(3 Hours)   **[Total Marks: 80]**

Note: i) Question no. 1 is compulsory
      ii) Attempt any three from remaining
      iii) Assume necessary data

1	(a)	Explain the Learning Agent with suitable block diagram.	**5**
	(b)	Give difference between Informed Search and Uninformed search Algorithms.	**5**
	(c)	Give PEAS and state space description for "Automobile Driver Agent"	**5**
	(d)	Explain different quantifiers with example.	**5**
2	(a)	Explain various properties of task environment with suitable examples	**10**
	(b)	What is Game Playing Algorithm? Draw a game tree for Tic-Tac-Toe problem.	**10**
3	(a)	Illustrate forward-chaining and backward-chaining algorithm with suitable example.	**10**
	(b)	Explain Hill Climbing Algorithm and problems that occurs in hill climbing algorithm?	**10**
4	(a)	What do you mean by Resolution? Also discuss the steps in Resolution.	**10**
	(b)	Consider problem of changing a flat tire. The goal is to have a good spare tire properly mounted on to the car's axle, where the initial state has a flat tire on the axle and a good spare tire in the trunk. Give the ADL description for the problem and also discuss the solution	**10**
5	(a)	Explain Partial-order planning with suitable example.	**10**
	(b)	Define Belief Network. Describe the steps of constructing belief network with an example.	**10**
6		Write short notes on **any Two** of following:	
	(a)	Explain different applications of AI in Healthcare, Retail and Banking.	**10**
	(b)	Alpha Beta Pruning	**10**
	(c)	Wumpus world Environment	**10**

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(3 Hours)   **Total Marks: 80**
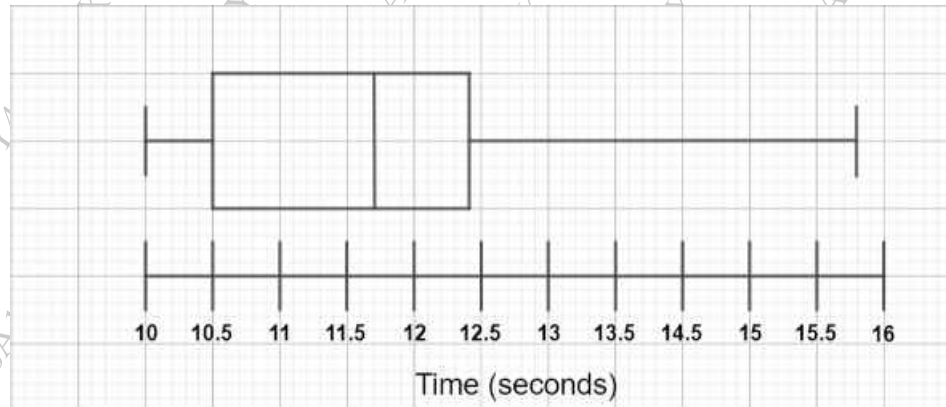
N.B. 1. Question No. 1 is compulsory.
      2. Attempt any three questions out of remaining five.
      3. All questions carry equal marks
      4. Assume Suitable data, if required and state it clearly.

1   Attempt any four: **20**
    (a)   The box plot below was constructed from a collection of times taken to run   **5**
          a 100 m sprint. Using the box plot, determine the range and interquartile range.

    (b)   Define Type I and Type II Errors   **5**
    (c)   In 800 families with 4 children each. Classify according to given criteria, how   **5**
          many families would you expect to have?
          2 boys and 2 girls
    (d)   A coin is tossed three times. Calculate the probability of obtaining more heads   **5**
          than tails.
    (e)   Explain the various decomposition models used in time series data. Also,   **5**
          state which decomposition model will be appropriate for the following
          condition:
          a) When the seasonal variation is relatively constant over time.

