



INSTITUTE OF INFORMATION TECHNOLOGY
JAHANGIRNAGAR UNIVERSITY
B.S.C. (HONS.) IN INFORMATION TECHNOLOGY
4TH YEAR 2ND SEMESTER EXAMINATION 2017

Course Code: IT-4201

Course Title: Human Computer Interaction

Time: 3 hours

Full Marks: 60

Answer any FIVE questions
(All parts of a particular question must be answered consecutively)

1. a) What do you mean by Human Computer Interaction (HCI)? Why HCI is an important issue in the field of IT? 4
b) What are the main components of HCI? Why do we need to know about user? 4
c) What is meant by 'good user interface'? State the benefits of a good design? 4

2. a) Why do we need to study on human psychology for an interactive design? 4
b) Explain how human habituated to think. 4
c) Any interaction design exercise must be for users. So it is often stated as: know your users. How can we realize the users before designing an interface? 4

3. a) What are the difference between Long-Term Memory and Short-Term Memory? 4
b) What are the functions of cone, rods, x-cells and y-cells in our retina? 4
c) How human realize the size, color, brightness and depth of a visual image? 4

4. a) What is problem solving theory? Mention some of the theories and explain one of them. 4
b) What is Muller-Lyer Illusion? How human naturally reads something from? 4
c) What are the mental models? Why are they important in interface design? 4

5. a) What do you mean by software life cycle? Draw the waterfall model for software lifecycle? 4
b) Clearly explain the "Laws of size Constancy". Explain the Fitts' Law 4
c) What is prototyping in software design? What are the pitfalls in prototyping? 4

6. a) What is usability engineering? What are the six general attributes that define usability? 4
- b) What is design rationale? List different types of DR. Write the benefits of DR. 4
- c) What is the main element of issue based information system (IBIS)? Draw the hierarchical structure of gIBIS. 4
7. a) State the screen design goals. 2
- b) Discuss how a poor screen design can distract the user and what a user expects in good screen design. 5
- c) What is the advantage and disadvantage of direct and indirect techniques for capturing information for determining requirements? 5



INSTITUTE OF INFORMATION TECHNOLOGY

JAHANGIRNAGAR UNIVERSITY

4th YEAR 2ND SEMESTER FINAL EXAMINATION-2017

COURSE CODE: IT-4203

TOTAL MARKS: 60

COURSE TITLE: WIRELESS & MOBILE COMMUNICATION

TIMES: 3 HOURS

ANSWER ANY FIVE (5) QUESTIONS

1. a) Distinguish between wireless and cellular mobile communication. 2
- b) A telephone operator has found that there is a high blocking probability in a base station. In addition, the coverage area of that BS required to be improved. Explain with illustration, how can we improve the Coverage and Capacity of the Systems? 4
- c) A total of 24 MHz of bandwidth is allocated to a particular FDD cellular tele- phone system that uses two 30 kHz simplex channels to provide full duplex voice and control channels. Assume each cell phone user generates 0.1 Erlangs of traffic. Assume Erlang B is used. 6
- (i) Find the number of channels in each cell for a four-cell reuse system.
- (ii) If each cell is to offer capacity that is 90% of perfect scheduling, find the maximum number of users that can be supported per cell where omnidirectional antennas are used at each base station.
- (iii) What is the blocking probability of the system in (ii) when the maximum number of users are available in the user pool?
- (iv) If each new cell now uses 120 sectoring instead of omnidirectional for each base station, what is the new total number of users that can be supported per cell for the same blocking probability as in (c)?
- (v) If each cell covers five square kilometers, then how many subscribers could be supported in an urban market that is 50km × 50km for the case of omnidirectional base station antennas?
- (vi) If each cell covers five square kilometers, then how many subscribers could be supported in an urban market that is 50km×50km for the case of 120 sectored antennas?
2. a) If the transmitter produces 50W of power, express the transmit power in dBm. If 50W is applied to a unit gain antenna with a 900MHz carrier frequency, find the received power in dBm at the S-R separation of 100m. What is $P_r(10\text{km})$ 4
- b) For the new cells to be smaller in size, the transmit power of these cells must be reduced. The transmit power of the new cells with radius half that of the original cells can be found by examining the received power at the new and old cell boundaries and setting them equal to each other. This is necessary to ensure that the frequency reuse plan for the new microcells behaves exactly as for the original cells. Prove that the transmit power must be reduced by 12 dB in order to fill in the original coverage area with microcells, while maintaining the S/I requirement. 4
- c) Prove that for a hexagonal geometry, the co-channel reuse ratio is given by, where $N = i^2 + ij + j^2$. 4
3. a) Distinguish between various small scales fading model. 4
- b) Explain the spreading and despreading of a CDMA system. 4
- c) Draw LTE architecture. How can we convert a 3G mobile cellular system into a 4G broadband cellular system? 4
4. a) Draw the GSM structure which consists of switching subsystems and radio sub- systems. 4
- b) Explain challenge-response-authentication. How can we generate the encrypted data in the GSM system? 4
- c) List core functions of HLR and VLR. Prove that the transmission data rate of the GSM system is 270kbps. 4

