CO	BT	No. of Questions Group A (2 Marks) 50	No. of Questions Group B (5 Marks) 78	No. of Questions Group C (10 Marks) 48
CO1	Remembering (R)	30		
CO2	Understanding (U)	20	8	8
CO3	Apply (A)		20	10
CO4	Analyse (N)		20	10
CO5	Evaluate (E)		20	10
CO6	Create (C)		10	10

Group A (2 marks questions)			
Remembering (30 Questions)			
S. No.	**Questions**	**Module**	**CO**
1	Briefly explains the applications of Wireless Sensor Networks.	1	CO1
2	What do you mean by design principle of WSNs?	2	CO1
3	Define Single Hop and Multihop Communication in WSNs.	1	CO1
4	What is propagation delay?	4	CO1
5	What do you mean by IPSec?	8	CO1
6	What is security policy in WSNs?	8	CO1
7	When does Route Error message get initiated in AODV routing protocol?	1	CO1
8	Define Tampering attack.	4	CO1
9	Give any two examples of Public Key Encryption algorithm.	6	CO1
10	What is Hash Function?	6	CO1
11	Write one example of stream and block cipher each.	6	CO1
12	Define the terms Information Security and Cyber Security.	5	CO1
13	What do you mean by Cryptology?	5	CO1
14	What are the characteristics of good encryption technique?	5	CO1
15	Give any five applications of SMAC.	3	CO1
16	What do you mean by PAMAS?	3	CO1
17	Write the fundamental steps of Set-up phase in LEACH routing.	3	CO1
18	What is clustering?	3	CO1
19	Which types of attacks are considered under Information in transit?	4	CO1
20	What attacks are comes under network layer? Write any four.	4	CO1
21	What attacks are comes under data link layer? Write any four.	4	CO1
22	What do you mean by flooding?	4	CO1
23	What do you mean by operating system?	7	CO1
24	What do you mean by Access Control?	7	CO1
25	Write any four methods to protect memory.	7	CO1
26	Write the purpose and scope of Security Policy.	8	CO1
27	Define Security Policy.	8	CO1
28	What are actuators?	2	CO1
29	What is Microcontroller?	2	CO1
30	Give one example of table driven routing protocol.	2	CO1
Understanding (20 Questions)			

S. No.	Questions	Module	CO
1	Generalize the concept of hidden terminal problem.	1	CO2
2	Mention the significance of power aware routing in ad hoc wireless networks.	2	CO2
3	How to update the routing table in table driven routing protocol.	1	CO2
4	Evaluate the pros and cons of the proactive routing protocol.	1	CO2
5	Wireless sensor network and wireless mesh network are part of the ad hoc wireless network- Justify that statement.	1	CO2
6	How does the table driven protocol work in ad hoc networks?	1	CO2
7	List the messages involved in AODV routing protocol employed in a wireless network.	1	CO2
8	Discuss the impact of Black Hole attack in WSNs.	4	CO2
9	How Internet Use Policy is differing from Email Use policy?	8	CO2
10	Elaborate the protection methods of operating system.	7	CO2
11	Mention two difference between memory protection and file protection.	7	CO2
12	Mention the features of Public Key Encryption.	6	CO2
13	Write the difference between public and private keys.	6	CO2
14	Mention the differences between Host based attack vs. Network based attack.	4	CO2
15	Write the difference between Active and Passive attack by taking proper example for each.	5	CO2
16	Elaborate Confusion vs. Diffusion.	5	CO2
17	How SMAC perform neighbour discovery?	3	CO2
18	Elaborate the purpose of TDMA schedule in LEACH routing.	3	CO2
19	PAMAS behaves line binary search. Justify it.	3	CO2
20	In which way WSN is applicable for military?	2	CO2

Group B (5 marks questions)			
Understanding (8 Questions)			
S. No.	**Questions**	**Module**	**CO**
1	Elaborate the node architecture of WSNs in detail.	2	CO2
2	Outline the differences between contention based protocol with reservation and Scheduling Mechanism protocols.	3	CO2
3	Describe the issues and challenges involved in Ad hoc wireless networks.	1	CO2
4	What role does the routing protocol play in the provisioning of QoS guarantees for ad hoc wireless networks?	1	CO2
5	Determine the impact of Black hole and Warm hole attack w.r.t. security threats in WSNs.	4	CO2
6	Explain how the security can be improved by minimizing the attacks in sensor networks.	5	CO2
7	Write the differences between AES and DES algorithms.	6	CO2
8	Mention the differences between active and passive attacks.	5	CO2
Apply (20 Question)			

