Preventing format string vulnerabilities :

1.Always specify a format string as part of the program, not as an input:

- Imagine you have a program that uses format strings, like “%s”. Instead of letting users input the format string, make it a fixed part of your code.
- Example: Instead of taking a user input for the format string, use `printf("Hello, %s!\n", name);` where “%s” is part of the code, not something a user can control.

2. Make the format string a constant:

- Constants are values that don’t change during the program’s execution. If possible, use constants for your format strings.
- Example: Instead of `printf(format, data);`, use `printf("%s", data);` where “%s” is a constant format string.

3. If the above two practices are not possible, use defenses such as Format_Guard:

- Sometimes, you might need user input as part of the format string. In such cases, use additional defenses or tools like Format_Guard to ensure that the input is safe.
- Example: If you have to use user input in a format string, make sure it’s sanitized and doesn’t contain any malicious characters or sequences.

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2. Which components of the computer system need to be secure ?

3. Discuss the goals of computer security system.
4. Describe the problems related with computer security.
5. Explain security measure taken to protect the system.
6. How can an organization protect its computer system hardware ?
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9. Discuss different security models in details.
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11. Discuss the security mechanism used to provide security in computer system.
12. What are the components of security policy ?
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22. Explain integer overflow attack.
23. How can we prevent integer overflow attack ?
24. What do you understand by format string vulnerabilities ?
25. How can we control hijacking attack ?
26. What is Data breach ?
27. Define and explain the term confidentiality policy.
28. What are the issues related Bell-LaPadula model?

29. Explain Discretionary Access Control (DAC).
30. Explain the issues related with DAC.
31. Describe Mandatory Access Control (MAC).
32. What are the problems related with MAC ?
33. What are the advantage and disadvantages of DAC and MAC ?
34. Differentiate between DAC and MAC.
35. Describe confinement principle in brief.
36. Describe detour used in Unix user ids and process ids.
37. Explain basic permission bits on non-directories and directories files.
38. Define SUID, SGID and sticky bits with basic difference.
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45. Explain various types of rootkits.
46. How can we prevent rootkits ?
47. What is Intrusion Detection System (IDS) ?
48. Explain the types of intrusion detection system.
49. Discuss the need of intrusion detection system.
50. Explain advantages and disadvantages of different types of IDS.
51. What are the features of intrusion detection system ?
52. What are the components of IDS ?
53. What is an intrusion detection system ? What are the difficulties in anomaly detection ?
54. Why is security hard ?
55. What is Access Control list (ACL) and also define what are the technologies used in

access control ?

56. Write short notes on Software Fault Isolation (SFI)i. Goal and solution, ii. SFI approach.
57. Explain briefly the term access control.
58. Describe different models of access control.
59. Discuss implementation of access control ABAC and MAC.
60. Briefly explain the uses of access control system.
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62. Discuss access control principle and security principle used for access control.
63. What are the characteristics and features of Unix ?
64. Differentiate between Unix and Windows.
65. What are the various issues in access control ?
66. Describe browser isolation.
67. Explain working of browser isolation.
68. Define browser isolation technology. What are browser isolation vendors ?
69. Define web security with its goals.
70. Explain threat modelling. What is its purpose?
71. Discuss threat modelling methodologies.
72. Explain tools used for threats modelling.
73. How to create a threat model ?
74. What is rendering ? Discuss rendering engine. List some rendering engine in web browser.
75. Explain security interface framework.
76. Describe cookies and frame busting.
77. Discuss web server threats in details.
78. Describe cross-site request forgery in details.
79. How can we prevent CSRF attack ?
80. When does CSRF attack takes place ?

81. Write short note on cross-site scripting (XSS).
82. Explain different ways used to prevent XSS.
83. Describe XSS vulnerabilities.
84. What is the principle of public key cryptography ? Discuss the applications for public key cryptography.
85. Difference between symmetric and asymmetric key cryptography.
86. What are the advantages and disadvantages of RSA ?
87. Write a short note on hybrid cryptosystem.
88. Describe briefly the term digital envelope.
89. Explain the digital signatures.
90. Describe the steps used in creating digital signature.
91. Write a short note on Message Digest (MD) hash function.
92. What are the properties and requirements for a digital signature ?
93. Explain the variants of digital signatures.
94. What is hash function ? Discuss SHA-512 with all required steps, round function and block diagram.
95. What are the characteristics of SHA function ?
96. Discuss public key distribution. Describe the various schemes used for public key distribution.
97. Discuss X.509 certificates in detail. What is the role ofX.509 certificates in cryptography ?
98. Discuss X.509 digital certificate format.
99. What do you mean by PGP ? Discuss its application.
100. Discuss the steps that are followed for the transmission and reception of PGP messages.
101. Explain real world protocols.
102. List the basic terminology used in cryptography.

103. Discuss the functionality of S/MIME.
104. What is email security ?
105. What is an email certificate ?
106. What is Transport Layer Security (TLS) ?
107. What are the components of TLS ? Explain the working of TLS.
108. Explain internet protocol security (IPSec) in detail.
109. Write a short note on the applications of IP security.
110. What are the advantages of IPSec ?
111. What are the uses of IP security ?
112. Discuss components of IP Security.
113. Explain the working of IP Security.
114. Describe briefly Domain Name Server (DNS).
115. How DNS security works ?
116. Explain the DNS security threats.
117. Discuss measures against DNS attacks.
118. Explain SSL encryption. What are the steps involved inSSL server authentication ?
119. What is DES ? Why were double and triple DES created and what are they ?
120. Write short note on secret key cryptography. Also list its advantages, disadvantages and examples.
121. Define internet infrastructure. What are different internet infrastructures ?
122. Explain the advantages and disadvantages of in TCP/IP model.
123. Give a short summary of IP protocol functions.
124. Define routing protocols.
125. What are the types of routing protocols ?
126. Discuss the advantages and disadvantages of different routing protocols.
127. What do you mean by DNS ? Explain DNS rebinding attack.
128. How DNS rebinding work ?

129. Discuss the features of DNS rebinding attack.
130. How can we prevent DNS rebinding attack ?
131. Explain key management protocol
132. What are the advantages and disadvantages of key management protocol ?
133. What are the security and operational requirements forkey management protocol ?
134. Write a short note on VPN and tunnel mode.
135. Discuss link layer connection in TCP/IP model.
136. Write short note on firewall.
137. What is packet filtering firewall ? Explain its advantage and disadvantage.
138. Write short note on telnet.
139. Explain briefly fragmentation at network layer.
140. Write short note on proxy firewall.
141. Write short note on intrusion detection.
142. What is packet filtering firewall ? Explain its advantage and disadvantage.
143. What is Cyberethics?