5. a) Distinguish among various data networks in terms of deployed techniques and features. 4
- b) We have seen our data service in the mobile phone always switches from "LTE" to "H+" to "E" and vice versa. This means, we are getting the signals from different data services in the same location. Draw a functional block representation which shows the overlay structures of 2G; Edge, 3G, 4G. 4
- c) The near-far problem always exist in the CDMA and it is a challenge for the system designer. What is near-far problem? Does the problem exist in GSM? Explain the WCDMA handover and power control. 4
6. a) Define Clustering Protocols. Show the Classification of Clustering Protocols 5
- b) Show the frame format of IEEE 802.11. "The frame control (FC) field provides information on the type of frame has 11 subfields". Explain any six of them. 2
- c) If a signal to interference ratio of 15 dB is required for satisfactory forward channel performance of a cellular system, What is frequency reuse factor and cluster size that should be used for maximum capacity if the path loss exponent is $\gamma=3$? Assume that there are six co-channel cells in the first tier and all of them are at the same distance from the mobile. 5
7. a) Explain the term 'Orthogonality'. Explain long PN, Short PN and Walsh codes. 4
- b) For the Internet of things, a Wireless Sensor network plays a vital role to collect data using various sensors. List the possible challenges of deploying a wireless sensor network for a particular application. Also list some applications of such network. 4
- c) Define the term 'Mobile-IP'. Explain the call routing process considering the home agent and foreign agent. 4



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4th YEAR 2ND SEMESTER FINAL EXAMINATION-2017

COURSE CODE: IT-4225

COURSE TITLE: DIGITAL IMAGE PROCESSING & PATTERN RECOGNITION

TOTAL MARKS: 60

TIMES: 3 HOURS

ANSWER ANY FIVE (5) QUESTIONS

1. a) Describe about RGB control model 4
b) Write the expression to find the number of bits to store a digital image? 2
c) Write down the difference between spatial and frequency domain filtering. Which is better- 3
Justify your answer.
d) Given an image with impulse noise, Rahim applies MINMAX after MAXMIN while Karim 3
adopts MAXMIN after MINMAX. Would they get the same results? Why or why not?

2. a) Define the Hit - or -Miss Transformation 2
b) When the pixel replication method is applicable for zooming a digital image. 3
c) For median filter, what's the difference between large kernel size and small one? Which one 3
outperforms the other?
d) Briefly explain following image enhancement method indicating their typical application 4
area- i) contrast stretching, ii) median filtering

3. a) Briefly explain the histogram equalization technique for image enhancement. Can histogram 4
equalization always provide a better result? State your reasons.
b) Given a gray image I, we want to find all its pixels that are in the domain [a, b]. Design a 4
matlab function $F = f(I, a, b)$ that returns a binary matrix F that is of the same size as I, where
1 for pixels satisfying the domain condition and 0 otherwise.
c) Mention some applications of image processing for biometric security system. 2
d) Discuss the role of sampling & quantization processes with an example 2

