Scalene, Isosceles, Equilateral, and not a triangle]. Design the equivalence class test cases? (7)
- c) Consider the following program:

```
1. #include<stdio.h>
2. int main()
3. {
4.     int n, first = 0, second = 1, next, c;
5.     printf("Enter the number of terms\n");
6.     scanf("%d",&n);
7.     printf("First %d terms of Fibonacci series are :-\n",n);
8.     for ( c = 0 ; c < n ; c++ )
9.     {
10.        if ( c <= 1 )
11.            next = c;
12.        else
13.        {
14.            next = first + second;
15.            first = second;
16.            second = next;
17.        }
18.        printf("%d\n",next);
19.    }
20.    return 0;
21. }
```

For the above program i) Draw Control Flow Graph

ii) Determine the cyclomatic complexity

iii) Determine the basis set of independent paths. (3+2+2)

Q5.

- a) A system has 12 external inputs, 24 external outputs, fields 30 different external queries, manages 4 internal logical files, and interfaces with 6 different legacy systems (6 EIFs). All of these data are average complexity and overall system is relatively simple. Compute Function Point (FP) for this system? (7)

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- b) Use the COCOMO II model to estimate the effort required to build software for a simple ATMs that produces 12 screens, 10 reports, and will require approximately 80 software components. Assume average complexity and average developer / environment maturity. Use the application composition model with object points. (7)
- c) Write short note on the following. (3.5+3.5)
i) Reverse Engineering
ii) Reengineering

NIT

Code: IT 605

B.Tech (Sixth Semester) Examination, Nov-Dec 2014**Subject: Software Engineering****Branch: Information Technology**

Time: 3 Hours

Max. Marks: 70

Note: Attempt any two parts from each question. Marks of each part are given in the right hand side margin.

Q1.

- a) With the help of neat diagram, explain the spiral model of a process. What are the advantages over waterfall model? (7)
- b) Explain the Incremental model with neat diagram and its advantages and disadvantages? (7)
- c) Describe any two techniques for developing software prototypes in detail? (7)

Q2.

- a) Explain the requirements engineering process, with a neat block diagram? (7)
- b) Explain the structure of a software requirement document? (7)
- c) What is data flow model? Draw the DFD model for the Student Result Management up to 3 levels? (7)

Q3.

- a) Explain the general model of software design process? (7)
- b) Explain the architectural styles used in the design process? (7)
- c) Draw and explain the sequence and state diagram for a typical Library Management System? (7)

Q4.

- a) Explain various types of Integration Testing with its advantages and disadvantages? (7)
- b) Explain the categories of debugging approaches? (7)

PTO

- c) Draw the control flow graph for the following function named sort. From the control flow graph, determine the cyclomatic complexity and All D-U paths? (2+2+3)

```
Void sort(int a[], int n){  
    int i,j;  
    for(i=0;i<n-1;i++)  
        for(j=i+1;j<n;j++)  
            if(a[i]>a[j]) {  
                temp=a[i];  
                a[i]=a[j];  
                a[j]=temp;  
            }  
}
```

Q5.

a)

- i) Compute function point value for a project with the following information
domain characteristics (4)

No of external inputs -30

No of external outputs -52

No of external inquiries -30

No of log files -12

No of external interface files-2

Assume complexity adjustment values and adjustment factors for above are average.

- ii) Explain the difference between Reverse Engineering and Reengineering in detail? (3)

- b) Explain step by step to measure the project effort using COCOMO-II model? (7)

- c) Why risk management is important in project management? Explain different stages in risk management? (7)

Time: 1:15 Hrs

Attempt any Three questions.

Max Marks: 15

- Q.1 Explain BPN with its derivation, architecture and algorithm. Discuss the role of momentum factor. [5]
Q.2 Consider three orthogonal vectors $[1 -1 1 -1]$, $[-1 1 1 -1]$ and $[1 1 -1 -1]$ for auto associative network. Find the weight matrix to store all the vectors and test the response of the net for each of the input vectors. [5]
Q.3 Explain BAM with its architecture, concepts and training algorithm. [5]
Q.4 Write short notes on : i) Discrete Hopfield Network, ii) Radial Basis function Network [5]

B.Tech.(Sixth Semester) Makeover (III) Examination, May 2017

Subject: Neural Network and Fuzzy Logic
Branch: Information Technology

Time: 1:15 Hrs

Max Marks: 15

Attempt any Three questions.

1. Consider a full CPN using input pair $x = (1, 1)$ with the weights $v = [0.2 \ 0.3; 0.4 \ 0.5]$, $y = (0, 1)$ with the weights $w = [0.1 \ 0.3; 0.6 \ 0.7]$. Perform the one step & first phase of training. Find the activation of the cluster layer units (2 nodes) and update the weights using learning rates of 0.3. [5]
✓ 2. Explain the concept, architecture and training algorithm of ART 2. [5]
3. Describe the Boltzmann machine with its architecture and application algorithm. [5]
4. Explain: a) LR Fuzzy Neurons, & b) FAMs. [2.5X2]

RollNo _____

Time: 1:15 Hrs

Max Marks: 15

Note: Q.1 Compulsory and among Q.2, 3, 4 & 5 attempt any three questions

- Q.1 Write the evolutionary development of Artificial Neural Network. [3]
Q.2 Compare and correlate the ANN with BNN with proper illustration. [4]
Q.3 Compare the feature of AI and ANN. List some activation function used in ANN. [2+2]
Q.4 Describe and illustrate supervised, unsupervised and reinforcement training. [4]
✓ Q.5 Explain McCulloch-Pitts Neuron model. Generate the output of logic AND (with suitable parameter values) OR function ($w_1=3, w_2=3$) (take 2 inputs, 1 output for both function) by using the McCulloch Model. [2+2]

RollNo

B.Tech.(Sixth Semester) First Examination, Feb 2017
Subject: Neural Network and Fuzzy Logic
Branch: Information Technology

Time: 1:15 Hrs

Max Marks: 15

Note: Q.1 Compulsory and among Q.2, 3, 4 & 5 attempt any three questions

- Q.1 Write the evolutionary development of Artificial Neural Network. [3]
Q.2 Compare and correlate the ANN with BNN with proper illustration. [4]
Q.3 Compare the feature of AI and ANN. List some activation function used in ANN. [2+2]
Q.4 Describe and illustrate supervised, unsupervised and reinforcement training. [4]
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RollNo

B.Tech.(Eighth Semester) First Examination, Feb 2016
Subject: Neural Network and Fuzzy Logic
Branch: Information Technology

Time: 1:15 Hrs

Max Marks: 16

Note: Q.1 Compulsory and among Q.2, 3, 4 & 5 attempt any three questions

- Q.1 Write the evolutionary development of Artificial Neural Network. [3]
Q.2 Compare and correlate the ANN with BNN with proper illustration. [4]
Q.3 Compare the feature of AI and ANN. List some activation function used in ANN. [2+2]
Q.4 Describe supervised & unsupervised training. Give the taxonomy of ANN for fixed pattern. [2+2]
Q.5 Explain McCulloch Pitts Neuron model. Generate the output of logic AND ($w_1=1, w_2=1$) & OR function ($w_1=3, w_2=3$) (take 2 inputs, 1 output for both function) by using the McCulloch Model. [2+2]

RollNo

B.Tech.(Eighth Semester) First Examination, Feb 2015
Subject: Neural Network and Fuzzy Logic
Branch: Information Technology

Time: 1:15 Hrs

Max Marks: 20

Note: Q.1 Compulsory and among Q.2, 3, 4 & 5 attempt any three questions

- Q.1 Write the evolutionary development of Artificial Neural Network. [3]
Q.2 Compare and correlate the ANN with BNN with proper illustration. [4]
Q.3 Write the notes on: i) Delta learning rule & ii) Memory based learning rule. [2 + 2]
Q.4 Write & explain the Hebbian Network with algorithms & realize ANDNOT function. [4]
Q.5 Develop the perceptron for NAND function with bipolar inputs, bias & targets by giving the activation function & taking learning parameter (α) equal to 1. [4]

Roll No. _____

B.Tech.(Sixth Semester) Second Examination, March 2015

Subject: Neural Network and Fuzzy Logic

Branch: Information Technology

Time: 1:15 Hrs

Max Marks: 15

Attempt any Three questions.

- Q.1 Explain BPN with its derivation, architecture and algorithm. Discuss the role of momentum factor. [5]
Q.2 Consider three orthogonal vectors $[1 -1 1 -1]$, $[-1 1 1 -1]$ and $[1 1 -1 -1]$ for auto associative network. Find the weight matrix to store all the vectors and test the response of the net for each of the input vectors. [5]
Q.3 Explain BAM with its architecture, concepts and training algorithm. [5]
Q. 4 Construct and test an LVQ with five vectors assigned to two classes. The given vectors along with the classes are as shown:

Vector	Class	(Assume $\alpha = 0.1$)
(0 0 1 1)	1	
(1 0 0 0)	2	
(0 0 0 1)	2	
(1 1 0 0)	1	
(0 1 1 0)	1	

$$N = \{(500, 0.35), (1000, 0.67), (1500, 0.97), (1800, 0.25)\}$$

Compute the relation T for relating series resistance to motor speed
i.e. R_{se} to N . Perform max-min composition. [2+5]

c) Write short notes on :

- i. Fuzzy Numbers & Fuzzy Neurons
- ii. Defuzzification

[3.5 X 2]

NIT

Roll No

1 2 1 1 8 - - - -

Code No.: IT-610

B.Tech.(Sixth Semester) Examination, April-May 2015

Subject: Neural Network and Fuzzy Logic

Branch: Information Technology

Time: Three Hours

Max Marks: 70

Min Pass Marks: 25

Note:

- i. Attempt all questions and from each attempt any two subsections.
- ii. All parts of a question should be answered together.
- iii. Answer should be brief and to the point.
- iv. Figures on the right hand side margin indicate break marks for that question.
- v. Notations have their usual meanings.
- vi. Assume default values if required.

