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| **Examination:** | November-December 2017 | **Date:** | 22-11-17 |
| **Branch:** | Computer Engineering | **Subject:** | DSP |
| **Class/SEM:** | BE/VII | **Paper Code:** | 22974 |

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| **Examination:** | November-December 2017 | **Date:** | 28-11-17 |
| **Branch:** | Computer Engineering | **Subject:** | CSS |
| **Class/SEM:** | BE/VII | **Paper Code:** | 24641 |

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| **Examination:** | November-December 2017 | **Date:** | 5/12/2017 |
| **Branch:** | Computer Engineering | **Subject:** | AI |
| **Class/SEM:** | BE/VII | **Paper Code:** | 24610 |

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| **Examination:** | November-December 2017 | **Date:** | 12/12/2017 |
| **Branch:** | Computer Engineering | **Subject:** | SC |
| **Class/SEM:** | BE/VII | **Paper Code:** | 22936 |

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| **Examination:** | November-December 2017 | **Date:** | 12/12/2017 |
| **Branch:** | Computer Engineering | **Subject:** | SA |
| **Class/SEM:** | BE/VII | **Paper Code:** | 27659 |

QP CODE : 22974

**(3 hours)**            **Total Marks: 80**

N.B.   1. Question No. 1 is compulsory
       2. Attempt any **three** out of remaining
       3. Assume suitable data if **necessary** and justify the assumptions
       4. Figures to the **right** indicate full marks

Q1   A   Compare microprocessor with digital signal processor.      05

     B   State whether $x[n] = \cos(3\pi n/4)$ is an energy or power signal with proper      05

         justification.

     C   Find the cross correlation of two causal sequences $x[n] = \{2, 3, 1, 4\}$ and      05
         $y[n] = 3\,\delta(n-3) - 2\,\delta(n) + \delta(n-1) + 4\,\delta(n-2)$.

     D   State BIBO stability criterion for LTI systems. Test the stability of the LTI      05
         systems, whose impulse response is: $h[n] = 0.2^n\, u[-n] + 3^n\, u[-n]$.

Q2   A   Check whether the system $y[n] = a^n\, u[n]$ is:      10
         i) Static or Dynamic
         ii) Linear or Non-linear
         iii) Causal or Non-Casual
         iv) Shift variant or Shift Invariant

     B   Consider analog signal $x(t) = 2 \sin 80\pi t$. If the sampling frequency is 60 Hz, find      10
         the sampled version of discrete time signal $x[n]$ also find an alias frequency
         corresponding to Fs = 60 Hz.

Q3   A   Determine the output response of the LTI system using tabular method, whose      10
         input is:
         $x[n] = 1$     ; n = 0, 1
              $= 3$     ; n = 2, 3
              $= 0$     ; elsewhere
         and $h[n] = \delta[n] - 2\,\delta[n-1] + 3\,\delta[n-2] - 4\delta[n-3]$.

     B   Compute DFT of sequence $x[n] = \{0, 2, 3, -1\}$. Sketch the magnitude and      10

         phase spectrum.

Q4   A   Explain the following properties of DFT :      10
         i) Periodicity
         ii) Linearity
         iii) Time Shift
         iv) Circular Convolution
         v) Time Reversal

     B   Compute linear convolution of the causal sequences $x[n] = \{4, 4, 3, 3, 2, 2, 1, 1\}$      10
         and $h[n] = \{-1, 1\}$ using overlap save method.

[TURN OVER]

I

Q5  A   In a LTI system the input x[n] = {1, 2, 1} and impulse response is h[n] = {1, 3}.  10
        Determine the response of LTI system using radix- 2 DIT FFT method.

    B   Explain Parseval's energy theorem.  10
        If IDFT { X(k)} = x[n] = {2, 1, 2, 0} using DFT properties, evaluate the
        following:
        i)IDFT of {X(k-1)}
        ii)IDFT of {X(k) circularly convolved with X(k)}
        iii)IDFT of {X(k).X(k)}
        iv)Signal energy

Q6  A   Explain the significance of Carl's Correlation Coefficient Algorithm in digital  10
        signal processing. Evaluate Carl's Coefficient for two causal sequences
        x[n]={3, 4, 7, 8} and y[n]={2, 1, 1, 2}.

    B   i) Compare 64 point DFT and FFT systems with respect to the number of  5
        complex additions and multiplications required.

        ii) Write a detailed note on biomedical applications of DSP processors.  5

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Q. P. Code: 24641

(Time: 3hrs)                                             (Marks 80)

1. Question No 1 is compulsory.
2. Attempt any three out of the remaining five questions.

Q1. (a) Encrypt the message "Cryptography is fun" with a multiplicative cipher with key = 15. Decrypt to get back original plaintext.                                                              05

(b) With the help of suitable examples compare and contrast monoalphabetic ciphers and polyalphabetic ciphers?                                                              05

(c) What are the properties of hash functions? What is the role of a hash function in security?                                                              05

(d) What are the different protocols in SSL? How do the client and server establish an SSL connection                                                              05

Q2. (a) What is a digital certificate? How does it help to validate the authenticity of a user? Explain the X.509 certificate format.                                                              10

(b) With reference to DES comment on the following:                                                              10
    i)   Block size and key size
    ii)  Need for expansion permutation
    iii) Avalanche and completeness effects
    iv)  Weak keys and semi-weak keys
    v)   Role of S-box.