4. a) Explain how can you sharpen an image using *Laplacian* operator? 3
b) Explain about the restoration filters used when the image degradation is due to noise only. 3
c) What are the advantages of using a 'Wiener Filter' over a conventional 'Inverse Filter' for 3
image restoration, discuss
d) What are high pass and low pass filters in frequency domain? How does it work? 3

5. a) Describe the differences between harmonic mean filter and contra-harmonic mean filter. 3
When does contra-harmonic mean filter becomes an arithmetic mean filter? 4
- b) Explain the procedure how does an adaptive median filter works. 4
- c) Write down the algorithm of boundary extraction and thinning of a digital image. 4
- d) Suppose you have a 3x3 Gaussian filter in spatial domain, what is the size of this filter in frequency domain? 1
6. a) Consider the problem of image blurring caused by uniform motion in the x direction. If the image is at rest at $t = 0$ and moves with a uniform velocity $x_0(t) = 2at/T$ for a time T , find the blurring function $H(u,v)$. You may assume that shutter opening and closing times are negligible. Now deduce an expression for $H(u,v)$ if there is a y component of velocity $y_0(t) = 2bt/T$. 4
- b) Explain about Gaussian noise and gamma noise with necessary figures. 4
- c) Images X and Y are shown below with the crossing in the left bottom showing their correspondence. Design an appropriate structure element such that Y can be obtained after dilating X. (black for 1 and white for 0) 4
-
-
7. a) What is meant by *morphological processing*? 2
- b) What is the limiting effect of repeatedly dilating and eroding an image? 3
- c) How dose *opening and closing* operation works? Explain with necessary figures. 4
- d) Draw and describe a Lossless Predictive Coding model. 3

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B.SC. (HONS.) IN INFORMATION TECHNOLOGY
4TH YEAR 2ND SEMESTER EXAMINATION 2017

Course Code:IT-4227

Time: 3 hours

Course Title: Mobile Application Development

Full Marks: 60

Answer any FIVE questions
All parts of a particular question must be answered consecutively

- | | | |
|-------------|--|---|
| 1(a) | What is Android and why it is popular platform? Mention few features of Android operating system. | 4 |
| (b) | How many layers are in Android architecture? Mention the android section's name with few components. | 4 |
| (c) | Suppose that you are starting a service in an Activity as follows: | 4 |

```
Intent service = new Intent(context, MyService.class);
startService(service);
where MyService accesses a remote server via an Internet connection.
```

If the Activity is showing an animation that indicates some kind of progress, what issue might you encounter and how could you address it?

- | | | |
|-------------|--|---|
| 2(a) | Why Android Adapter? Draw conceptual and visual representation of this recycle process of Android Adapter. | 5 |
| (b) | What is Intent? Can it be used to provide data to a ContentProvider? Why or why not? | 4 |
| (c) | Draw the Fragment Life Cycle method of Android. | 3 |
| 3(a) | Explain explicit and implicit of Intents with syntax (source code). | 3 |
| (b) | Write the procedures for sending out explicit or implicit intents with example. | 5 |
| (c) | Under what condition could the code sample below crash your application? How would you modify the code to avoid this potential problem? Explain your answer. | 4 |

```
Intent sendIntent = new Intent();
sendIntent.setAction(Intent.ACTION_SEND);
sendIntent.putExtra(Intent.EXTRA_TEXT, textMessage);
sendIntent.setType(HTTP.PLAIN_TEXT_TYPE); // "text/plain" MIME type
startActivity(sendIntent);
```

- | | | |
|-------------|--|---|
| 4(a) | What is listener? Write down some common listener events in Android. | 4 |
| (b) | How to send data from one Activity to Another Activity in Android applications - explain step by step. | 5 |
| (c) | What is Widgets ? Explain briefly some of its functionality. | 3 |

