(3 Hours) [Marks: 80]

N.B.: 1) Question No. 1 is compulsory.
2) Answer any three out of remaining questions.
3) Assume suitable data if necessary.
4) Figures to the right indicate full marks.

Q1. Attempt any FOUR 20

(a) Define software testing. Explain software testing model with a neat diagram.
(b) Define Software Metrics. List different types of Software metrics.
(c) Compare Static and Dynamic Testing.
(d) Compare Traditional Software Testing and Web based Software Testing.
(e) Explain the need of Automation in testing.

Q2. (a) Explain Verification in high level and low level design. 10

Q2. (b) A program takes an angle as input within the range [0,360] and determines in which quadrant the angle lies. Design test cases using equivalence class partitioning method. 10

Q3. (a) Explain McCall's quality factors. 10

Q3. (b) Explain Regression Testing in detail. 10

Q4. (a) What is Agile testing? Explain challenges in Agile Testing 10

Q4. (b) Differentiate between Effective Software Testing and Exhaustive Software Testing. 10

Q5. (a) Consider the program for calculating the factorial of a number. It consists of main() program and the module fact(). Calculate the individual cyclomatic complexity number For main() and fact() and then, the cyclomatic complexity for the whole program. 10

```
main()
        {
        int number;
        int fact();
        clrscr();
        printf("Enter the number whose factorial is to be found out");
        scanf("%d", &number);
        if(number <0)
                printf("Facorial cannot be defi ned for this number);
else
                printf("Factorial is %d", fact(number));
        }
```

```
int fact(int number)
{
int index;
 int product =1;
for(index=1; index<=number; index++)
        product = product * index;
return(product);
}
```

Q5. (b) Describe the procedure for Test Point Analysis (TPA) 10

Q6. Write short note on any TWO. 20

a) JIRA Automation Testing Tool
b) SIX sigma
c) Efficient Test Suite Management

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Time: 3 Hours **Max. Marks: 80**

N.B

1. Q.1 is compulsory
2. Attempt any three from the remaining five questions.
3. Each Question carries 20 marks.
4. Assume suitable data, if required and state it clearly.

Q 1 Attempt all. **(20 marks)**

a. Discuss Objective of IRS
b. Define data modeling ? Explain any two types of data models.
c. Compare and contrast Proximity Queries and Wildcard Queries .
d. What is the purpose of a search engine?. List the steps of search operation by search engine.

Q 2. Attempt all. **(20 marks)**

a. What is User relevance feedback: How this will contribute to get results.
b. Discuss various phases of text preprocessing within a document. Discuss any one application for the same.

Q3. Attempt all. **(20 marks)**

a. Discuss automatic local analysis, with suitable examples.
b. What is human-computer interaction? List and discuss any four design principles for information access interfaces

Q.4. Attempt all. **(20 marks)**

a. What is the purpose of using keyword based query? Briefly explain any 3 types of keyword based queries.
b. What is the starting point? Explain list of collections and overviews in detail.

Q 5. Attempt all. **(20 marks)**

a. Summarize two visualization techniques with respect to user interface design.
b. Describe the process of creating an inverted index with an example. How can this process be optimized using block addressing?

Q 6. Write short note on**: (any two)** **(20 marks)**

a. Sequential Search
b. Document clustering
c. Interface support for the search process
d. Multimedia indexing

Time: 3 hours **Marks: 80**

N.B.: 1) Question No.1 is compulsory.
2) Attempt any THREE questions out of remaining FIVE questions.
3) Figures to the right indicates full marks.
4) Assume suitable data if necessary.

Q1	**Attempt Any 4**	**20**
a	Explain about digital evidence.	
b	Explain different password cracking techniques.	
c	What are different Security Risks for Organizations?	
d	What is Cybercrime? Who are Cybercriminal? Explain.	
e	Explain about Credit card frauds in Mobile and Wireless Computing era.	
Q.2		
a	If a hacker creates a website similar to university website to cheat student. Identify attack and explain different types it. How to prevent from such attack.	**10**
b	Discuss steps involved in planning of cyberattacks by criminal.	**10**
Q.3		
a	Explain different types of Cybercrimes and how security will provide?	**10**
b	Explain why do we need cyber laws? Discuss about the challenges to Indian cyber laws	**10**
Q.4		
a	Explain Steps for SQL Injection attack. How to prevent SQL Injection attacks?	**10**
b	If an attacker creates heavy traffic on the college website so that it becomes inaccessible to the legitimate user. Which is this attack. Explain in details with it's types.	**10**
Q.5		
a	What are illegal activities observed in Cyber Cafes? What are safety and security measures while using the computer in Cyber Café?	**10**
b	What are basic security precautions to be taken to safeguard Laptops and Wireless devices? Explain?	**10**
Q.6	**Write short notes on any FOUR**	**20**
a	Salami attack	
b	HIPAA	
c	Mobile/Cell Phone attacks	
d	Cyberstalking and harassment	
e	SOX	
f	Buffer overflow attack	