Q3. (a) What are the different types of viruses and worms? How do they propagate?                                                              10
(b) What are the various ways for memory and address protection in Operating System?                                                              10

Q4. (a) Explain briefly with examples, how the following attacks occur:                                                              10
    i)   Phishing attack
    ii)  Denial of Service attack
    iii) SQL injection attack
    iv)  Cross-site scripting attack
(b) How is security achieved in the transport and tunnel modes of IPSec? What are security associations?                                                              10

Q5. (a) What are the different threats to emails? Give an algorithm to secure emails being sent from user A to user B.                                                              10
(b) A and B wish to use RSA to communicate securely. A chooses public key as (7,119) and B chooses public key as (13,221). Calculate their private keys. A wishes to send message m=10 to B. What will be the ciphertext? With what key will A encrypt the message "m" if A needs to authenticate itself to B.                                                              10

Page 1 of 2

Q6. (a) Compare and contrast (any two):

    i) Block and stream ciphers

    ii) MD-5 versus SHA                           10

    iii) Key generation in IDEA and Blowfish

(b) What are the different components of an Intrusion Detection System? Compare the working of signature based IDS with anomaly based IDS.    10

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**Q. P. Code: 24610**

3 Hours

Total Marks = 80

**Note:**
(i) Each question carries 20 marks
(ii) Question 1 is compulsory
(iii) Attempt any three (3) from the remaining questions
(iv) Assume suitable data wherever required

Q1. Attempt any four (4) questions from the following:                                    [20]
   (a) Give PEAS description for an Autonomous Mars Rover. Characterize its environment.
   (b) Give the initial state, goal test, successor function, and cost function for the following problem
      "You have to colour a planar map using only 4 colours, in such a way that no two adjacent regions have the same colour".
   (c) Draw and explain architecture of Expert System.
   (d) Explain Hill-climbing algorithm with an example.
   (e) Covert the following propositional logic statement into CNF
      (i)    $A \rightarrow (B \leftrightarrow C)$

Q2. (a). Explain decision tree learning with an example.                                   [10]

   (b) Write first order logic statements for following statements:                        [10]
      (i)    Horses, cows, and pigs are mammals.
      (ii)   Bluebird is a horse.
      (iii)  Whoever can read is literate.
      (iv)   Every tree in which any aquatic bird sleeps is beside some lake.
      (v)    Anything anyone eats and is not killed by is food.

Q3. (a) Design a planning agent for a Blocks World problem. Assume suitable initial state and final state for the problem.                                                          [10]

   (b) Consider a situation in which we want to reason about the relationship between smoking and lung cancer. Intuitively, we know that whether or not a person has cancer is directly influenced by whether she is exposed to second-hand smoke and whether she smokes. Both of these things are affected by whether her parents smoke. Cancer reduces a person's life expectancy.
      (i) Draw the Bayesian network.
      (ii) How many independent values are required to specify all the conditional probability tables (CPTs) for your network?                                                      [10]

Q4. (a) Compare Greedy Best first search and A* search algorithms based on performance measure with justification: Complete, Optimal, Time and Space complexity.                  [10]
   (b) Write a pseudocode for alpha-beta algorithm. Apply alpha-beta pruning on example given in Figure 1 considering first node as max.                                           [4+6]
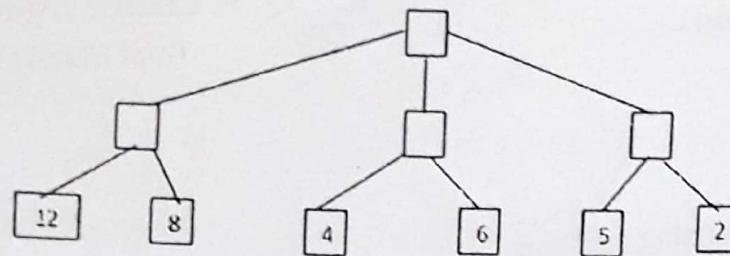
Figure 1.

Q5. (a) Define the terms chromosome, fitness function, crossover and mutation as used in Genetic algorithms. Explain how Genetic algorithms work?                                    [4+6]

(b) Consider the graph given in Figure 2 below. Assume that the initial state is A and the goal state is G. Show how **Greedy Best first Search** would create a search tree to find a path from the initial state to the goal state:                                    [10]
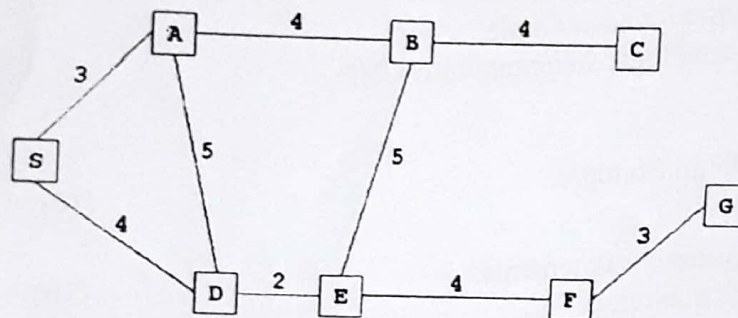


Figure 2.