- 5(a) What is orientation in Android – explain with a simple code. 3
- (b) Sketch the core building blocks in Android 4
- (c) Explain and differentiate among Linear Layout, Relative Layout & Absolute Layout. 5
- 6(a) Define android Views and ViewGroups, graphically explain the most commonly used android View classes. 5
- (b) Write the different attributes for styling the android Button. 3
- (c) Explain *Toast* in Android with features and different methods for creating *Toast*. 4
- 7(a) Draw Android activities interface and labeling it. 4
- (b) Write Libraries and other Components of Android. 3
- (c) What is the difference between a fragment and an activity? Explain the relationship between the two. Which method is called only once in a fragment life cycle? 5

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4TH YEAR 2ND SEMESTER EXAMINATION 2017

Course Code: IT-4259

Time: 3 hours

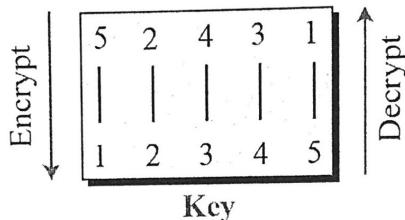
Course Title: Computer Network Security

Full Marks: 60

Answer any FIVE questions
(All parts of a particular question must be answered consecutively)

1. a) State the importance of network security? Draw a general model for network security. [3]
 - b) What do you mean by **CIA** and **DAD** triads of security? [3]
 - c) Distinguish between passive and active security attacks. Given some attacks in the box below. [3]
Identify which are active and which are passive attacks:
Replaying, Traffic analysis, DoS, Modification, Snooping, Masquerading, DDoS, Repudiation
 - d) What security service and mechanism are recommended by **ITU-T**? What does 'non-repudiation' mean? [3]
-
2. a) What is a session key? Illustrate the processes of creating a session key between Alice and Bob using **KDC**. [4]
 - b) What is **Kerberos** and why it is named so? Describe the function of each servers involved in Kerberos protocol. [4]
 - c) What does '**symmetric-key agreement**' mean? Illustrate the processes of creating a symmetric-key between Alice and Bob using **Diffie-Hellman Key Agreement** protocol. [4]
-
3. a) Illustrate the general idea behind i) symmetric-key cipher ii) asymmetric-key cipher. [4]
 - b) Distinguish between -
 - i) symmetric and asymmetric cryptography
 - ii) cryptography and steganography
 - d) An ideal password authentication scheme has to withstand a number of attacks. Describe four of these attacks. [4]
-
4. a) List some mathematical fields where cryptography is widely used. Find the result of the following operations: (i) $0 \bmod 5$, (ii) $-15 \bmod 7$, (iii) $15 \bmod 29$, (iv) $29 \bmod 58$ [3]
 - b) Define binary operation with example. Why division is not a binary operation? [2]
 - c) Using **Euler's Phi-Function**, determine the number of elements in –
 - i) Z^*_{35}
 - ii) Z^*_{36}
 - iii) Z^*_{37}
 - iv) Z^*_1
 - d) How to express the following set of integers? [2]
 - (i) Set of all positive integers
 - (ii) Set of all non-negative integers
 - (iii) Set of integers zero to 99
 - (iv) Set of all integers
 - e) Suppose, **A** and **B** are two integers in **N** modulus. When is **A** called the (i) additive inverse of **B** (ii) multiplicative inverse of **B**? Find the multiplicative inverse of 11 in Z_{26} using extended Euclidean algorithm. [3]

5. a) An encryption key used in a transposition cipher is given as 5 3 4 1 6 2 7. Determine the [3]
 corresponding decryption key and then decrypt the message 'IVELSOC EPLOTME IBLLNYD' using
 keyed transposition cipher with the decryption key you determined.
- b) Encrypt the message "two wrongs do not make a right" using Columnar transposition cipher with [3]
 the help of following key.



- c) Encrypt the message 'blockchain' using any TWO of the following ciphers. (Ignore the space [4]
 between words and use modulo 26). Decrypt the message to get the original plaintext.
- (i) Affine cipher with key = (11, 9) $[11^{-1} = 19]$
 - (ii) Autokey cipher with key = 12
 - (iii) Playfair cipher with the keymatrix you consider.
- d) List two types of traditional symmetric-key ciphers. Suppose you want to encrypt a message using [2]
 26 modulus. What will be the possible key domain if **Affine cipher** is used?