S. No.	Questions	Module	CO
1	Why WSNs play key role in all field of society and daily life?	2	CO3
2	Discuss about the transceiver tasks and characteristics in a sensor node in a wireless sensor network.	2	CO3
3	Identify the Key management schemes in Wireless Sensor Networks. Illustrate the key distribution and management mechanism required for secure communication in sensor networks.	2	CO3
4	How does the table driven protocol work in ad hoc networks?	1	CO3
5	Write the importance of a Gateway in a wireless network.	1	CO3
6	Explain how route is established and maintained in an ad hoc network using AODV routing protocol.	1	CO3
7	Elaborate the metrics that is applicable to evaluate the performance of S-MAC protocol.	3	CO3
8	Elaborate the areas where SMAC is applicable in details.	3	CO3
9	Elaborate the organization of each round of LEACH with its sketch diagram.	3	CO3
10	Exhibit the performance metrics of PAMAS protocol in WSNs.	3	CO3
11	Discuss about the transceiver tasks and characteristics in a sensor node in a wireless sensor network.	2	CO3
12	Point out the key characteristics of a microcontroller which makes it possible to use in wireless sensor node.	1	CO3
13	Exhibit how LEACH protocol differs from other routing protocols used in WSN.	3	CO3
14	How does misdirection affect the routing in sensor networks?	4	CO3
15	Exhibit the Characteristics of Public Key System. Also describe its applicability in sensor network.	6	CO3
16	Exhibit the Properties of Trustworthy Encryption Systems. Also describe its applicability in sensor network.	5	CO3
17	Elaborate round function of DES with a neat sketch diagram.	6	CO3
18	Describe the applicability of host based attack vs. network based attack w.r.t. to security in WSNs.	4	CO3
19	How flooding attack harms the information transit in WSN? Justify it.	4	CO3
20	Assess the problems occurred with Micro TESLA.	4	CO3
Analyse (20 Questions)			
S. No.	**Questions**	**Module**	**CO**
1	Analyse the nature of MAC protocol in WSN and discuss their requirements.	3	CO4
2	Analyze the mechanism that will form typical parts of WSNs.	2	CO4
3	Discuss the role of fault tolerance and WSN topology in the design of WSN.	2	CO4
4	Analyze the factor by which AODV performs well compared to DSDV routing protocol.	1	CO4
5	Analyze the differences among cellular network, wireless network and an ad hoc network.	2	CO4

6	Generalize the active and passive attacks with suitable examples. Also explain how these attacks differ from each other.	4	CO4
7	Examine the distributed assignment of network wide unique MAC address for WSN.	3	CO4
8	Analyze how energy scavenging is realized in wireless sensor network.	4	CO4
9	Analyze the relationship between computation and communication w.r.t. sensor in network.	2	CO4
10	Brief the energy consumption in discrete operational states of an embedded microcontroller in a sensor node.	2	CO4
11	Distinguish sensor networks from the mobile ad hoc network.	1	CO4
12	Classify the modes of operation of a sensor node. Also Compare Single Hop with Multiple Hop	1	CO4
13	Analyze the characteristics on which the transceiver is selected for a wireless sensor node.	2	CO4
14	Does random address assignment in WSN lead to address conflicts? Justify your answer.	2	CO4
15	Analyze the pros and cons of scheduled based protocols.	3	CO4
16	Analyze the energy efficient routing protocols in brief.	3	CO4
17	Exhibit the features of the IEEE 802.15.4 MAC protocol.	3	CO4
18	Analyze different types of security attacks with suitable parameters.	5	CO4
19	Analyze how the security can be improved by minimizing the attacks in sensor networks.	5	CO4
20	Analyze the significance of a good hash function and digital signature in sensor network.	6	CO4
Evaluate (20 Questions)			
S. No.			**CO**
1	Assess the function of microcontroller in a wireless sensor node and discuss about the microcontrollers that are used in the sensor node.	2	CO5
2	Assess how the SPIN protocol provides authenticated broadcast for resource-constrained environments.	4	CO5
3	Evaluate the performance of MAC protocols for Wireless Sensor Networks and estimate the duty cycle.	3	CO5
4	Discuss about the energy consumption of sensors and actuators.	2	CO5
5	Assess the working principle of CSMA protocol used in 802.15.4 for medium access in WSN with the help of state diagram.	3	CO5
6	Assess how the link-layer jamming affects the performance of sensor networks.	4	CO5
7	Evaluate the impact of black hole and warm hole attacks in WSNs.	4	CO5
8	Evaluate the working and importance of Hash Function in Digital Signature.	6	CO5
9	Assess how signing and verification is done using digital signature.	6	CO5
10	Users Alice & Bob exchange the key using Diffie Hellman algorithm. Assume a=5, q=11, X_A=2 and X_B=3. Find Y_A, Y_B and K.	6	CO5
11	In an RSA cryptosystem, a particular A uses two prime numbers p = 13 and q =17 to generate her public and private keys. If the public key of A is 35. Then the private key of A is?	6	CO5

