Duration:3 hours   **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)**	Define "System Programming". Differentiate between system software & application software.	**[05]**
	b)	Explain in brief "forward reference problem". Explain how TII handles forward reference problem in single pass assembler.	**[05]**
	c)	Explain conditional macro with suitable example.	**[05]**
	d)	Compute FIRST and FOLLOW for the following grammar:	**[05]**

$$S \rightarrow Aa$$
$$A \rightarrow BD$$
$$B \rightarrow b|\varepsilon$$
$$D \rightarrow d|\varepsilon$$

Q.2.	**a)**	Draw the flowchart of pass1 of assembler and explain its working with the databases.	**[10]**
	b)	What are the different ways of Intermediate code representation? Explain with example.	**[10]**

Q.3.	**a)**	Construct the necessary data structures after compiling the following code by Pass1 of two-pass macro processor:	**[10]**

```
1.   MACRO
2.   COMPUTE      &x, &a, &p
3.   MOVER        &a, &x
4.   MULT         &a, ='4'
5.   MOVEM        &a, &p
6.   MEND
7.   MACRO        &g, &k, &r
8.   MOVER        &r, &k
9.   SUB          &r, ='4'
10.  MEND
```

	b)	Construct LR(0) parsing table for the following grammar and Analyze the contents of stack and input buffer and action taken after each step while parsing the input string "abbcbcde":	**[10]**

$$S \rightarrow aCDe$$
$$C \rightarrow Cbc$$
$$C \rightarrow b$$
$$D \rightarrow d$$

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Q.4. **a)** State and explain the types of assembly language statements with examples. **[10]**

b) Discuss the databases used in direct linking loader. **[10]**

Q.5. **a)** Generate 3-address code for the following C program and construct flow graph with the help of basic blocks : **[10]**

```
i=1; j=1;x=5;
while(i<3)
{
    switch(i)    {
       case 1:   a[j++]=i+x;
                  break;
       case 2:   a[j++]=i-x;
                  break;      }
i++;

                  }
```

b) What are the phases of compiler? Give working of each phase for the
following statement:
$$P = Q + R - S * 3$$
[10]

Q.6. **a)** Explain Dynamic Linking Loader in Detail. **[10]**
b) Explain different Code Optimization Techniques in detail. **[10]**

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Time: 3 Hours   Max. Marks: 80

Instructions:
1) **Attempt any Four question out of six questions.**
2) **All question carries equal marks.**
3) **Illustrate your answers with neat sketches wherever necessary.**
4) **Figures to the right indicate full marks.**
5) **Assume suitable additional data, if necessary and clearly state it.**
6) **All sub-questions of the same question should be grouped together.**

Q.1	(a)	Give the function of each layer of a seven-layer IoT architectural reference model published by IoTWF architectural committee.	10
	(b)	What is meaning of Smart object? Give the Security and privacy concerns of Smart objects in Internet of things.	05
	(c)	Explain the characteristics of Smart object. Give the trends in smart objects.	05
Q.2	(a)	Explain the architectural classification of smart objects according to Things: Sensors and Actuators Layer. Give the classification of networks according to access technologies and distances considering in IoT based applications.	10
	(b)	What are the factors based on the type of device involved and the function it will perform helps to choose right protocol for a particular IoT application?	05
	(c)	Compare with suitable parameters COAP and MQTT application protocols used for IoT applications.	05
Q.3	(a)	Describe top 10 applications of IoT in existing market place.	10
	(b)	Compare with suitable parameters between Raspberry Pi and Arduino.	05
	(c)	Why RESTful JSON is a popular choice for IoT applications?	05
Q.4	(a)	What is Fog Computing? Give advantages and disadvantages of Fog computing.	05
	(b)	What is Edge Computing? Give advantages and disadvantages of Edge computing.	05
	(c)	Explain the different types of sensors are used for measuring one of the physical properties and give its representative examples.	10
Q.5	(a)	Explain in detail about Smart services in IoT system.	05
	(b)	Write a short note on "Data Analytics Versus Business Benefits".	05
	(c)	Draw and explain neat diagram of Protocol Stack for Transporting Serial DNP3 SCADA over IP. Give meaning of a master/slave relationship in DNP3.	10
Q.6	(a)	Explain at least five use cases where IoT involvements will convert cities into smart cities.	10
	(b)	Compare any Five IoT software platforms with suitable parameters.	10