Q.1

- a) Explain biological neural network with its concepts, transmission of signals, major elements. Correlate BNN with ANN. [5+2]
- b) Explain network architecture of ANN. Lists some activation functions used in ANN. [4+3]
- c) Explain the following:
 - i. Linear separability. Justify XOR function is non linearly separable by single decision boundary line.

P T Q

ii. Neural Network as directed graphs. [4+3]

- Q.2
a) Explain the different learning strategy with their block diagram and examples for each in support of strategies. [6+1]

b) Explain the following:

- i. Hebb net [3]
ii. Perceptron & Competitive learning rule [4]

c) Give the concept of Auto Associative Memory network. Consider auto associative network with three orthogonal vectors $[1 -1 1 -1]$, $[-1 1 1 -1]$ and $[1 1 -1 -1]$. Find the weight matrix to store all the vectors and test the response of the net for each of the input vector given. [2+5]

Q.3
a) Explain EBPA along with the derivation of the delta rule for different layers. Give some methods for selection of parameters. [5+2]

b) Briefly describe KSOM. Consider KSOM net with weight $W = [1 0.3; 0.9 0.5; 0.7 0.7; 0.5 0.9; 0.3 1]$. Find the winning cluster unit for the input pattern $[0 0.5 1 0.5 0]$ with learning rate = 0.25, find the new weight matrix. [3+4]

c) Consider the forward only CPN with weights between input and cluster layer $V_{ij} = [0.3 0.6; 0.1 0.5]$ and weights between cluster layer to output layer $W_{jk} = [0.2 0.8; 0.4 0.7]$ using input pair $x = (1 0)$, and $y = (1 0)$ perform the training (one step-one iteration). Find the activation of the cluster layer units. Update the weights using learning rates $\alpha=0.5$ and $a=0.1$. [7]

Q.4
a) Explain the ART fundamentals. Give the architecture & algorithm for ART 1 neural net. [2+5]

b) Explain the structure, types of neuron, and training of Cognitron. [7]

c) Explain the following:
i. Simulated Annealing
ii. Support Vector Machine [3.5+3.5]

Q.5
a) Explain Fuzzy Sets & Membership function with suitable diagram and examples. Determine the implication relations

i. IF x is A THEN y is B

ii. IF x is A THEN y is B ELSE y is C.

$$\text{where } A = \{(a, 0) (b, 0.7) (c, 0.5) (d, 1)\}$$

$$B = \{(1, 0.2) (2, 0.9) (3, 0.8) (4, 0.1)\}$$

$$C = \{(1, 0.1) (2, 0.4) (3, 0.9) (4, 0.7)\}$$

[3+4]

b) Explain Fuzzy Inference. For a speed control of DC motor, the membership functions of series resistance(R_s), armature current (I_a) and speed(N) are given as follows:

$$R_s = \{(30, 0.4), (60, 0.6), (100, 1.0), (120, 0.1)\}$$

$$I_a = \{(20, 0.2), (40, 0.3), (60, 0.6), (80, 0.8), (100, 1.0), (120, 0.2)\}$$

PTO:

(S. 18)

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR, CG 492010
Department of Information Technology
SEMESTER - VI

"Neural Networks and Fuzzy Logic"

Theory Periods: 30
Credits: 4

Tutorials: "10"
Code: IT 610

UNIT-1 Introduction to Artificial Neural Networks:

Elementary Neurophysiology, Biological Neuron, Biological and Artificial Neuron Models, characteristics of ANN, Historical developments, Neural Networks viewed as directed graphs, Feedback from neurons to ANN, Artificial Intelligence and Neural Networks, McCulloch-Pitts Model, Network Architectures, Recurrent Networks, Topologies, overview of Single-layered Feed forward Networks and Multi-layered Feed-forward Networks.

UNIT-2 Learning and Training and Associated Memories

Classification Taxonomy of ANN, Different Learning strategy-Supervised and Unsupervised learning, Reinforcement, Learning rules, Memory models, Stability and Convergence, Activation and Synaptic Dynamics, Competitive, Error-Correction Learning, Associative Memory, Hebbian Learning, General concept of associated memory, Bidirectional Associated memory (BAM) architecture, BAM Training algorithm, Hopfield Network Architecture, Discrete and continuous versions, Storage and recall algorithm, stability analysis.

UNIT-3 A Survey of Neural Network Models:

Single-layered Feed Forward Neural Networks- Perceptron model- least mean square algorithm (Rosenblat Algorithm), ADALINE-algorithm and applications Multi-layered Feed Forward Neural Networks-Perceptron model - Backpropagation Algorithm, XOR - Problem, The generalized Delta rule, BPN Applications, MADALINE - Algorithm and applications, Self Organizing Feature map algorithm, Learning Vector Quantization, Counter Propagation Network.

UNIT-4 Applications:

Application and Architecture of Complex Pattern Recognition: ART/ART-1, ART-2, Cognitron - Structure & training, Neocognitron architecture - Data processing-performance - addition of lateral inhibition & feedback to the neocognitron, Character Recognition and Handwritten Digit recognition, Simulated Annealing, Support Vector machines.

UNIT-5 Neural Fuzzy Systems:

Introduction to classical sets-properties, Operations and relations :Introduction to Fuzzy sets, membership, uncertainty, operations, relations, cardinalities, Examples of Fuzzy logic, Defuzzification to crisps sets and Its methods, Fuzzy Associative memories, Fuzziness in neural networks and examples - Fuzzy logic control and fuzzy classification.

Name of Text Books:

1. Artificial Neural Networks by B. Yagna Narayan, PHI
2. Neural Networks Fuzzy Logic & Genetic Algorithms by Rajshekaran & Pal, Prentice Hall
3. Principles of Soft Computing by S. N. Sivanandam, S. N. Deepa, Wiley-India.
4. Introduction to Neural N/w using MATLAB 6.0 by S. N. Sivanandam, S. N. Deepa, S. Sumathi, TMH.

Reference books

1. Neural N/w by James A. Freeman and David M. Skapura, Prentice Hall.
2. Neural N/w & Fuzzy System by Bart Kosko, Prentice Hall.
3. Neural N/w design by Jędrzej Maleszka, Wileja Vilnius Publications, Vilnius.

Roll No

1 4 1 1 8 0 1 9

Code No.: IT-610

NIT

B.Tech.(Sixth Semester) Examination, April-May 2017

Subject: Neural Network and Fuzzy Logic

Branch: Information Technology

Time: Three Hours

Max Marks: 70

Min Pass Marks: 25

Note:

- i. Attempt all questions and from each attempt any two subsections.
- ii. All parts of a question should be answered together.
- iii. Answer should be brief and to the point.
- iv. Figures on the right hand side margin indicate break marks for that question.
- v. Notations have their usual meanings.
- vi. Assume default values if required.

Q.1

- a) Compare and correlate biological neuron with artificial neuron. Explain the electrochemical transmission in BNN with functioning of some neurotransmitters [4+3]
- b) Describe basic building blocks of ANN. [7]
- c) Explain Mc-Culloch's Pitts model of ANN. Realize the NAND & NOR functions. What is Boolean function? Explain how ANN can solve linearly separable problems.

Q.2

- a) Briefly describe the BAM network. Construct and test the a BAM network to associate the letter 'E' and 'F' with simple bipolar input-output vectors. The target output for 'E' is (-1,1) and for 'F' is (1,1). (The display matrix size is 5 X3).

[2+5]

$$\begin{matrix} * & * & * \\ * & . & . \\ * & * & * \\ * & . & . \\ * & * & * \end{matrix}$$

'E' : Target(-1,1)

$$\begin{matrix} * & * & * \\ * & . & . \\ * & * & * \\ * & . & . \\ * & * & * \end{matrix}$$

'F': Target(1,1)

- b) Explain ADALINE network. Develop the ADALINE network for OR function with bipolar inputs and targets with initial weights and bias are assumed a random values say 0.1 and learning rate is also set to 0.1. [Perform 2 epochs only & calculate MSE.]

[2+5]

- c) Explain the following:

- i. Hopfield net
ii. Hebbian net

[3.5]
[3.5]

Q.3

- a) Explain EBPA stepwise along with the derivation of the delta rule for different layers. Explain significance and drawback of momentum factor.