6. a) Describe an efficient procedure for picking a prime number. [3]
- b) In the RSA public-key encryption scheme, each user has a public key and a private key. Suppose [6]
 Bob leaks his private key. Rather than generating a new modulus, he decides to generate a new
 public and new private key. Is this safe? Justify your answer.
- c) What is P-Box and S-box? An S-Box used for encryption is given below. Determine the invertible [3]
 S-Box that will be used for decryption.

		LSBs of Input			
		00	01	10	11
MSBs of Input	00	1000	0101	1010	0000
	01	1011	0001	1110	0010
	10	0100	1111	0110	1101
	11	1100	0111	1001	0011

7. a) What is digital signature? Illustrate the process of signing and verification used in digital signature. [3]
- b) Define hash function. State some desirable properties a cryptographic hash function should have. [3]
- c) List three services provided by digital signature. Differentiate between digital signature and conventional signature. [3]
- d) What is SSL? Illustrate the processes of establishing a secured connection using SSL. [3]



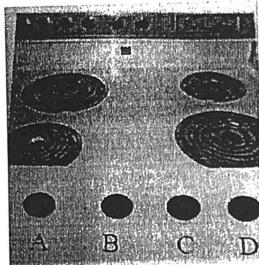
INSTITUTE OF INFORMATION TECHNOLOGY
JAHANGIRNAGAR UNIVERSITY
4TH Year 2ND SEMESTER FINAL EXAMINATION 2018

COURSE CODE: IT-4201
TOTAL MARKS: 60

COURSE TITLE: HUMAN COMPUTER INTERFACING
TIMES: 3 HOURS

ANSWER ANY FIVE (5) QUESTIONS

1. a) "HCI is the study of bridge between them, which includes observation of interactions", Give 3
an example and explain. What else also a part of HCI study?
- b) "Utility affects effectiveness", explain the statement with example. 2
- c) Differentiate HCI by ACM, Dix and Carroll. 4
- d) Observe the following figure and write which controls go with which burner rings? Redraw it with your choice. Look at the fan and light switches in your exam room, how can you recognize them for better use? Also redraw it. 3



2. a) Describe various input-output channels in human computer interaction and compare various 4
text entry devices.
 - b) How do ergonomics affect the interaction between man and machine? 4
 - c) Explain Donald Norman's model of interactions. 4
3. a) Whether the following is push or pull? Which Norman's principle has been used? 1



- b) Failures occurs most commonly for "unclear objectives and requirements" while critical 4
success occurs most often for "clear, detailed requirements", explain it in the text of
upcoming "gorur haat at gabtoli".
- c) What are the activities involved in HCI design? Explain each with flow diagram
- d) "Iteration is needed throughout the HCI core activities", why? Give an example 3

4. a) Build and explain a Lifecycle model for student-teacher interaction in the class 3
- b) Suppose for a 21 inch flat panel display, the average distance the cursor between the menu bars is 80 mm. Size of menu bar for Macintosh:30 mm and Windows: 20mm, $a=50$, $b=150$. Calculate the time to move the cursor to a menu item on Macintosh and Windows. 3
- c) What are the Norman's 7 Principles of Usability? 3
- d) "Interaction: communication between user and system", is it true? Prove it. 3
5. a) Explain the general principles of HCI design with figure. 3
- b) "Consider a company that wants to develop a wireless information system to help tourists with personal digital assistants (PADs) at Cox's Bazar Airport". Develop and draw a conceptual model for this system. 3
- c) Draw the block diagram of memory model. How information goes to long-term memory? How chunking improves memory? 3
- d) Draw and describe a life -cycle model. 3
6. a) "HCI arises in our daily life", explain with appropriate figure. 3
- b) "Google's search engine has the largest market share", why? Explain 3
- c) How to achieve "user- friendliness" in computer design? Can you suggest 5 such designs? 3
- d) Briefly explain six HCI goals 3
7. a) What are the causes and effects of emotion? 4
- b) What is cognition? Explain cognitive architecture in detail. 4
- c) Describe the main kind of social mechanism that are used by people to communicate and collaboration. 4