At each step of the search algorithm, show which node is being expanded, and the content of fringe. Also report the eventual solution found by the algorithm, and the solution cost. Assuming the straight-line distance as the heuristics function: $h(S)=10.5$, $h(A)=10$, $h(B)=6$, $h(C)=4$, $h(D)=8$, $h(E)=6.5$, $h(F)=3$ and $h(G)=0$.

Q6. Answer any two (2) of the following                                    [20]
  (i)     What are steps involved in natural language processing (NLP) of an English sentence? Explain with an **example** sentence.
  (ii)    Draw and explain the basic building blocks of Learning Agent.
  (iii)   How will you convert the propositional logic statement into CNF? Give a suitable example at each step.

Q.P. Code: 22936

(3 Hours)      Total Marks: 80

N.B : (1) Question No. 1 is compulsory
      (2) Attempt **any three** questions out of remaining **five**.

1. (a) Distinguish between hard computing and soft computing.    5

    (b) Explain fuzzy extension principle with suitable example.    5

    (c) Prove that $f'(net) = (1 - O^2)/2$ for bipolar continuous activation function    5

    (d) What are hybrid systems? Explain any 2 types of hybrid systems.    5

2. (a) Explain EBPTA with the help of block diagram.    10

    (b) What do you understand by learning? Compare the different learning rules w.r.t weight adjustments, initial weights, type of learning, neuron characteristics and number of neurons.    10

3. Design a fuzzy logic controller for an air-conditioner. Consider room temperature and humidity as input and AC temperature as output. Use four descriptors each for inputs and output. Derive proper set of rules and using appropriate de-fuzzification technique get exact AC temperature. The design should be supported by appropriate figures. Also prove that if the room temperature is hot and humidity is high then the AC temperature is set to cool.    20

4. (a) Explain working of LVQ with the help of an algorithm. Also construct and test an LVQ net with five vectors assigned to two classes. The given vectors along with the classes are as shown in Table 1.    10

| Vector | Class |
|--------|-------|
| [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 |

Consider $\alpha = 0.1$. Show the weight change for only one epoch.

    (b) Draw and explain the architecture of ANFIS. Briefly explain the application of ANFIS.    10

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5. (a) Explain Genetic Algorithm with a suitable flowchart. Explain Roulette wheel selection and rank selection methods used in GA. **10**

   (b) Explain the alpha cut and strong alpha cut features of fuzzy membership function. **10**

   Also consider the following fuzzy sets.

   A = {(0, 1), (0.1, 2), (0.2, 3), (0.3, 4), (0.4, 5), (0.5, 6), (0.6, 7)}

   B = {(1, 1), (0.9, 2), (0.8, 3), (0.7, 4), (0.6, 5), (0.5, 6), (0.4, 7)}

   Find the following

   $A/B$

   $(A \cap \bar{B})_{0.4}$

   $\bar{A}_{0.2}$

   $B'_{0.6}$

   $\bar{A}_{0.8}$

6. (a) What is linear separability? Using the linear separability concept, obtain the response for AND function with bipolar inputs and targets. **10**

   (b) Explain the Newton's methods of derivative based optimization techniques. **10**

Q.P. Code : 27659

[Time: 3 Hours]                                                    [ Marks: 80]

Please check whether you have got the right question paper.

N.B: 1. Question No. 1 is compulsory.
     2. Attempt any three questions out of remaining questions.
     3. Make suitable assumptions whenever necessary.

Q.1. a) Design Domain-Specific Software Architecture (DSSA) for online Admission in First Year          20
     Engineering Colleges website Management System. Assume suitable entities, attributes etc.
     Domain Model must consists following: -
        a)   Domain Dictionary and Information Model.
        b)   Feature Model and Operational Model.

Q.2. a) Define Architectural patterns. Explain any one Pattern with an example.                          10
     b) Define the following terminology:                                                                10
        1)   Connector
        2)   Configuration
        3)   Accuracy
        4)   Architectural Analysis
        5)   Precision

Q.3. a)  "Focus on Architecture is focus on Reuse". Comment.                                             10
     b)  What is perspective and descriptive architecture? Give one Example.                            10

Q.4. a)  Explain the distributed object style in connection with CORBA middleware.                      10
     b)  Discuss Design issues for NFP's: Complexity and Heterogeneity.                                 10

Q.5. a)  Discuss frameworks for the Pipe-and-Filter Architectural Style.                                10
         What is REST? Explain its Architecture.                                                        10

Q.6. a)      Write short notes on the following. (Any Two)                                              20
             a)  xADL.
             b)  ATAM
             c)  Stakeholder driven modelling
             d)  SOA and Web Services.

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