[5+2]

2

- b) Describe KSOM. Consider KSOM net with weight $W = [0.3 \ 0.2 \ 0.1 \ 0.8 \ 0.4; 0.5 \ 0.6 \ 0.7 \ 0.9 \ 0.2]$. Find the winning cluster unit for the input pattern [0.2 0.4] with learning rate = 0.25, find the new weight matrix. [3+4]

- c) Briefly describe CPN. Consider the forward-only CPN net with weight between input & cluster layer, $V = [0.8 \ 0.2; 0.8 \ 0.2; 0.2 \ 0.8; 0.2 \ 0.8]$, and weight between cluster & output layer, $W = [0.5 \ 0.5; 0.5 \ 0.5]$. Using the input pair $x = [1 \ 0 \ 0 \ 0]$ and $y = [1 \ 0]$, perform phases I & II of training and update the weights using learning rates $\alpha = a = 0.2$. [2+5]

Q.4

- a) Explain the concept of ART 2. Consider the ART 2 network to cluster the input vector (0.6 0.8 0). Find the winning unit and update the weight for winner unit. [Given values of parameters are: $a = b = 10$, $c = 0.1$, $d = 0.9$, $e = 0$, $p = 0.9$, $\theta = 1/\{\text{sqrt}(n)\}$, $\alpha = 0.6$ and take typical values of b_p and t_p]. [2+5]
- b) Explain SVM. List some common kernels and describe various SVM classifiers. [2+2+3]
- c) Explain the following:
i. Cognitron
ii. Simulated Annealing [3.5+3.5]

Q.5

- a) Explain the significant role of Fuzzy logic to deal with the problem of uncertainty. Describe fuzzy relations with the explanation of fuzzy Cartesian product and various operations on fuzzy relation. [2+5]

Note: Attempt all questions. Each question carries equal marks

Que1: What is Handoff management in PCS network? What are strategies for Handoff Detection in PCS NETWORK?

Que2: If a transmitter produces 50W of power, express the transmit power in units of (a) dBm, and (b) dBW. If 50W is applied to a unity gain antenna with a 900 MHz carrier frequency, find the received power in dBm at a free space distance of 100 m from antenna. What is $P_r(10 \text{ km})$? Assume unity gain for the receiver antenna

Que3: What is code division multiple access (CDMA) technique and how it works? Let us assume that Sender A sends 1 and Sender B sends 0 by using CDMA technique. How the receiver A and receiver B will get the senders information. (Sender A and Receiver A key = 010011, Sender B and Receiver B key= 110101)

(19)

Note: Attempt all questions. Each question carries equal marks

Que1: What is Handoff management in PCS network? What are strategies for Handoff Detection in PCS NETWORK?

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NATIONAL INSTITUTE OF TECHNOLOGY Raipur

B.Tech (VIth) Semester CT 2 Branch: Information Technology Subject: CMC



Time- 1:15 h
Note: Attempt H
Q.1
Q.2
Q.3

Note: Attempt all questions. Each question carries equal marks

Que1. Discuss the system architecture and protocol architecture of IEEE 802.11 based wireless local area network (WLAN) system.

Que2: Describe the medium access control layer for WLAN system. What is short inter-frame spacing (SIFS), PCF inter-frame spacing and DCF inter-frame spacing?

Que3: What are the goals, assumption and requirement for the Mobile IP.

CT3 NIT Raipur Department: I.T Subject: CMC

Que1. Assuming free space propagation, a receiver is located 10 km away from a 50 W transmitter. The carrier frequency is 900 MHz, antenna gain at transmitter and receiver is 1 and 2, calculate

- (a) Power received at the receiver (3)
- (b) The magnitude of the E-field at the receiver antenna (7)

Que2: A base-station transmitter has a power output of 10 watts operating at a frequency of 250 Mhz. The transmitter is connected by 20m of an RF coaxial cable, which has a loss of -3dB/100 m specification, to an antenna that has a gain of 9 dBi. The receiving antenna is 25 km away and has a gain of 4 dBi. There is negligible loss in the receiver feeder line, but the receiver is mismatched; the receiving antenna and feeder cable are designed for a 50 ohm impedance, but the receive input has 75 ohm impedance, resulting into a mismatch loss of about 0.2 dB. Calculate the power delivered to the receiver, assuming free space propagation. (5)



National Institute of Technology, Raipur
B. Tech. (6th Semester), Second exam
Subject: Cellular and Mobile Computing
Branch: Information Technology

Max. Marks-15

Time- 1:15 hrs.

Note: Attempt all questions.

- Q.1 How can MACA still fail in case of hidden/exposed terminals? Think of mobile station and changing transmission characteristics. (5)
- Q.2 Why & when handoff will occur. How handoff will detected by any mobile node? What are the strategies is used for handoff detection (5)
- Q.3 In mobile communication there are two type of handoff: hard handoff and soft handoff. In hard handoff, Mobile node associate only single base station while in soft handoff MN can associate with multiple base stations. Describe the procedure for adding and removing the base station from Mobile Node. (5)

B.Tech (VIth Semester) CT 2 Branch: Information Technology Subject: CMC

Note: Attempt all questions. Each question carries equal marks

Que1: What is WLAN system? Discuss the advantage and disadvantage of WLAN system.

Que2: What is Bluetooth? How the Piconet forms in the AdHoc Network.

Que3: How the IP packet delivery is done from correspondent node (CN) to Mobile Node, if the Mobile Node moves from its home network to other Network.

Que 4: Why is routing in multi hop ad-hoc networks completed, what are special challenges?

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National Institute of Technology, Raipur

B. Tech. (6th Semester), First exam

Subject: Cellular and Mobile Computing

Branch: Information Technology

Time- 1:15 hrs.

Note: Attempt all questions.

Max. Marks-15

- Q.1 A spectrum of 30 MHz is allocated to a wireless FDD cellular system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses (a) four-cell reuse, (b) seven-cell reuse, and (c) 12-cell reuse. If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell for each of the three systems. (4)
- Q.2 Explain direct sequence spread spectrum and frequency hopping spread spectrum? How can we reduce the narrowband interference? (3)
- Q.3 If a transmitter produces 50 W of power, express the transmit power in units of (a) dBm, and (b) dB'V. If 50 W is applied to a unity gain antenna with a 900 MHz carrier frequency, find the received power in dBm at a free space distance of 100 m from the antenna. What is $P_r(10 \text{ km})$? Assume unity gain for the receiver antenna. (4)
- Q.4 Calculate the mean path loss using Okumara's model for $d = 50 \text{ km}$, $h_{te} = 100 \text{ m}$, $h_{re} = 10 \text{ m}$ in a suburban environment. If the base station transmitter radiates an EIRP of 1 kW at a carrier frequency of 900 MHz. Find EIRP (dBm) and the power at the receiver where gain at receiving antenna is 10 dB. From the Okumara's curve, $A_{\text{env}}[900 \text{ MHz}(50 \text{ km})] = 43 \text{ dB}$ and $G_{\text{AREA}} = 9 \text{ dB}$. (4)

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR

B. Tech (Informational Technology)

Class Test-1, Feb 2016

SEM: VI Max. Marks: 15 SUB: Cellular and Mobile Computing

Note: All questions are equal marks.

1. A wireless communication transmitter has output power of 165 watts at a carrier frequency of 325 MHz. It is connected to an antenna with gain of 12 dBi. The receiving antenna is 15 km away and has a gain of 6 dBi. Calculate the power delivered to the receiver, considering free space propagation. Assume that there are no other losses or mismatch in the system.
2. Draw the basic architecture of PCS network.
3. A wireless communication base station transmits 10 watts of power at a carrier frequency of 1GHz. If the receiver station is at a distance of 1.6 km from base station
 - a) The propagation path loss (in dB) in a free space environment
 - b) The received signal power (in dBm)
 - c) The transmission delay in nsAssume that the transmitter and receiver antenna gains are 1.6 each.
4. What is main physical reason for the failure of many MAC scheme known in wireless networks? What is done in wired networks to avoid this effect?

14/11/18/019

B.Tech (VI semester) Examination April- May 2017**Branch: Information Technology****Subject: Cellular and Mobile Computing**

Attempt any two parts of each question

Que1:

- A) A Wireless communication base station transmits 10 watts of power at a carrier frequency of 1 GHz. If the receiver at a distance 1.6 km from the base station, then determine
- The propagation path loss (in dB) in a free space environment
 - The receiver signal power (in dB)
 - The transmitter delay in ms

Assume that the transmitter and receiver antenna gains are 1.6 each

- B) A wireless communication transmitter has an output power of 165 watts at a carrier frequency of 325 Mhz. It is connected to an antenna with a gain of 12 dBi. The receiving antenna is 15 km away and has a gain of 6 dBi. Calculate the power delivered to the receiver, considering free space propagation. Assume that there are no other losses in the system.
- C) Discuss the Space division multiplexing, time division multiplexing, frequency division multiplexing and code division multiplexing technique

Que 2:

- A) What is code division multiple access (CDMA) technique and how it works? Let us assume that Sender A sends 1 and Sender B sends 0 by using CDMA technique. How the receiver A and receiver B will get the senders information. (Sender A and Receiver A key = 010011, Sender B and Receiver B key= 110101).
- B) Describe four different channel assignment schemes in detection and assignment of handoff management. Under what circumstances is the reserved channel scheme (RCS) more desirable than others?
- C) What are the main steps of the mobile-assisted handoff (MAHO) link transfer?