12	In RSA algorithm if p = 7, q = 11 and e = 13 then what will be the value of d?	6	CO5
13	Perform encryption and decryption using RSA algorithm for the given data: P=7, q=11, e=17 & M=8	6	CO5
14	Suppose that two parties A and B wish to set up a common secret key (D-H key) between themselves using the Diffie Hellman key exchange technique. They agree on 7 as the modulus and 3 as the primitive root. Party A chooses 2 and party B chooses 5 as their respective secrets. Find the secret key.	6	CO5
15	In a Diffie-Hellman Key Exchange, Alice and Bob have chosen prime value q = 17 and primitive root = 5. If Alice's secret key is 4 and Bob's secret key is 6, what is the secret key they exchanged?	6	CO5
16	In RSA, a participant uses two prime numbers p=3 and q=11 to generate his public and private keys. If the private key is 7, then how will the text 'COMPUTER' be encrypted using public key?	6	CO5
17	How is the 48-bit subkey generated for each round in DES?	6	CO5
18			CO5
19			CO5
20			CO5
Create (10 Questions)			
S. No.	**Questions**	**Module**	**CO**
1	Draw the schematic diagram of an ad hoc wireless Internet and discuss the issues to be considered for the successful ad hoc wireless Internet.	**1**	CO6
2	Elaborate the advance radio concepts that are associated with the transceivers of a mote.	**1**	CO6
3	Generalize the essential aspects of power supply for an untethered wireless sensor node.	**2**	CO6
4	List the possible sensors and actuators that can be used to design a wireless sensor network.	**2**	CO6
5	Mention the types of mobility of a sensor node in a network.	**2**	CO6
6	Obtain the possible countermeasures to alleviate the denial-of-service attacks.	**5**	CO6
7			CO6
8			CO6
9			CO6
10			CO6

Group C (10 marks questions)			
Understanding (8 Questions)			
S. No.	**Questions**	**Module**	**CO**
1	Elaborate CSMA and PAMAS protocol in detail.	3	CO2
2	Explain briefly the various main category of WSN applications and also discuss the industrial applications.	2	CO2