2 (a)   You have just taken ownership of a pizza shop. The previous owner told you   **10**
        that you would save money if you bought the mozzarella cheese in a 4.5 pound
        slab. Each time you purchase a slab of cheese, you weigh it to ensure that you
        are receiving 72 ounces of cheese. The results of 7 random measurements are
        70, 69, 73, 68, 71, 69 and 71 ounces. Are these differences due to chance or is
        the distributor giving you less cheese than you deserve?
        a. State the hypotheses.
        b. Calculate the test statistic.
        c. Would the null hypothesis be rejected at the 10% level? The 5% level? The
        1% level?
  (b)   Elaborate moving average and exponential smoothing techniques?   **10**

3 (a) Define sampling and central limit theorem ? Elaborate stratified sampling,   **10**
       judgment sampling , systematic sampling and cluster sampling

(b)   Use multiple regression derive equation for y given x1 and x2.   **10**

y	x1	x2
-3.7	3	8
3.5	4	5
2.5	5	7
11.5	6	3
5.7	2	1

4   a)   In a manufacturing unit, four teams of operators were randomly selected and sent   **10**
to four different facilities for machining techniques training. After the training,
the supervisor conducted the exam and recorded the test scores. At 95%
confidence level does the scores are same in all four facilities? (Kruskal–Wallis
and chi-square table)

Facility 1	Facility 2	Facility 3	Facility 4
88	77	71	52
82	76	56	65
86	84	64	68
87	59	51	81

b)   In the context of Multiple linear regression explain what is Over fitting &   **10**
multicollinearity?

5   a)   Some vehicles pass through a junction on a busy road at an average rate of 300   **10**
per hour.
a. Find out the probability that none passes in a given minute.
b. What is the expected number of passing in two minutes?
c. Find the probability that this expected number found above actually pass
through in a given two-minute period.

b)   Find the simple linear regression equation for the data given below: **10**

X	Y
2	21
4	27
6	29
8	64
10	86
12	92

6   a)   Explain any 3 numerical measures for :   **10**
a.   Measures of variability
b.   Measures of location
c.   Measures of distribution shape

b)   Difference between   **10**
a.   Parametric and non-parametric test
b.   Discrete and Continuous probability distribution.

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

N.B: **(1) Question No. 1 is compulsory.**
(2) Attempt any three questions out of remaining five questions.
(3) Make suitable assumptions wherever necessary.

Q.1. a) Differentiate between System software & Application software. [05]

b) What is Left recursion? Check if the following grammar is left recursive, [05]
and take necessary action if it exists:
$$S \rightarrow SS + |SS * |a$$

c) Discuss the forward reference problem in assembler with suitable [05]
example.

d) Explain different functions of loader in detail. [05]

Q.2. a) Explain any five code optimization in compiler designing with suitable [10]
example.

b) Explain with the help of flow chart the working of two pass assembler [10]
along with databases used.

Q.3. a) Explain Design of Direct Linking Loader. [10]

b) Construct LL(1) parsing table for the following grammar: [10]
$S \rightarrow aBDh$
$B \rightarrow cC$
$C \rightarrow bC | \varepsilon$
$D \rightarrow EF$
$E \rightarrow g | \varepsilon$
$F \rightarrow f | \varepsilon$

Q.4. a) Generate 3-address code for the following C program and construct flow [10]
graph with the help of basic blocks : (assume 4 memory locations for
integer):

```
min=a[0];
for (i=1;i<n;i++)
  if(a[i]>max)
    max=a[i];
flag=1;
```

b) With reference to MACRO, explain the following tables with suitable [10]
example:
i) MNT   ii) MDT   iii) ALA

Q.5. a) Explain design issues in code generation in detail. [10]

b) Explain Phases of compiler with following example [10]
$$a = a * b - 5 * 3 / c$$

Q.6. Write short note on: [20]
a) Three address code representation
b) YACC
c) Parameterized Macros
d) Syntax directed translation

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Duration: 3hrs [Max Marks: 80]

N.B.: **(1) Question No 1 is Compulsory.**
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.

Q1. Attempt any FOUR Questions 20

a) Explain the concept of frequency reuse with clustering.
b) Compare LTE and LTE advanced.
c) What is Hidden and Exposed station problem?
d) What are the roles of EIR and HLR entities in a GSM network?
e) Discuss about the mobile services and data services in GSM.