Que 3:

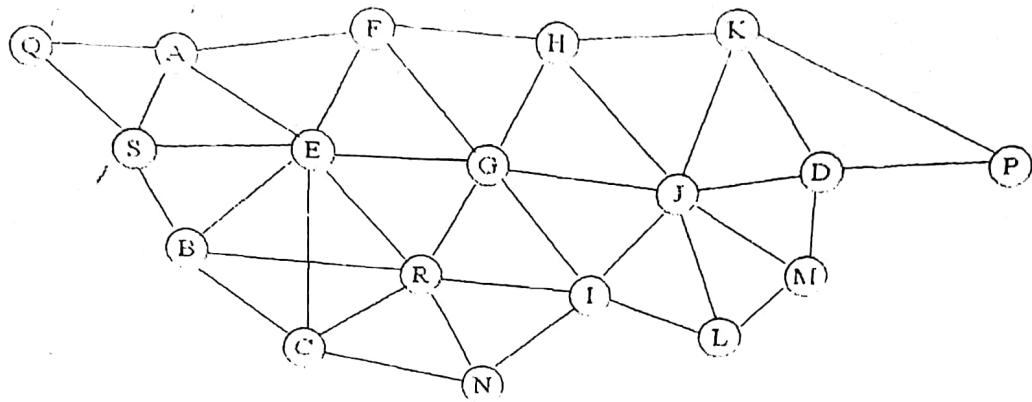
- A) Describe the Bluetooth technology. What is piconet and scatternet and how they will form?
- B) What is Mobile IP and explain its working procedure with proper diagram?
- C) Explain the concept of Wireless LAN and discuss are its merit and demerit and how reliable date delivery occurs in WLAN

Que 4:

- A) Why Mobile Data management is required? What is transaction processing and data processing scenario for mobile computing?
- B) What is replication in mobile computing? Describe the synchronous single master replication.
- C) What are the mobility constraints in mobile computing? Also discuss the device mobility and bandwidth management in mobile computing

Que5:

- A) What is dynamic source routing? How the data delivery will be done from source Q to destination P. How the route maintenance process will be going if the route between node G to node J will be going to be terminated.

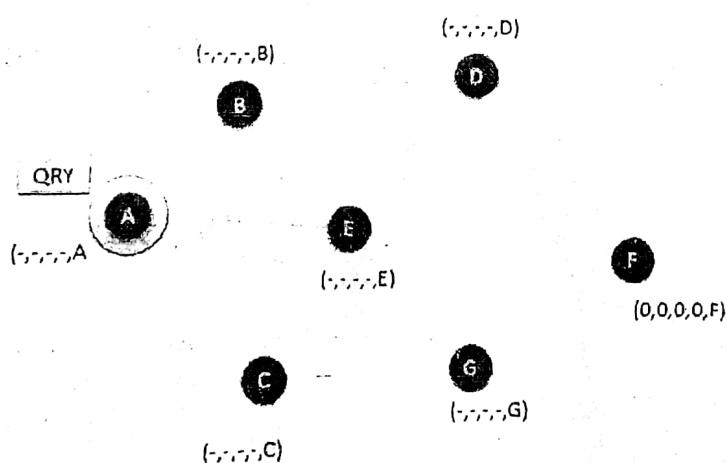


- B) What is The Temporally Ordered Routing Algorithm (TORA)? How the Route Maintenance will be done for the given case

Case1: Link is broken (between D to F) and every node in network has a downstream link

Case2: Link is broken (between B to D) and node is network do not have any downstream link

Case3: Node in network dont have any downstream link because of route maintenance process (link is failed between D to F).



- C) What is Destination sequence distance vector (DSDV) routing algorithm? How the DSDV is differ from distance vector algorithm.

National Institute of Technology, Raipur
Information Technology Department

Subject: Compiler Design Sem: 6th Max. Marks: 15 Time: 1hr 15mins

All questions are compulsory and each carries equal marks.

Q1 Explain the kind of transformation done on the source program by the individual phase of the compiler for the statement,

$$a = (b+c)^* (b+c)^* 2$$

Q2 a) Write a structure of LEX program specification for tokens.
or

b) i) Eliminate left recursion from the following grammar----
 $E \rightarrow aa/abba/Eb/EE$

ii) Explain the concept of Boot-Strapping in compiler design process.

Q3 Construct LL(1) parsing table for the following grammar and check whether this is LL(1) or not.

$$S \rightarrow aAC/bB$$

$$A \rightarrow eD$$

$$D \rightarrow eE/\epsilon$$

$$E \rightarrow eD/dD$$

$$B \rightarrow f/g$$

$$C \rightarrow h/i$$



National Institute of Technology, Raipur
Information Technology Department
Subject: Compiler Design
Class Test 2

Sem: 6th

Max. Marks: 15

Time: 1hr 15mins

All questions are compulsory.

- Q.1 Construct an SLR (1) parsing table for the following grammar and find conflicts, if any. 6

$$\begin{aligned} S &\rightarrow xAy / xBy / xAz \\ A &\rightarrow aS / q \\ B &\rightarrow q \end{aligned}$$

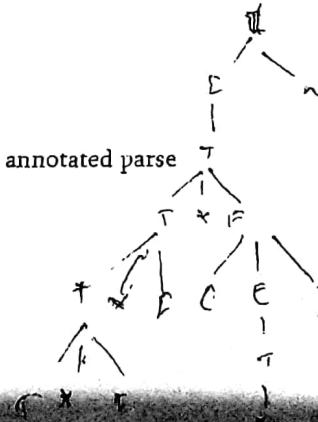
- Q.2 What is handle and handle pruning? Give reduction steps of 4 expression $id + id * id$ for the following grammar,

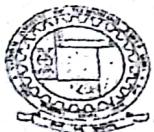
$$E \rightarrow E + E / E * E / (E) / id$$

- Q.3 Consider the grammar that is used for simple desk calculator. 5

$$\begin{aligned} L &\rightarrow En \\ E &\rightarrow E + T / T \\ T &\rightarrow T * F / F \\ F &\rightarrow (E) / digit \end{aligned}$$

Obtain the semantic action and design the annotated parse tree for the string $1 * 2 * 3 * (4 + 5) n$





National Institute of Technology, Raipur
Information Technology Department
Subject: Compiler Design
Class Test 2

Sem: 6th

Max. Marks: 15

Time: 1hr 15mins

All questions are compulsory.

- Q.1 Construct an SLR (1) parsing table for the following grammar and find conflicts, if any. 6

$$\begin{aligned} S &\rightarrow xAy / xBy / x\Delta z \\ A &\rightarrow aS / q \\ B &\rightarrow q \end{aligned}$$

- Q.2 What is handle and handle pruning? Give reduction steps of expression $id + id * id$ for the following grammar, 4

$$E \rightarrow E + E / E * E / (E) / id$$

- Q.3 Consider the grammar that is used for simple desk calculator. 5

$$\begin{aligned} L &\rightarrow En \\ E &\rightarrow E + T / T \\ T &\rightarrow T * F / F \\ F &\rightarrow (E) / digit \end{aligned}$$

Obtain the semantic action and design the annotated parse tree for the string $1 * 2 * 3 * (4 + 5)$ n



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NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR

B.Tech. (Sixth Semester) Examination

Subject: Compiler Design

Second Examination

Branch: Information Technology

Time: 75 Minutes

Max Marks: 15

Roll No.:

Note: (1) Use proper symbols used in their notations for formula/expressions.

1. Construct SLR Parsing table for the given grammar :- (5)

$$S \rightarrow L = R + G / R$$

$$L \rightarrow *R / p$$

$$R \rightarrow q$$

$$G \rightarrow ++r$$

2. Construct LALR Parsing table for the given below grammar:- (Any One) (5)

/ (a)

$$\begin{aligned} S &\rightarrow CC \\ C &\rightarrow cC \\ C &\rightarrow d \end{aligned}$$

(b)

$$\begin{aligned} S &\rightarrow iSeS \\ S &\rightarrow iS \\ S &\rightarrow a \end{aligned}$$

3. (a) Describe S-attribute and L-attribute definitions in SDT with the help of suitable example. (2)

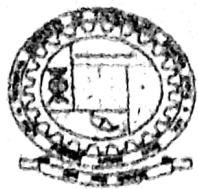
- (b) Calculate all given terms for the expression

$$a + b * c - d / (b * c)$$

(3)

- a. TAC
- b. Triple
- c. Quadruple
- d. DAG
- e. Syntax Tree

-; End of Paper:-



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NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR
B.Tech. (Sixth Semester) Examination
Subject: Compiler Design
Branch: Information Technology

Time: 75 Minutes

Max Marks: 15

Roll No.:

Note: (1) Use proper symbols used in their notations for formula/expressions.

UNIT-1

- Q.1. (a)** Describe phases of compiler with the help of suitable example as well as diagram. (5)
(b) Construct an automata for $(a|b)^* aab$ (2)

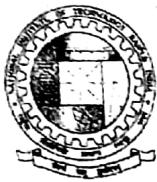
UNIT-2

- Q.2. (a)** Construct a predictive passing table for the given grammar (4*2)
- $$\begin{aligned}
 S &\rightarrow S@E \mid E \\
 E &\rightarrow E^*F \mid F \\
 F &\rightarrow G\#F \mid G \\
 G &\rightarrow id \mid (S)
 \end{aligned}$$

- (b)** Check the given grammar is LL (1) or not

$$\begin{aligned}
 S &\rightarrow A\epsilon B / C\epsilon B / B\epsilon \\
 A &\rightarrow d\epsilon / BC \\
 B &\rightarrow g / \epsilon \\
 C &\rightarrow h / \epsilon
 \end{aligned}$$

-:End of Paper:-



NIT

B.Tech (6th Semester) Examination, April-May 2015
Subject: Compiler Design
Branch: Information Technology

Code: IT 601
121180

Time: 3 Hours

Max. Marks: 70

Note: 1) Part (A) of each question is compulsory and carries 2 marks.