3	Describe the importance of security protocols for sensor networks. also explain about the building blocks of SPINS protocols in security provisioning.	4	CO2
4	Briefly specify IEEE 802.15.4 MAC protocol and explain whether the MAC protocols of 802.11 & Bluetooth be used for WSN. Justify.	3	CO2
5	Draw the schematic diagram of an ad hoc wireless Internet and discuss the issues to be considered for the successful ad hoc wireless Internet.	1	CO2
6	Explain how optimization goals and figure of merits achieved in WSN with list of factors used to optimize the wireless sensor network.	2	CO2
7	Explain the transceiver characteristics and structure used in the sensor node.	2	CO2
8	List the possible solutions to mitigate the denial-of-service attacks in sensor networks and explain how it improves the performance of the system.	5	CO2
Apply (10 Question)			
S. No.	**Questions**	**Module**	**CO**
1	How can you explain various issues regarding security in information system? Also explain the various mechanism that can help to safeguard from such issues?	1	CO3
2	Discuss the applicability of congestion detection and congestion avoidance protocols in WSNs.	3	CO3
3	Assess the important parameters used in Energy efficient routing protocols and estimate the efficiency of the protocol.	3	CO3
4	Describe the enabling technologies and characteristic requirements of the wireless sensor networks	2	CO3
5	How the sensor networks are deployed for Military and SAR application? Explain in brief.	2	CO3
6			CO3
7	Describe about the applicability of SPIN and PEGASIS routing with the help of neat diagram. Give its advantages and disadvantages also.	3	CO3
8	Illustrate and explain the functional diagram which depicts the issues in addressing and naming of WSN.	2	CO3
9			CO3
10			CO3
S. No.	**Analyze (10 Question)**		**CO**
1	Examine the impacts of physical-layer jamming attacks on radio communication. How it distorts the signals in the sensor network's frequency band.	4	CO4
2	Summarize the methods to select the protocol for Scheduled based routing and justify the reasons.	3	CO4
3	Derive the expression for energy consumption in a sensor node with an appropriate diagram.	2	CO4

4	Categorize the sensor network scenario with diagrams and also explain how mobility can appear in WSN?	2	CO4
5	Analyze about the importance of the Mediation device protocols with relevant diagrams in wireless sensor networks.	3	CO4
6	Analyze the challenges and issues in Transport layer protocol and find the suitable solutions for it.	4	CO4
7	Analyze the impacts of denial-of-service and masquerade attacks in sensor networks.	5	CO4
8			CO4
9			CO4
10			CO4
Evaluate (10 Questions)			
S. No.	**Questions**	**Module**	**CO**
1	**User A & B exchange the key using Diffie Hellman algorithm. Assume a=5, q=11, X_A=2 and X_B=3. Find Y_A, Y_B and K.**	6	CO5
2	**Perform encryption and decryption using RSA algorithm for the given data:** **P=17, q=11, e=7 & M=88**	6	CO5
3	**Users Alice & Bob exchange the key using Diffie Hellman algorithm. Assume a=5, q=83, X_A=6 and X_B=10. Find Y_A, Y_B and K.**	6	CO5
4	In an RSA cryptosystem, a participant uses two prime numbers p = 3 and q = 11 to generate his public and private keys. If the private key is 7, then how will the text COMPUTER be encrypted using the public key?	6	CO5
5	Assess the detail in the following table, draw network based on the data available and explain DSDV protocol with the framed network. **Destination / Next hop / Metric / Sequence No.** **A / A / 0 / A-550** **B / B / 1 / B-102** **C / B / 3 / C-588** **D / B / 4 / D-312**	1	CO5
6	**An Adhoc network has 7 nodes namely A, B, C, D, E, F & G and one node can reach other node by one or more hops. The node named B which is nearer to D is now moved nearer to G. Using DSDV show the topology and routing table of node B before and after movement. Give the final routing table of B.**	1	CO5
7	Evaluate how the jamming and tampering affects the functional characteristics of wireless sensor networks in real time environment.	3	CO5
8	Assess the importance of multicasting in an ad hoc wireless network applications. Also summarize the security threats in an AdHoc wireless networks. [5+5]	2	CO5

9	Assess the function of microcontroller in a wireless sensor node and discuss about the microcontrollers that are used in the sensor node.	2	CO5
10	Evaluate the non-radio frequency communication available for communication in a wireless sensor network.	1	CO5
Create (10 Questions)			
S. No.	**Questions**	**Module**	**CO**
1	What kind of multiple access technology is suitable in a military ad hoc network environment, and a home ad hoc network environment? Devise the methods for different applications of ad hoc wireless network.	**1**	CO6
2	Design an ad hoc wireless network with nodes and demonstrate the process of route establishment and route maintenance using the on demand routing protocol.	**1**	CO6
3	Elaborate how the network layer attacks degrades the performance of an end-to-end communication in WSN and also discuss about the reliability bottleneck of the network.	**3**	CO6
4	Compile the various issues in security provisioning in WSN and also write about the solutions to avoid it.	**5**	CO6
5	Write the detailed notes on energy consumption during the transmission and reception of a signal in WSN with the supporting equations.	**4**	CO6
6			CO6
7			CO6
8			CO6
9			CO6
10			CO6