Time: 3 hrs Marks: 80

Note: 1. Question 1 is compulsory
2. Answer any three out of remaining questions
3. Assume suitable data where required

Q1	Solve any 4		
a)	Explain Bluetooth Low Energy(BLE) role		5
b)	Briefly elaborate the COAP		5
c)	Explain data retention strategy.		5
d)	Explain the concept of I-IoT and its similarity with IoT		5
e)	Explain the characteristic of IoT		5
Q2			
a)	How can IoT analytics be effectively utilized within IoT-based healthcare systems? Additionally, what are some essential parameters that should be incorporated into the patient dashboard for comprehensive monitoring and management of health data?		10
b)	Evaluate long-range communication systems and protocols such as LTE, LTE-A, LoRa, and LoRaWAN in the context of IoT connectivity. Discuss their suitability for different IoT use cases based on factors like coverage, data rate, power consumption, and scalability.		10
Q3			
a)	Define the role of analytics in IoT technology and elaborate the challenges associated with it.		10
b)	Elaborate the need of new network architecture in IoT.		10
Q4			
a)	Compare edge, fog and cloud computing w.r.to its hierarchy.		10
b)	Consider smart smoke detection system. Elaborate its working and list down the different types of sensors and actuators required during the deployment scenario.		10
Q5			
a)	Explain the role of HTTP, WebSocket, and MQTT in IoT communication. Compare and contrast these protocols in terms of their characteristics, suitability for different IoT scenarios, and support for real-time data transmission.		10
b)	Discuss the functional blocks of IoT architecture, highlighting their roles and interactions. Provide examples to illustrate the importance of each block in the overall functionality of IoT systems.		10
Q6			
a)	Elaborate the Smart Object with diagram and describe its characteristics.		10
b)	Explain the following access technologies with applications area of each 1) IEEE 802.15.4 2) Z-wave 3) LTE-A		10

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Duration: 3hr. **Max. Marks: 80**

Instructions:

(1) Question one is Compulsory.

(2) Assume suitable data wherever required but justify it.

(3) Solve any THREE from Question No. 2 to 6.

(4) Figure to the right indicate full marks.

Q1	**(a)**	From a standard deck of playing cards, a single card is drawn. The probability that the card is king is 4/52, then calculate posterior probability P(King|Face), which means the drawn face card is a king card.	**05**
	(b)	Describe the Centroid method of defuzzification. Include its formula and discuss its advantages and disadvantages compared to other defuzzification methods.	**05**
	(c)	List down different applications of Deep Learning. And explain it	**05**
	(d)	Compare and contrast Bagging and Boosting with their application	**05**
Q2	**(a)**	How do you explain random forest? Does random forest need pruning, explain in detail?	**10**
	(b)	Describe how cognitive computing can be applied in healthcare. Provide specific examples of tasks or problems that cognitive computing can help address, and explain the potential benefits.	**10**
Q3	**(a)**	Explain how an autoencoder can be used for dimensionality reduction. Include a brief description of how the encoder and decoder parts of the network work in this context.	**10**
	(b)	List three industries where data science is extensively used and briefly describe one application in each industry.	**10**
Q4	**(a)**	Using Mamdani fuzzy model design a fuzzy logic controller to determine the wash time of domestic washing machine. Assume the inputs are dirt and grease on clothes. Use three descriptors for each input variable and five descriptor for output variables. Derive necessary membership functions and required fuzzy rules for the application.	**10**

(b) What is a Markov Decision Process (MDP)? List its primary components. Explain in detail. **10**

Q5 (a) What is cognitive computing, and how does it differ from traditional computing? List the process of building a cognitive application. **10**

(b) Describe the architecture of a typical CNN. What are the main components, and how do they contribute to the network's performance in image recognition tasks? **10**

Q6 (a) Let's consider a binary classification problem where we have built a classifier to predict whether a transaction is fraudulent (positive class) or legitimate (negative class). After training the classifier and testing it on a dataset, we obtain the following confusion matrix: **10**

	Actual Legitimate	Actual Fraudulent
Predicted Legitimate	850	30
Predicted Fraudulent	20	100

Calculate Accuracy, Precision, Recall and F1-score.

(b) Briefly explain Data science for Multimodal applications. **10**