2) Attempt any 2 parts from (B), (C) and (D) in each questions having 6 marks.

Q.1

A What is LEX?

B Why to build a compiler? Explain analysis-synthesis model of compiler with suitable example.

C Explain transition diagram for identifier, unsigned number and relational operators with proper regular expression.

D Consider the following program:-

```
int main ( i , j )
{
    int i , j ;
    Return i > j ? i : j ;
}
```

Count the number of tokens and list down the lexeme, tokens and patterns of token at the end of lexical analysis of above program.

Q.2

A What are the problems in Top-Down Parsing?

B Construct the Predictive parse table for the following grammar :-

$$S \rightarrow a / \uparrow / (T)$$
$$T \rightarrow T, S / S$$

Check whether above grammar is LL (1) or not.

(Note: - \uparrow is a symbol.)

Write a code for the Recursive-descent parsing of the following grammar:-

$$\text{expr} \rightarrow \text{term rest}$$
$$\text{rest} \rightarrow + \text{term rest} / - \text{term rest} / \epsilon$$
$$\text{term} \rightarrow 0/1/2/...../9$$

D 1) Differentiate between Top-Down parser and Bottom-Up parser.

2) Consider the following grammar and show the handle of each right sentential form for string (a , (a , a))

$$S \rightarrow (L) / a$$
$$L \rightarrow L, S / S$$

Q.3

A What is meant by dependency graph?

B Consider the expression, $\cdot - (a + b) * (c + d) + (a + b + c)$ and translate them into:

- i. Three Address Code
- ii. Quadruples
- iii. Triples
- iv. Indirect Triples

C

Using given grammar,

$$L \rightarrow E^n$$

$$E \rightarrow E + T / T$$

$$T \rightarrow T * F / F$$

$$F \rightarrow (E) / \text{digit}$$

Write the SDD's semantic rule to evaluate as expression. Also Construct the annotated parse tree for the sentence,

$$(9 + 8 * (7 + 6) + 5) * 4 n$$

D Differentiate between following terms:-- (at least in 3 points)

- i. Synthesized translation and Inherited translation.
- ii. S-attribute and L-attribute.

Q.4

A What are the limitations of static allocation?

B What is the use of symbol table? Explain different ways to implement symbol table.

C Explain various allocation strategies in detail.

D Write a short notes on: (any 2)

- i. Activation record
- ii. Activation tree
- iii. Passing parameters by copy-restore

Q.5

A What is basic blocks?

B Generate three address code and target code for the following 'C' statement:

$$X = a / (b + c) - d * (e + f)$$

C Construct syntax tree and DAG for the following expressions:

- i. $a = b * (-c) + b * (-c)$
- ii. $x = a + (a + a) + ((a + a + a) + (a + a + a + a))$

D Write a short notes on (any 2)

- i. Loop optimization
- ii. Dead code elimination
- iii. Copy propagation



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NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR

B.Tech. (Sixth Semester) Examination Jan-June 2017

Subject: Compiler Design

Branch: Information Technology

Time: 75 Minutes

Roll No.:

Max Marks: 15

Note: (1) Use proper symbols used in their notations for formula/expressions.

- (I) (a) Explain Language Processing System and different phases of a compiler with the help of given grammar.

$$f = (a + b)^* c - d$$

(4)

- (b) Construct the finite automaton equivalent to the regular expression

$$(0+1)^*(00+11)(0+1)^*$$

(3)

- (2) (a) Check given grammar is LL (1) or not?. (Any One)

(4)

$A \rightarrow BCc/gDB$	$S \rightarrow S@E E$
$B \rightarrow bCDE/ \epsilon$	$E \rightarrow E^*F F$
$C \rightarrow DaB/ca$	$F \rightarrow G\#F G$
$D \rightarrow \epsilon /dD$	$G \rightarrow id (S)$
$E \rightarrow Eaf /c$	

- (3) (b) Construct LL (1) parsing table for the following grammar: (Any One)

(4)

$S \rightarrow aBDh$	$S \rightarrow ACB/ CbB/ Ba$
$B \rightarrow Bb/c$	$A \rightarrow da/BC$
$C \rightarrow bC/ \epsilon$	$B \rightarrow g/ \epsilon$
$D \rightarrow EF$	$C \rightarrow h/ \epsilon$
$E \rightarrow g/ \epsilon$	
$F \rightarrow f/ \epsilon$	

-; End of Paper:-



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 NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR
 B.Tech. (Sixth Semester) Examination Jan-June 2017
 Subject: Compiler Design
 Branch: Information Technology

Time: 75 Minutes
 Roll No.:

Max Marks: 15

Note: (1) Use proper symbols used in their notations for formula/expressions.

- (1) (a) Explain Language Processing System and different phases of a compiler with the help of given grammar.

$$f = a + b * c - d \quad (4)$$

- (b) Construct the finite automaton equivalent to the regular expression

$$(0+1)^*(00+11)(0+1)^* \quad (3)$$

- (2) (a) Check given grammar is LL (1) or not?. (Any One) (4)

$A \rightarrow BCc/gDB$ $B \rightarrow bCDE/\epsilon$ $C \rightarrow DaB/ca$ $D \rightarrow \epsilon/dD$ $E \rightarrow Eaf/c$	$S \rightarrow S@E E$ $E \rightarrow E^*F F$ $F \rightarrow G\#F G$ $G \rightarrow id (S)$
--	---

- (3) (b) Construct LL (1) parsing table for the following grammar: (Any One) (4)

$S \rightarrow aBDh$ $B \rightarrow Bb/c$ $C \rightarrow bC/\epsilon$ $D \rightarrow EF$ $E \rightarrow g/\epsilon$ $F \rightarrow f/\epsilon$	$S \rightarrow ACB/ CbB/ Ba$ $A \rightarrow da/BC$ $B \rightarrow g/\epsilon$ $C \rightarrow h/\epsilon$
---	---

-: End of Paper:-



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NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR

B.Tech. (Sixth Semester) Examination CT 3 May 2017

Subject: Compiler Design

Branch: Information Technology

Time: 75 Minutes

Max Marks: 12

Roll No.:

(1) Construct LALR parsing table for the following grammar. (4)

$$S \rightarrow AA$$

$$A \rightarrow aA/b$$

(2) Check given grammar is SLR or not? (4)

$$S \rightarrow c A / c c B$$

$$A \rightarrow c A / a$$

$$S \rightarrow c c B / b$$

(3) Check given grammar is LL (1) or not? (4)

$$S \rightarrow a P / a Y$$

$$P \rightarrow + S r / Y z / b / \epsilon$$

$$Y \rightarrow \epsilon$$

-: End of Paper:-

NIT Scheme

Code: IT 601



राष्ट्रीय प्रौद्योगिकी संस्थान रायपुर

NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR

B.Tech. (Sixth Semester) May 2017 Examination

Subject: Compiler Design

Branch: Information Technology

Time: 3 Hours

Max Marks: 70

Note: (1) Attempt any five question. All question carry equal marks.

- [1] (a) Explain Language Processing System and different phases of a compiler with help of given grammar Position= Initial + Rate*60.
- (b) Construct the finite automaton equivalent to the regular expression $10 + (0 + 11) 0^*1$.

[2] (a) Create predictive parsing table for the given grammar.

$$\begin{aligned} S &\rightarrow aBDEF \\ B &\rightarrow cC \\ C &\rightarrow bC/ \epsilon \\ D &\rightarrow EF \\ E &\rightarrow g/ \epsilon \\ F &\rightarrow f/ \epsilon \end{aligned}$$

(b) Construct an LL (1) parsing table for the following grammar:

$$E \rightarrow E+T/T$$

$$T \rightarrow T^*F/F$$

$$F \rightarrow (E)/id$$

[3] (a) Is the following grammar SLR.

$$S \rightarrow AaAb/BbBa$$

$$A \rightarrow \epsilon$$

$$B \rightarrow \epsilon$$

(b) Construct an SLR parsing table for the following grammar.

$$S \rightarrow iSeS$$

$$S \rightarrow iS$$

$$S \rightarrow a$$

[4] (a) Construct CLR Parsing table for the given grammar.

$$S \rightarrow Aa / bAc / Bc / bBa$$

$$A \rightarrow d$$

$$B \rightarrow d$$

(b) Is the following grammar CLR.

$$S \rightarrow xAy/xBy/xAz$$

$$A \rightarrow q S/q$$

$$B \rightarrow q$$

[5] (a) Construct LALR Parsing table for the given grammar.

(a) $S \rightarrow L=R/R$

$$L \rightarrow *R/i$$

$$R \rightarrow L$$

(b) Construct LALR Parsing table for the given grammar.

$$E \rightarrow E+E / E^*E / (E) / id$$

[6] (a) Calculate following terms for given expression (I) TAC (II) Triple (III) Quadruple
(IV) DAG (V) Syntax Tree

$$a+b^*c-d/(b^*c)$$

(b) Write an Intermediate code for 10×10 matrix to an identity matrix and describe basic blocks and flow graphs for the same.

