

DECEMBER 2019

EXAMINATION TIME TABLE PROGRAMME - B.E.(COMPUTER)(Sem VII) (CBSGS)

| Days and Dates | Time | Paper Code | Paper |
|------------------------------|--------------------------|------------|---------------------------------------|
| Thursday, November 14, 2019 | 10:30 a.m. to 01:30 p.m. | 42101 | Digital Signal Processing |
| Monday, November 18, 2019 | 10:30 a.m. to 01:30 p.m. | 42102 | Cryptography and System Security |
| Wednesday, November 20, 2019 | 10:30 a.m. to 01:30 p.m. | 42103 | Artificial Intelligence |
| Friday, November 22, 2019 | 10:30 a.m. to 01:30 p.m. | 42104 | Elective- II Advance Algorithms 1) |
| Friday, November 22, 2019 | 10:30 a.m. to 01:30 p.m. | 42105 | 2)Computer Simulation and Modeling |
| Friday, November 22, 2019 | 10:30 a.m. to 01:30 p.m. | 42106 | 3)Image Processing |
| Friday, November 22, 2019 | 10:30 a.m. to 01:30 p.m. | 42107 | 4) Software Architecture |
| Friday, November 22, 2019 | 10:30 a.m. to 01:30 p.m. | 42108 | 5)Soft Computing |
| Friday, November 22, 2019 | 10:30 a.m. to 01:30 p.m. | 42109 | 6)ERP and Supply Chain Management |

(3 Hours)

Total Marks: 80

- N.B:** 1) Question **number 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.

- Q.1 A) Determine Power and Energy of a Unit Step Signal. 05
- B) Compare FIR systems with IIR Systems 05
- C) Consider the analog signal
 $X_a(t) = 3 \cos 2000 \Pi t + 5 \sin 6000 \Pi t + 10 \cos 12000 \Pi t$
 a) Determine the minimum required sampling rate to avoid aliasing.
 b) If $F_s=5000$ samples per unit time, what is the discrete time signal obtained after sampling? 05
- D) For $x(n) = \{ 4, 2, -1, 1, 3, 2, 4, 2 \}$ find the following 05
 ↑
 1) $x(n - 2)$
 2) $x(1 - n)$
 3) $x(n + 3)$
 4) $x(n) \cdot u(n - 1)$
 5) $x(n - 2) + \delta(n - 1)$
- Q.2 A) Perform the linear convolution between $x(n)$ and $h(n)$ given below in time domain. 12
- i) $x(n) = \left(\frac{1}{3}\right)^n u(n - 2), h(n) = (3)^n u(-n)$
- ii) $x(n) = \begin{cases} 1 & \text{for } n = -2, 0, 1 \\ 2 & \text{for } n = -1 \\ 0 & \text{else where} \end{cases}$
- $h(n) = \delta(n) - \delta(n - 1) + \delta(n - 2) - \delta(n - 3)$
- B) Find the auto correlation of the signal $x(n) = \{ 3, 2, 1, 2 \}$ 08
 ↑
 Also, explain what is the significance of the value corresponding to origin?

- Q.3 A) Given a 6 point sequence 10
- $$x(n) = 3\delta(n) + 4\delta(n - 1) + 6\delta(n - 3)$$
- a) if $P(K) = W_N^{3K} X(K)$, find p(n)
 b) if $Q(K) = X(K - 3)$, find q(n)
 c) if $R(K) = \text{Real} \{ X(K) \}$, find r(n)
- B) Compute the Inverse DFT of the following 4 point sequence. 10
- $$X(K) = \{ 4, 1 - j, -2, 1 + j \}$$
- Q.4 A) Find the circular convolution of following two sequences using concentric circle method. 10
- $$x_1(n) = \{ 1, -1, 2, -4, 2 \}$$
- $$x_2(n) = \{ 1, 2, 3 \}$$
- B) Apply DIT- FFT algorithm on the following 8 point sequence. 10
- $$x(n) = \{ 1, 2, 3, 4, 4, 3, 2, 1 \}$$
- Q.5 A) Check whether the given system $y(n) = x(2n) - x(n - 1)$ is 10
- a) Static or dynamic
 b) Linear or Non Linear
 c) Stable or unstable
 d) Causal or Non causal
 e) Time variant or Time Invariant
- B) Find the output y(n) whose impulse response is $h(n) = \{ 1, 1, 1 \}$ and input signal $x(n) = \{ 3, -1, 0, 1, 3, 2, 0, 1, 2, 1 \}$ using overlap add method. 10
- Q.6 Attempt any two questions from the following 20
- a) Explain in detail any five DFT properties.
 b) Explain Carl's correlation coefficient algorithm with the help of suitable example.
 c) Write a detailed note on biomedical application of DSP processor.

(Time: 3hrs)

(Total Marks 80)

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

- Q1. **Solve any four:** (5 marks for each)
- (a) Why is padding done in MD5 and SHA? 05
 - (b) What are the properties of cryptographic hash functions? 05
 - (c) Explain with examples, poly-alphabetic & mono-alphabetic ciphers. 05
 - (d) What are the different types of viruses? Explain in brief. 05
 - (e) With examples explain Denial of service attack. 05
- Q2. (a) Justify why DES is a fiestel cipher. Explain the different operations in DES. How are the subkeys generated in each round different from each other? 12
- (b) Design a double transposition cipher and use it to encrypt "Enemy attacks tonight". Column Key to be used is [5,2,4,3,1]. 08
- Q3. (a) What is a digital certificate? Explain the significance of X.509 certificate in PKI. How is a digital certificate verified by the receiver during a communication? 10
- (b) How is single sign-on achieved in Kerberos? What is the role of each server in the protocol? 10
- Q4 (a) A and B use RSA to communicate securely. B choses public key (e,n) as (7,221). Calculate p,q and Φn . Compute the private key, d . A choses public key as (E_a,N_a). A wishes to send message $m=5$ to B such that confidentiality is maintained. With what key will A encrypt the message? 10
- Q4. (b) What is session hijacking? What are the different ways to prevent session hijack attacks? 10
- Q5. (a) What are the different types of firewalls? Differentiate between working of the statefull and stateless inspection firewalls. 10
- (b) Discuss how authentication and integrity is achieved in SET payment protocol? 10
- Q6. (a) Write in brief about (any two): 10
- i) Database Security.
 - ii) Key generation in IDEA
 - iii) SSL record protocol.
- Q6. (b) How does the IPSec protocol help in achieving authentication and integrity? 10
-