**INSTITUTE OF INFORMATION TECHNOLOGY
JAHANGIRNAGAR UNIVERSITY
4TH YEAR 2ND SEMESTER FINAL EXAMINATION-2018**

COURSE CODE: IT-4203

COURSE TITLE: WIRELESS AND MOBILE COMMUNICATIONS

TIMES: 3 HOURS

TOTAL MARKS: 60

ANSWER ANY FIVE (5) QUESTIONS

1. a) If a total of 25 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 200 KHz simplex channels to provide full duplex voice and control channels and each frequency channel is divided into 8 time slots. Compute the number of channels available per cell if a system uses
i. 4 cell reuse
ii. 7 cell reuse
If 1 MHz of the allocated spectrum is dedicated to control channels then determine an equitable distribution of control channels and voice channels in each cell for each of the system. 4
- b) Discuss three different types of handoff algorithms. Draw the flow chart or steps involved in the handoff process. 4
- c) Due to the cell splitting, the cell radius of a new cell has become $\frac{1}{2}$ of the old cell. Prove that the transmit power must be reduced by 12 dB in order to fill in the original coverage area with microcells, while maintaining the same S/I requirement. 4
2. a) In wireless networking the hidden node problem occurs when a node can communicate with a wireless access point, but cannot directly communicate with other nodes that are communicating with that access point. Write down the steps to solve this hidden terminal problem. 4
- b) Many of the wireless applications use CSMA/CA protocol for their medium access technique, why? Discuss CSMA/CA protocol using a flow chart. 4
- c) Draw and describe the layers for Bluetooth protocol stack. 4
3. a) "Wireless LANs can operate in one of two configurations, with a base station and without a base station". Explain this statement. 4
- b) What is Frequency hopping? Why it is so useful? 4
- c) Draw and describe Collision Avoidance with RTS-CTS exchange 4
4. a) Explain the condition for various types of small-scale fading used in wireless communications 4
- b) "Ad-hoc networks have several types of applications". Explain four of them. 4
- c) Calculate the rms delay spread and the maximum excess delay(10dB) for the multiple profile given
 $P(0) = -21 \text{ dB}$
 $P(1) = -10 \text{ dB}$
 $P(2) = -10 \text{ dB}$
 $P(3) = -10 \text{ dB}$
 $P(4) = 0 \text{ dB}$
Estimate the 0.5 coherence BW of the channel. Would this channel be suitable for GSM 1800 service without the use of an equalizer? 4

5. a) The basic CN architecture for UMTS is based on the GSM network with GPRS. Now draw the architecture and describe HLR, VLR, EIR. Again the Core Network is divided in circuit switched and packet switched domains. Identify them. 4
- b) Let you have deployed a wireless LAN system in your office network where you need to authenticate your user periodically. If you use your knowledge of MS Authentication in your WLAN system, how can the access point authenticate the wireless nodes? 4
- c) Explain the Signaling and Data Confidentiality techniques used in the GSM system. 4
6. a) Distinguish between CDMA and GSM in terms of power, number of users, frequency reuse factor, voice quality, frequency used for each user, security and Cell size. 4
- b) Explain Burst formatting of GSM Speech Processing. 4
- c) "UMTS uses wideband code division multiple access (W-CDMA) radio access technology to offer greater spectral efficiency and bandwidth to mobile network operators". How? 4
7. a) Distinguish single carrier and multi-carrier FDM technique. Mention two advantages of OFDM. 4
- b) One of the important features of LTE is femtocell deployment. Explain the objective of such deployment. 4
- c) A mmWave BS is communicating with a MS, what are the parameters must be adjusted in order to improve the QoS at the MS? Explain in details. 4