[7] Discuss and describe in details (Any Four)

(a) Describe issue in the design of code generator.

(b) Describe various code optimization techniques.

(c) Discuss about Basic blocks and flow graphs with suitable examples.

(d) What is activation record? Explain the purpose of different field in an activation record.

(e) Explain the following storage allocation strategies (i) Static & Heap allocation

(f) S-attributed and L-attributed and Bootstrapping.

-: End of Paper:-

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR
6th Semester, B.Tech (IT-603)

Class Test-I

(19)

Internet and Web Technologies

Duration: 1.15 hrs

Max. Marks: 15

Note: Attempt ANY THREE questions.

- 1) Explain TCP Header with diagram in detail. What is the role of Flags in Connection Establishment and Termination in TCP? [3+2]
- 2) Explain HTML tags. Write a programme in HTML to draw a table with three rows and four columns. [2+3]
- 3). What do you understand by 'style'? in how many ways we can add style to our webpage? Explain with example [5]
- 4) Explain in detail.
 - a). Domain name server
 - b). Life cycle of an applet[2.5x2]

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR
6th Semester, B.Tech (IT-603)

Class Test-I

Internet and Web Technologies

Max. Marks: 15

14118003
Duration: 1.15 hrs

Note: Attempt ANY THREE questions.

- 1) Explain TCP Header with diagram in detail. What is the role of Flags in Connection Establishment and Termination in TCP? [3+2]
- 2) Explain HTML tags. Write a programme in HTML to draw a table with three rows and four columns. [2+3]
- 3). What do you understand by 'style'? in how many ways we can add style to our webpage? Explain with example [5]
- 4) Explain in detail.
 - a). Domain name server
 - b). Life cycle of an applet[2]

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR

6th Semester, B.Tech (IT)

II Examination March 2016

Internet and Web Technologies

Duration: 1.15 hrs

Max. Marks: 15

Note: All questions are compulsory. Internal choices are given.

- 1) a). What is an applet? Explain methods of applet lifecycle in detail. [2+2]

OR

- ✓ b). What is XML? Explain structure of an XML document with an Example. [2+2]

- 2) Write a programme to create an applet to draw a string [3]

- 3) Write short notes on any two. [2+2]

a). IP packet screening.

b). Electronic data interchange

c). Firewall.

- 4) What is File Transfer Protocol? Explain all three kinds of FTP commands in detail. [2+2]

NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR
CLASS TEST-II

Internet and Web Technology (6th Semester)

Time: 75Minutes

Max. Marks: 15

Note:

i. Attempt all questions.

ii. Marks of each part are given in the right hand side margin.

- i. Write a java script to validate the following fields in a registration page. [3]

- Name (should contains alphabets and the length should not be less than 6 characters).
- Password (should not be less than 6 characters).
- Phone number (Phone number should contain 10 digits only).

Also write the appropriate HTML code to implement this script.

- ii. Explain JavaScript with example. Does it resemble JAVA? How simple animation can be done using JavaScript. Explain with example. [3]

iii. What is the difference between static and dynamic web pages? Explain the significance in the retrieval of a dynamic webpage. [3]

iv. How DNS works? Describe in brief about DNS resources. [3]

v. Explain the working of a proxy server. [3]

vi. Explain the concept of client side and server side scripting. [3]

vii. Explain the concept of client side and server side scripting. [3]

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NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR
6th Semester, B.Tech. (IT)
Class Test-I
Internet and Web Technologies

Duration: 1.15 hrs

Max. Marks: 15

Note: Attempt Any *Three* Questions. **Question no. 2 is Compulsory.**

- 1) Explain TCP header with Diagram in detail. What is the role of Flags in Connection Establishment and Termination in TCP? [3+2]
- 2) Explain the HTML tags ~~in detail~~, WAP in HTML to draw a table with three rows and four columns. [2+3]
- 3) What do you understand by 'style'? What are the benefits of using Style Sheets compared with placing formatting directly into the text of webpage? [2.5x2]
- 4) How IP addressing is done? Discuss all the special case IP Addresses in detail. [2+3]

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR

6th Semester, B.Tech (IT)

Class Test-I

Internet and Web Technologies

Duration: 1.15 hrs

Max. Marks: 15

Note: All questions are compulsory. Internal choices are given.

- ✓ 1) What is HTTP? How does it work? Why HTTP is called stateless protocol. [5]
- ✓ 2) What is meant by FORM? What are essential steps while designing the idle form? [4]
- ✓ 3) What is search Engine? Write steps to search using google.com. [3]

OR

- 4) How IP addressing is done? Discuss the various IP address classes in detail. [3]
- ✓ 5) Design the page. [3]

Special Equipment	Specification & Performance Data
Reinforce protective armor	Engine Type Jet Turbine
Weapons System	Thrust 1159 lbs @ 105% ROS
Instruments-Aircraft w/on-board computer	Torque 1750 lbs ft @ 98.7% ROS
	0 to 60 MPH 0.7 sec
	Top Speed Unknown
	Brake Rating Excellent
	Wheel Base 141.0 in.
	Length 260.7 in.
	Width 64.4 in.
	Height 51.2 in.
	Wheels Cast alloy, 15 x 6.5
	Fuel Requirement High oct 97% Special

B. Tech. (Sixth Semester) Examination April-May 2017
Subject: Internet and Web Technologies
Branch: Information Technology

Time: 3 hrs**Marks: 70****Note: Attempt any five questions. Answers should be specific and to the point.**

1.

- a. Explain Internet Protocol (IP) with its header format. Suppose we have to transmit a datagram of size 4000 bytes from source node to destination node while the maximum transmission unit (MTU) of intermediate routers is 1000 bytes. Then calculate the number of fragments and value of fragmentation offset of each IP fragment. (The size of IP header is 20 bytes). [3+4]
- b. What is Hyper Text Markup Language (HTML)? Explain the HTML tags for FRAME and FORM with the help of suitable example. [2+5]

2.

- a. What is an applet? Define its Life-cycle? Write down steps to develop an applet and use it in web page with an example. [2+1+4]
- b.
 - i. Explain Transmission Control Protocol [TCP] header with Diagram. What is the role of Flags in connection establishment and termination in TCP? [5]
 - ii. Explain the key difference between working of Transmission Control Protocol and User Datagram Protocol. [2]

3.

- a. What do you understand by 'style'? Explain the syntax of Style rule with an example. In how many ways we can add style to our webpage? [2+2+3]
- b. What do you mean by Extensible Markup Language (XML)? What are its characteristics? Explain each component of XML structure with example in detail. [1+2+4]

4.

- a. What do you mean by an Event? How can we handle these following events in HTML using Javascript? Write programmes for them.
 - i. *on submit* event
 - ii. *onmouseover* and *onmouseout* event.
 - iii. *on click* event.

PTO

- b. Write short notes on:
i. Encrypted documents and E-mails.
ii. Types of web hosting. [3.5x2]

5.

a.

What do you mean by XML Document Type Declaration (DTD)? In how many ways we can add a DTD to an XML file. Write a programme in XML to display details of three students that includes the following: [7]

- Roll No.
- Name
- Course
- E-mail id
- Contact No.

- b. Explain packet filtering with its types. In how many ways Firewall can be categorized? [3+4]

6.

- a. Write short notes on:
i. Internet Relay Chat (IRC).
ii. Three-tier web based architecture. [3.5x2]
- b. How File Transfer Protocol (FTP) works? Discuss the process model of FTP and basic FTP commands in detail. [7]

7.

- a. What is Authentication, Authorization and Accounting? Discuss in brief about the protocol used for AAA services. [7]
- b. Explain in detail how to plan, design and host an effective website. What are those points that are to be considered during maintenance of a website? [5+2]

495199L

5 fragments

Roll No.

218
4

Code: IT 603

B. Tech. (Sixth Semester) Examination April-May 2017
Subject: Internet and Web Technologies
Branch: Information Technology

Time: 3 hrs

Marks: 70

Note: Attempt any five questions. Answers should be specific and to the point.

1. a. Explain Internet Protocol (IP) with its header format. Suppose we have to transmit a datagram of size 4000 bytes from source node to destination node while the maximum transmission unit (MTU) of intermediate routers is 1000 bytes. Then calculate the number of fragments and value of fragmentation offset of each IP fragment. (The size of IP header is 20 bytes). [3+4]
- b. What is Hyper Text Markup Language (HTML)? Explain the HTML tags for FRAME and FORM with the help of suitable example. [2+5]
2. a. What is an applet? Define its Life-cycle? Write down steps to develop an applet and use it in web page with an example. [2+1+4]
- b. i. Explain Transmission Control Protocol [TCP] header with Diagram. What is the role of Flags in connection establishment and termination in TCP? [5]
- ii. Explain the key difference between working of Transmission Control Protocol and User Datagram Protocol. [2]
3. a. What do you understand by 'style'? Explain the syntax of Style rule with an example. In how many ways we can add style to our webpage? [2+2+3]
- b. What do you mean by Extensible Markup Language (XML)? What are its characteristics? Explain each component of XML structure with example in detail. [1+2+4]
4. a. What do you mean by an Event? How can we handle these following events in HTML using Javascript? Write programmes for them.
i. on submit event
ii. onmouseover and onmouseout event.
iii. on click event. [7]

PTI

- b. Write short notes on:
i. Encrypted documents and E-mails.
ii. Types of web hosting. [3.5x2]

5.

a.

