



**DECEMBER 2020: END SEMESTER ASSESSMENT (ESA) B TECH 5 SEMESTER**

**UE18CS314 – Applied cryptography 4 Credits**

Time: 3 Hrs	Answer All Questions	Max Marks: 100
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1	a)	<p>If we have <math>K = \{k_1, k_2, k_3\}</math> and <math>M = \{a, b, c, d\}</math> with <math>\Pr[K = k_1] = 1/4</math>, <math>\Pr[K = k_2] = 1/2</math> and <math>\Pr[K = k_3] = 1/4</math> for each <math>k \in K</math>. <math>\Pr[M = a] = 1/4</math>, <math>\Pr[M = b] = 3/10</math>, <math>\Pr[M = c] = 3/20</math> and <math>\Pr[M = d] = 3/10</math> and encryption Matrix <math>M</math> is given as</p> <table><tr><td></td><td><math>a</math></td><td><math>b</math></td><td><math>c</math></td><td><math>d</math></td></tr><tr><td><math>k_1</math></td><td>3</td><td>4</td><td>2</td><td>1</td></tr><tr><td><math>k_2</math></td><td>3</td><td>1</td><td>4</td><td>2</td></tr><tr><td><math>k_3</math></td><td>4</td><td>3</td><td>1</td><td>2</td></tr></table> <p><math>M =</math></p> <p>What is the conditional probability distribution <math>\Pr[C=2 \mid M=d]</math> ?</p>		$a$	$b$	$c$	$d$	$k_1$	3	4	2	1	$k_2$	3	1	4	2	$k_3$	4	3	1	2	8
		$a$	$b$	$c$	$d$																		
	$k_1$	3	4	2	1																		
	$k_2$	3	1	4	2																		
$k_3$	4	3	1	2																			
b)	<p>A person X gains access to a system under another user's account and changes the Salary field of an employee record from \$20,000 to \$25,000. What type of attack does X perform on data. Discuss how this can be avoided using cryptographic Algorithm.</p>	4																					
c)	<p>Explain the different types of digital Steganography.</p>	4																					
d)	<p>Define cryptanalysis. EVE gets access to channel and gets to know ciphertext "HLOECMTCYTGAHELWLOEORPORPY" by some other means he came to know that the cipher system used is rail fence. can eve find the plaintext?</p>	4																					
2	a)	<p>The input/output in a s-box is shown in following table. derive the table for the inverse s-box</p> <table><tr><td colspan="2"></td><td colspan="2">Input: right bits</td></tr><tr><td colspan="2"></td><td>0</td><td>1</td></tr><tr><td rowspan="2">Input: left bits</td><td>1</td><td>01</td><td>11</td></tr><tr><td>0</td><td>10</td><td>00</td></tr></table>			Input: right bits				0	1	Input: left bits	1	01	11	0	10	00	6					
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Input: left bits	1	01	11																				
	0	10	00																				
b)	<p>Explain DES Mangler function</p>	8																					
c)	<p>Explain AES key expansion algorithm</p>	6																					
3	a)	<p>Describe a man-in-the-middle attack on the Diffie–Hellman protocol.</p>	6																				

	b)	In an RSA cryptosystem, A uses two prime numbers $p = 13$ and $q = 17$ generate her public and private keys. If A wants to send message =5 to B what is ciphertext generated by A? How B gets the original plaintext message from ciphertext.	8
	c)	Find primitive root for prime number 7.	4
	d)	Using Fermat little theorem find the value for $2^{17} \bmod 15$ .	2
4	a)	Describe the working of Fiat- Shamir protocol.	8
	b)	Explain Kerberos KDC authentication process.	8
	c)	If your message size is $\ell=49$ and if authentication method used is SHA1 find padding bits.	4
5	a)	Describe elliptical curve group operation equation. If elliptical curve is defined by the equation $y^2 = x^3 + Ax + B$ . Can $A=-3$ and $B=5$ be used for this curve. If $A=-3$ and $B=5$ is used then will point (25,28) satisfy the curve equation.	6
	b)	List and define DSA Domain Parameters	6
	c)	Explain with a diagram point addition and point multiplication of elliptic curve.	8