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

1) Q.1 is compulsory

2) Attempt any **three** from remaining **five** questions

Q1) Solve **any four** of the following:

a) Describe different types of environment of AI agents **[5]**
b) What do you mean by Total Turing test. Explain. **[5]**
c) Explain Utility based Agent with a block diagram **[5]**
d) Formulate the 8 puzzle problem **[5]**
e) Describe the characteristics of a part picking robot using the PEAS properties **[5]**

Q2) a) What do you understand by Min Max Search and alpha beta search? Explain in detail with example. **[10]**
b) What do you understand by A* search? Is it informed or uninformed search – Justify. **[10]**

Q3) a) Explain steps involved in converting propositional logic statement into CNF with suitable example **[10]**
b) What do you understand by forward chaining and backward chaining. Explain in detail **[10]**

Q4) a) Explain various methods of knowledge representation. **[10]**

b) What are local search algorithms? Explain any one in detail. **[10]**

Q5) a) What is planning in AI? Discuss partial order planning and hierarchical planning in detail **[10]**

b) What do you understand by Reinforcement learning. Explain in detail. **[10]**

Q6) Write short notes on **any two** of the following: **[20]**

a) Wumpus World Environment

b) Applications of AI

c) Natural Language Processing

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Time:3Hrs   **marks:80**

Instructions:

1. **Question No 1 is Compulsory, Attempt any Three from Q no 2 to Q No. 6**
2. **Describe your answers with neat sketches and examples wherever necessary**
3. **Assume Suitable Data if required and mention the same in your Answer.**

Q1 a) What are various Mobile Communication and Application Environments for the Following: **10**

    i)   **Business**
    ii)   **Location Based Services.**
    iii)   **Banking Services**
    iv)   **Vehicles**

  b) Explain Various Types of antennas along with their Radiation Pattern.   **10**

Q2 a) What is Spread Spectrum? What are the various advantages for the same?   **5**

  b) What are Various Advantages and Disadvantages of Small Cells in Cellular system   **5**
  c) Explain DSSS and FHSS in detail.   **10**

Q3 a) What do you mean by hidden & Exposed station Problem? How they can be avoided.   **10**

  b) Explain GSM System Architecture in Detail   **10**

Q4 a) Why it is necessary to have Handover Mechanism in GSM? Explain possible handover scenarios in short.   **10**

b) List various Security services offered by GSM. Explain A3 A5 and A8 Algorithm in brief.   **10**

Q5 a) Explain Packet Delivery Mechanism "To and From Mobile Node" with the help of Mobile IP Network Diagram.   **10**

b) Explain Tunnelling and Encapsulation in brief. What are the various types of Encapsulation techniques.   **10**

Q6. Write a Short Note on the Following. (ANY FOUR).   **20**

  a) **Bluetooth**
  b) **HIPERLAN**
  c) **IPV6**
  d) **CDMA**
  e) **Snooping TCP**

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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.
   (4) Assume suitable data, if required and state it clearly.

1   Attempt **any FOUR**   **[20]**

a Give examples of replay attacks. List three general approaches for dealing with replay attack.

b Explain key rings in PGP.

c What are the different protocols in SSL? How do client and server establish SSL connection?

d Explain TCP/IP vulnerabilities layer wise.

e What is the purpose of S-boxes in DES? Explain the avalanche effect.

2 a What is need for message authentication? List various techniques used for message authentication. Explain any one.   **[10]**

b What characteristics are needed in secure hash function? Explain secure hash algorithm on 512 bit.   **[10]**

3 a Use Hill cipher to encrypt the text "short". The key to be used is hill.   **[10]**

b Explain man in middle attack on Diffie Hellman. Explain how to overcome the same.   **[10]**

4 a Explain IPSec protocol in detail. Also write applications and advantages of IPSec.   **[10]**

b What are different types of firewall? How firewall is different from IDS.   **[10]**

5 a Explain Kerberos in detail.   **[10]**

b Provide a comparison between HMAC, CBC-MAC and CMAC.   **[10]**

6 a What is PKI? List its components.   **[10]**

b What is digital certificate? How does it help to validate authenticity of a user. Explain X.509 certificate format.

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