What do you mean by XML Document Type Declaration (DTD)? In how many ways we can add a DTD to an XML file. Write a programme in XML to display details of three students that includes the following: [7]

- Roll No.
- Name
- Course
- E-mail id
- Contact No.

- b. Explain packet filtering with its types. In how many ways Firewall can be categorized? [3+4]

6.

- a. Write short notes on:
i. Internet Relay Chat (IRC).
ii. Three-tier web based architecture. [3.5x2]
- b. How File Transfer Protocol (FTP) works? Discuss the process model of FTP and basic FTP commands in detail. [7]

7.

- a. What is Authentication, Authorization and Accounting? Discuss in brief about the protocol used for AAA services. [7]
- b. Explain in detail how to plan, design and host an effective website. What are those points that are to be considered during maintenance of a website? [5+2]

80 bytes data

1000 - 20
980 payload

13 frag

B.Tech (VI Semester) CT3 Apr 2017

Subject: ITC

Time: 1hr 15min

Max. Marks: 15

Note: (i) Attempt all the questions.

(ii) Attempt all the parts of a question together at one place.

Q.1 With the aid of a schematic diagram of the signal encoder and decoder, explain how a basic ADPCM scheme obtains improved performance over a DPCM scheme. (5)

Q.2 Draw the suitable block diagram of third order differential pulse code modulation and explain its principle of operation. (5)

Q.3 Explain Adaptive delta modulation and demodulation Scheme. What are the advantages and disadvantages of it? (5)

B.TECH (VI Semester) First Exam FEB-2017

Subject: Information Theory & Coding

Branch: Information Technology

AM118003

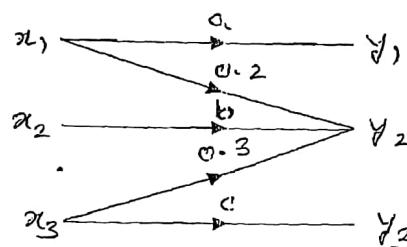
Time: 1hr 15min

Max Marks: 15

Note: (i) Solve all the questions.

(ii) Solve all the parts of a question together at one place.

Q.1 A discrete source transmits messages x_1, x_2 and x_3 with the probabilities 0.3, 0.4 and 0.3. The source is connected to the channel given in below figure. Calculate the value of a, b, c and all the entropies (i.e., $H(X), H(Y), H(X,Y), H(X/Y), H(Y/X)$).



Q.2 A DMS X has seven symbols $x_1, x_2, x_3, x_4, x_5, x_6$ and x_7 , with probabilities 0.05, 0.15, 0.2, 0.05, 0.15, 0.3 and 0.1 respectively.

(i) Construct a Shannon-Fano code for X and calculate the efficiency of code.

(ii) Repeat for the Huffman code and compare the results. (2+2)

Q.3 For a noiseless channel having m input symbols and n output symbols prove that

$$H(X) = H(Y)$$

and

$$H(Y/X) = 0 \quad (1.5+1.5)$$

Q.4 Verify the following expression:

$$0 \leq H(X) \leq \log_m m$$

Where, m is the size of the alphabet of X.

(3)

B.TECH (VI Semester) First Exam FEB- 2017

Subject: Information Theory & Coding

Branch: Information Technology

Time: 1hr 15min

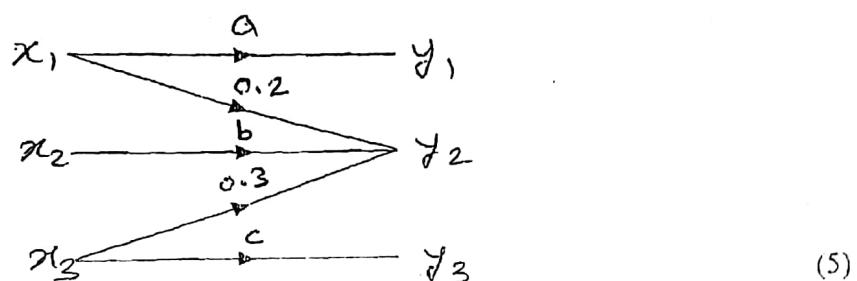
Max Marks: 15

Note: (i) Solve all the questions.

19

(ii) Solve all the parts of a question together at one place.

Q.1 A discrete source transmits messages x_1, x_2 and x_3 with the probabilities 0.3, 0.4 and 0.3. The source is connected to the channel given in below figure. Calculate the value of a, b, c and all the entropies (i.e. $H(X)$, $H(Y)$, $H(X,Y)$, $H(X/Y)$, $H(Y/X)$).



(5)

Q.2 A DMS X has seven symbols $x_1, x_2, x_3, x_4, x_5, x_6$ and x_7 with probabilities 0.05, 0.15, 0.2, 0.05, 0.15, 0.3 and 0.1 respectively.

(i) Construct a Shannon-Fano code for X and calculate the efficiency of code.

(ii) Repeat for the Huffman code and compare the results. (2+2)

Q.3 For a noiseless channel having m input symbols and m output symbols prove that

$$H(X) = H(Y)$$

and

$$H(Y/X) = 0 \quad (1.5+1.5)$$

Q.4 Verify the following expression:

$$0 \leq H(X) \leq \log_m m$$

Where, m is the size of the alphabet of X.

(3)

B.TECH (VI Semester) Second Exam March- 2017

Subject: Information Theory & Coding

Branch: Information Technology

Time: 1hr 15min

Max Marks: 15

Note: (i) Solve all the questions.

(ii) Solve all the parts of a question together at one place.

Q.1 Explain how the performance of a basic DPCM scheme can be improved by utilizing a more accurate version of the previous signal. Hence with the aid of a schematic diagram of the signal encoder and decoder, explain the principle of operation of a third-order DPCM scheme. (5)

Q.2 The generator matrix for a (6, 3) block code is shown below.

Obtain all code words of this code. (5)

$$G = \begin{bmatrix} 1 & 0 & 0:0 & 1 & 1 \\ 0 & 1 & 0:1 & 0 & 1 \\ 0 & 0 & 1:1 & 1 & 0 \end{bmatrix}$$

Q.3 Explain the meaning of following terms relating to compression:

- (i) Source encoders and destination decoders,
- (ii) Lossless and lossy compression,
- (iii) Entropy encoding,
- (iv) Source encoding

(5)

Qu1	Compare PCM, Delta modulation, and adaptive delta modulation on the basis of sampling rate, bits per sample, bit rate. Draw the block diagram of PCM system.	4+1
Qu2	Why Binary erasure channel is efficient and how can we achieve high channel capacity in noisy channel? (justify your answer with example)	2+2+1
Qu3	Explain the functionality of DPCM and ADPCM with block diagram.	5

Qu1	Compare PCM, Delta modulation, and adaptive delta modulation on the basis of sampling rate, bits per sample, bit rate. Draw the block diagram of system.	4+1
Qu2	Why Huffman coding belongs to fixed-to-variable class? Justify by example. Given symbols A, B, C, and D we have to encode them as follows; A:0; B:10; C:101; D:0101. Is this code uniquely decodable?	4+1
Qu3	How is lossy achieved using the GIF standard? Is it a lossy or loss-less? What is meant by group of pictures in MPEG video encoding? Briefly explain how each type of frame, in the group of pictures some form of video compression?	1+1+3

Qu1	What is entropy? 8 horses in a race with winning probabilities ($\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{15}, \frac{1}{64}, \frac{1}{64}, \frac{1}{64}, \frac{1}{64}$) find the entropy? How compression helps in information theory?	5
Qu2	How can we increase the channel capacity? Explain Binary symmetric channel.	2+3
Qu3	Write steps for Huffman coding is better? Symbols and frequency in table, apply Huffman coding and find codeword & average codeword length for following symbols:	2+3

G	O	space	E	S	H	P	R
3	3	2	1	1	1	1	1

Attempt all questions

Qu1	An encoding function $E: Z_2^2 \rightarrow Z_2^5$ is given by the generator matrix, (a) Determine all the code words. What can be said about the error detection capability of this code? What about its error correction capability? (Use Hamming Distance method) (b) Find the associated parity-check matrix H. (c) Use H to decode the received words: 11101, 11011, 11111.	$G = \begin{bmatrix} 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 1 & 0 \end{bmatrix}$	5																
Qu2	What is Entropy? An analog signal is band limited to $B=200$ Hz, sampled at the Nyquist rate, and the samples are quantized into 4-levels. The quantization levels Q_1, Q_2, Q_3 , and Q_4 (messages) are assumed independent and occur with probs. $P_1=P_2=1/8$ and $P_2=P_3=3/8$. Find the information rate of the source.		1+4																
Qu3	Why channel encoding is required? Why Huffman coding is better? Apply Huffman coding for symbols:	<table border="1"> <tr> <td>G</td><td>O</td><td>space</td><td>E</td><td>S</td><td>H</td><td>P</td><td>R</td> </tr> <tr> <td>3</td><td>3</td><td>2</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td> </tr> </table>	G	O	space	E	S	H	P	R	3	3	2	1	1	1	1	1	1+1+3
G	O	space	E	S	H	P	R												
3	3	2	1	1	1	1	1												

Time: 3 hrs.