Q2 a) What do you mean by Self Organizing Networks. Explain the architecture of SON. 10

Q2 b) What is a need of Micro Mobility? Explain Cellular IP in detail. 10

Q3 a) What are the different Handover mechanism in GSM? Explain each handover mechanism 10
in brief.

Q3 b) Explain the protocol architecture of IEEE 802.11 with diagram. 10

Q4 a) Explain the GPRS architecture, explain each block in detail. 10

Q4 b) Explain snooping TCP and mobile TCP with their merits and demerits. 10

Q5 a) What is spread spectrum? Why is it used? Explain any one of the spread spectrum 10
techniques.

Q5 b) Explain Mobile Terminated Call and Mobile Originated Call. 10

Q6 a) Explain the mechanism for IP packet delivery using mobile IP. 10

Q6 b) Discuss in detail about Wi-Fi security protocol. 10

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Duration: 3Hours [Max Marks : 80]

N.B : (1) Question No 1 is Compulsory.
      (2) Attempt any three questions out of the remaining five.
      (3) All questions carry equal marks.
      (4) Assume suitable data, if required and state it clearly.

1   Attempt any FOUR [20]

  a Explain Euclidean Algorithm.

  b Explain RC4 stream cipher.

  c Differentiate between SHA-1 and MD5

  d Explain worms and viruses

  e Discuss RSA as a digital signature algorithm.

2 a Explain Diffie Hellman key agreement algorithm. Also discuss the possible [10]
    attacks on it. Consider the example where A and B decide to use the Diffie
    Hellman algorithm to share a key. They choose p=23 and g=5 as the public
    parameters. Their secret keys are 6 and 15 respectively. Compute the secret key
    that they share

  b Explain Advanced Encrypted Standards (AES) in detail. [10]

3 a Explain cryptographic hash functions with properties of secure hash function. [10]

  b What is ICMP flood attack? Explain in detail. [10]

4 a Explain Public Key Distribution in detail. [10]

  b Encrypt the string "The Key is hidden under the door" with Play fair cipher using [10]
    the keyword "domestic".

5 a What are the different components of IDS? List and explain different approaches [10]
    of IDS.

  b Explain Needham-schroeder authentication protocol. [10]

6 a Write a short note on [10]
            1. Packet Sniffing.
            2. ARP spoofing.

  b Discuss various attacks on Digital signatures. [10]

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(3 Hours) [Total Marks: 80]

N.B.: (1) Question No. **1** is **compulsory.**
    (2) Solve any **three** questions out of remaining **five.**
    (3) Figures to **right** indicate **full** marks.
    (4) Assume suitable **data** where **necessary.**

1.

(a) Define hackers, crackers and Phreakers. **[5]**

(b) Discuss in detail the challenges in handling digital evidences. **[5]**

(c) What volatile data can be obtained from the investigation of routers. **[5]**

(d) Describe the staircase digital investigation process model. **[5]**

2 (a) Explain the role of the following tools in digital forensics: i) netstat ii) psloggedon iii) tcptrace iv) netcat v) cryptcat **[10]**

(b) Explain process of live data collection from Windows system in detail. **[10]**

3 (a) What is an incident response (IR)? Describe phases of IR process in detail. **[10]**

(b) Describe the various types of network monitoring techniques for data and evidence collection. **[10]**

4 (a) What is Mobile Forensics? What are different Mobile Forensic tools? Explain **[10]**

(b) What is the significance of command-line utility dd in unix? Enumerate the steps for Simple Forensics imaging with dd, **[10]**

5 (a) What is network forensics? What is the standard procedure used for network forensics. **[10]**

(b) Explain guidelines for incident report writing. Give one report-writing example. **[10]**

6 **Write short notes on (any 4)**

(a) Incident response methodology. **[5]**

(b) Preventive measures for cybercrime. **[5]**

(c) Digital Forensic Methodology. **[5]**

(d) Role of Windows registry in collecting forensic evidence. **[5]**

(e) E-mail forensic investigation methods. **[5]**

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