Time: 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 a **Personal Assistant in Smartphone**. Characterize its environment.
 - (b) Give the initial state, goal test, successor function, and cost function for an “**N Queens problem**”.
 - (c) Draw and explain architecture of Utility Based Agent.
 - (d) Define Turing test and explain its significance in AI.
 - (e) What are universal and existential quantifiers? Illustrate its usage in predicate logic with a suitable example
- Q2 (a) Explain termination conditions in a decision tree learning algorithm with an example for each condition. What are decision rules? How to use it for classifying new samples? [6+2+2]
- (b) Consider the following sentences: [10]
- Anyone passing his history exams and winning a lottery is happy. But anyone who studies or is lucky can pass all his exams. John did not study but he is lucky. Anyone who is lucky wins the lottery.
Answer “**Is John happy?**” using proof by resolution
- Q3 (a) Design a suitable planning agent for cleaning the kitchen. Give **any 2 STRIPS** style operators that might be used. When designing the operators take into account considerations such as --- Cleaning the stove or refrigerator will get the floor dirty. [10]
- (b) Explain the Bayesian Belief Networks (BBN) with a suitable example. What types of inferences can be drawn from such networks? [10]
- Q4 (a) Define heuristics. Give a suitable heuristic function to solve a **tic-tac-toe** problem in AI. Illustrate its application to any state of a tic-tac-toe problem [6]
- Q4 (b) Write a pseudo code for alpha-beta algorithm. Consider a section of min-max tree shown in Figure 1. Is there any Beta Cut Off possible? If possible, Where and Why? [4+2+4]

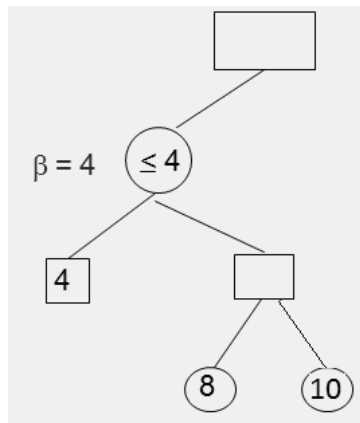


Figure 1

(c) What are the frustrations that occur in hill climbing algorithm? [4]

Q5 (a) Explain how Genetic algorithms work with a suitable example? Define the terms chromosome, fitness function, crossover and mutation for the same example. [10]

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

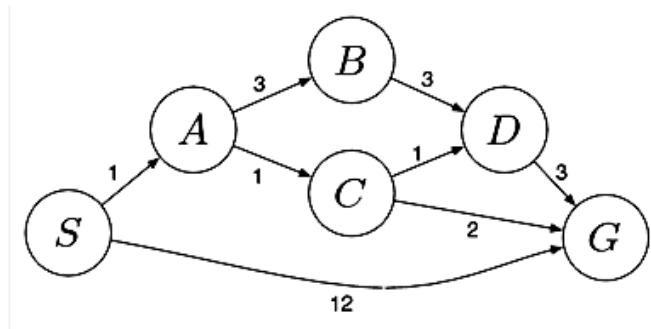


Figure 2

Assuming the straight-line distance as the heuristics function: $h(S)=4$, $h(A)=2$, $h(B)=6$, $h(C)=2$, $h(D)=3$ and $h(G)=0$.

Q6 Answer any two (2) of the following [20]

- (a) How would you differentiate between Expert System and just an AI program? Draw and illustrate expert systems architecture. Use an example to support your claims.
- (b) What are steps involved in natural language processing (NLP) of an English sentence? Explain with an example sentence. Briefly explain any one application of NLP
- (c) Write a short note on simulated annealing.

Time 3 Hours

Marks: 80

Instructions

1. Q1 is compulsory
2. Attempt any three from Q2 to Q6
3. Assume data if required

Q1 Explain the following :-

- a**
- | | |
|---|-----------|
| Architectural drift and Architectural erosion | 05 |
| Architectural model and Architectural recovery | 05 |
| Prescriptive architecture and descriptive architecture. | 05 |
| Architecture Description Language (ADL) | 05 |
| Architectural drift and Architectural erosion | 05 |

Q2

- a)** Explain in short the following terminology :- **10**
- 1) Connector
 - 2) Configuration
 - 3) Interfaces
 - 4) Rationale
 - 5) Components
- b)** Explain Architectures for Web Based Applications along with the help of suitable diagram and real time case study. **10**

Q3

- a** Explain proxy design pattern and when this pattern is used. **10**
- b** What is architectural pattern? List the categories, in which architectural patterns are grouped. On what basis the architectural pattern is selected. **10**

Q4

- a** Explain Broker architecture. Give example of an application where broker architecture would be the right choice. Give its benefits and liabilities. **10**
- b** What characteristics do all data-intensive connectors share? **10**

Q5

- a** Discuss Design issues for NFP's: Efficiency and Scalability. **10**
- b** Explain in brief decentralized architectures. **10**

Q6 Write short note on :-

- a** Stakeholder driven modeling. **10**
- b** MVC. **10**