Branch: Information Technology

Marks: 70

Questions**Note: Attempt any two questions from each section**

Qu. 1 (a). What is the coding rate R of your code? How do you know whether it is optimally efficient? 7

(b). Explain, which type of information achieve optimal encoding by Huffman code method? And how average storage space has been reduced by it? Justify by example. Draw a Huffman tree using following table: 7

SYMBOLS	B	F	G	H	I	J	K	M	P
RELATIVE FREQUENCY	3	2	1	3	3	1	2	4	3

(c). Prove that the entropy for a discrete source is maximum when the output symbols are equally probable. Find the discrete entropy for the source with symbol probabilities: {0.3, 0.25, 0.2, 0.15, 0.1}. 7

Qu. 2 (a). An encoding function $E: Z_2^3 \rightarrow Z_2^6$ is given by the generator matrix, 7

$$G = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$

(a) Find the code words assigned to 110 and 010.

(b) Find the associated parity-check matrix H.

(c) Hence decode the received words : 110110, 111101

(b). In a facsimile transmission of picture there are about 3.25×10^6 pixels per frame. For a good reproduction, 15 brightness levels are necessary. Assume all these levels are equally likely to occur. Find the rate of information transmission if one picture is to be transmitted every 3 minutes. 7

(c). At what rate can we communicate reliably over a noisy channel that is, how much redundancy must be incorporated into a message to protect against errors? From channel capacity theorem, find the capacity of a channel with infinite bandwidth and explain. 7

Qu. 3 (a). Discuss the difference between adaptive delta modulation and delta modulation. 7

(b). What is the role of BPF works in VOCODER? Explain types of errors in VOCODER. 7

(c). What is quantization and explain how it helps in digital modulation? 7

Qu. 4 (a). A memory less source emits binary digits with probabilities {0.4, 0.2, 0.2, 0.1, 0.1}. Find the 7

PTO

NIT

Code: IT 602

B. Tech (6th semester) Examination Jan-May 2015
Subject: Information Theory and Coding

Branch: Information Technology

Time: 3 hrs.

Marks: 70

Entropy, Information (I_i), Shannon-Fano code and determine its efficiency?

(b). Why do we need error control coding? What are the types of errors and types of coding to combat them? 7

✓ (c). Explain LPC and code-excited LPC and how its functions are different with block diagram? 7

Qu. 5 (a). Explain video compression by assuming an example. Suppose we have 24 bits per pixel available for a color image. We also note that humans are more sensitive to red and green than to blue, by a factor of approximately 1.5 times. How may we design a simple color representation to make use of the bits available? 7

✓ (b). Explain the function of Dolby audio coders with the help of block diagram. 7

✓ (c). Write short notes: (i) Entropy, (ii) BSC (iii) PNG, (iv) TIFF, (v) Convolution code, (vi) Linear code (vii) Gaussian noise 7



Time: 3 Hours

Max. Marks: 70

Minimum Pass Marks: 25

Note: (i) Attempt any five questions of the following.

(ii) Attempt all the parts of a question together at one place.

Q. No. 1

A Describe the channel capacity for

7

- Lossless channel,
- Deterministic channel,
- Noiseless channel,
- Binary Symmetric channel.

B Verify the following expression:

7

$$0 \leq H(X) \leq \log_2 m$$

Where, m is the size of the alphabet of X.

Q. No. 2

A A DMS X has five equally likely symbols.

7

- Construct a Shannon-Fano code for X, and calculate the efficiency of the code.
- Repeat for the Huffman code and compare the results.

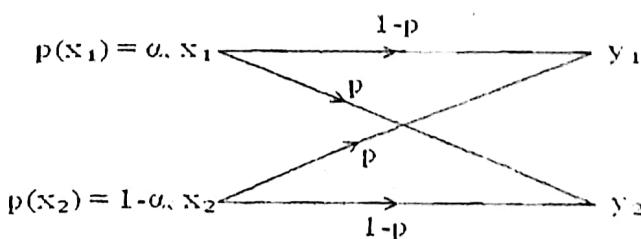
B Given a binary symmetric channel (BSC) with $P(x_1) = \alpha$.

7

(i) Show that the mutual information $I(X;Y)$ is given by

$$I(X;Y) = H(Y) + p \log_2 p + (1-p) \log_2 (1-p).$$

(ii) Calculate $I(X;Y)$ for $\alpha = 0.5$ and $p = 0.1$



Q. No. 3

A A (6, 3) linear block code is generated according to the following generator matrix:

7

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

For a particular code word transmitted, the received code word is 100011. Find the corresponding error word transmitted.

(P.10)

B The generator polynomial of a (7, 4) cyclic code is $G(p) = p^3 + p + 1$. Obtain all the code vectors for the code in non-symmetric and symmetric form. 7

Q. No. 4 A The parity check matrix of a particular (7, 4) linear block code is expressed as 7

$$[H] = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

- (i) Obtained the generator matrix (G).
- (ii) List all the code vectors.
- (iii) What will the minimum distance between code vectors?
- (iv) How many errors can be detected and corrected?

B Explain the following with suitable block diagram: 7

- (i) Syndrome decoder for linear block codes.
- (ii) Syndrome decoder for Cyclic codes.

Q. No. 5 A Explain how the performance of a basic DPCM scheme can be improved by utilizing a more accurate version of the previous signal. 7

B With the aid of schematic diagram explain delta modulation and demodulation. What are the advantages and disadvantages of it? 7

Q. No. 6

A Explain the meaning of following terms relating to compression: 7

- (i) Lossless and lossy compression,
- (ii) Entropy encoding.

B Write short notes on JPEG encoder scheme for Image/ block preparation. 7

Q. No. 7

A Explain the principles on which LPC codes are based. Hence with block diagram of an LPC encoder and decoder, identify the perception parameters and associated vocal track excitation parameters that are used. 7

B Draw the block diagram of MPEG perceptual coder and explain the operation perform by each block. 7

B.Tech (Sixth Semester) Examination, Apr - May 2017

Subject: Information Theory & Coding

Branch: Information Technology

Time: 3 Hours

Max. Marks: 70

Minimum Pass Marks: 25

- 14118003*
- Note: (i) Attempt any five questions of the following.
 - (ii) Attempt all the parts of a question together at one place.

Q. No. 1

A Describe the channel capacity for

7

- Lossless channel,
- Deterministic channel,
- Noiseless channel,
- Binary Symmetric channel.

B Verify the following expression:

7

$$0 \leq H(X) \leq \log_2 m$$

Where, m is the size of the alphabet of X .

Q. No. 2

A A DMS X has five equally likely symbols.

7

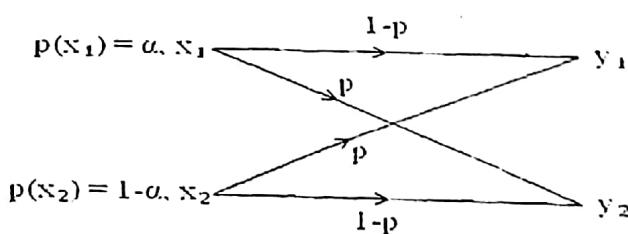
- Construct a Shannon-Fano code for X , and calculate the efficiency of the code.
- Repeat for the Huffman code and compare the results.

B Given a binary symmetric channel (BSC) with $P(x_1) = \alpha$.

7

(i) Show that the mutual information $I(X;Y)$ is given by

$$I(X;Y) = H(Y) + p \log_2 p + (1-p) \log_2 (1-p).$$

(ii) Calculate $I(X;Y)$ for $\alpha = 0.5$ and $p = 0.1$.

Q. No. 3

A A (6, 3) linear block code is generated according to the following generator matrix:

7

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

For a particular code word transmitted, the received code word is 100011. Find the corresponding data word transmitted.

(A10)

- B The generator polynomial of a (7, 4) cyclic code is $G(p) = p^3 + p + 1$. Obtain all the code vectors for the code in non-symmetric and symmetric form. 7
- Q. No. 4** A The parity check matrix of a particular (7, 4) linear block code is expressed as 7
- $$[H] = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$
- (i) Obtained the generator matrix (G).
(ii) List all the code vectors.
(iii) What will the minimum distance between code vectors?
(iv) How many errors can be detected and corrected?
- B Explain the following with suitable block diagram: 7
- (i) Syndrome decoder for linear block codes.
(ii) Syndrome decoder for Cyclic codes.
- Q. No. 5** A Explain how the performance of a basic DPCM scheme can be improved by utilizing a more accurate version of the previous signal. 7
- B With the aid of schematic diagram explain delta modulation and demodulation. 7
What are the advantages and disadvantages of it?
- Q. No. 6**
- A Explain the meaning of following terms relating to compression: 7
- (i) Lossless and lossy compression,
(ii) Entropy encoding.
- B Write short notes on JPEG encoder scheme for Image/ block preparation. 7
- Q. No. 7**
- A Explain the principles on which LPC codes are based. Hence with block diagram of an LPC encoder and decoder, identify the perception parameters and associated vocal track excitation parameters that are used. 7
- B Draw the block diagram of MPEG perceptual coder and explain the operation perform by each block. 7