INSTITUTE OF INFORMATION TECHNOLOGY
JAHANGIRNAGAR UNIVERSITY
4TH Year 2ND SEMESTER FINAL EXAMINATION 2018

COURSE CODE: IT-4225
TOTAL MARKS: 60

COURSE TITLE: DIGITAL IMAGE PROCESSING & PATTERN RECOGNITION
TIME: 3 HOURS

ANSWER ANY FIVE (5) QUESTIONS

1. a) Define pixel. How pixel is related with CCD array of digital camera? 4

- b) Prove that the SNR will be improved if we use average filter on an image. 3

- c) Consider the image segment S given below. Let $V = \{1, 2\}$ and compute the lengths of the shortest 4-, 8- and m-paths between p and q. If a particular path does not exist between these two points, explain why. 5

3	1	2	1(q)
2	2	0	2
1	2	1	1
(p)	1	0	2

2. a) Explain RGB color model. If RGB code of any color is {51, 255, 204} then find its Hex code. 6

- b) Explain spatial resolution and gray level resolution in case of digital image. 3

- c) When the pixel replication method is applicable for zooming a digital image? 3

3. a) What are the drawbacks of STFT? Give the basic concept of Wavelet Transform. 4

- b) Write the basic difference between Fourier Transform and Wavelet Transform. Write the properties of Wavelet Transform. 4

- c) According to type of signal classify wavelet transform. Explain each type. 4

4. a) What is the limitation of using *inverse filter* for image restoration? How does *winner filter* solve this problem? 4

- b) Explain logarithmic and power – law gray level transformations. 4

- c) Compare brightness and contrast. Consider the given image increase the brightness 4 times. Then find the contrast of it. 4

54	55	54	54
57	55	44	57
58	55	45	58
49	55	46	49

5. a) Consider the image matrix I and mask M . Find the output image matrix using convolution. 4
- $$I = \begin{bmatrix} 1 & 3 & 7 \\ 2 & 5 & 7 \\ 2 & 7 & 4 \end{bmatrix} M = \begin{bmatrix} 1 & 3 & 1 \\ 1 & 3 & 1 \\ 1 & 3 & 1 \end{bmatrix}$$
- b) Given the degradation function as follows: $g = f * h + n$ where g is degraded image, h is convolution filter, f is latent image and n is noisy. Describe a method to estimate f if we don't know about h . 4
- c) Why edges are detected? Write the different Robinson compass masks. 4
6. a) How dose *opening and closing* operation works? Explain with necessary figures. 4
- b) Consider a set A . Define the *reflection* of the set A and *translation* of the set A 2
- c) What is the limiting effect of repeatedly dilating and eroding an image? 3
- d) What is the purpose of Hit-or-Miss transformation? How does it work? 3
7. a) Describe the basic modules in designing a pattern recognition system. 4
- b) What is the difference between supervised learning and unsupervised learning? 2
- c) "Suppose you want to recognize the address written on the envelope. The data here is probably an image of the envelope including the sub-images of all the characters to be classified and some background." How do you classify all the characters of the address? 3
- d) What is the k nearest neighbour (KNN) classification rule? How does it work? 3



Institute of Information Technology
Jahangirnagar University
4th Year 2nd Semester B.Sc. (Hons.) Examination 2018

Course Code: IT-4227
Marks: 60

Course Title: Mobile Application Development
Time: 3 Hours

Answer any **FIVE** questions
All parts of a particular question must be answered consecutively

- | | |
|--|---|
| 1(a) Android is an OS, an open source and a platform - explain why? | 4 |
| (b) Draw the Android architecture and write the main component used in an Android application. | 4 |
| (c) Make a list of Android platform version, code name with their API level. | 4 |
| 2(a) Write some features of Android. Explain Eclipse IDE and Android Development Tools (ADT) Plug-in with their purpose in Android. | 4 |
| (b) Explain Activity Lifecycle used in Android (use necessary code and diagram). | 4 |
| (c) What is Adapter in Android? Write the similarities and dissimilarities among different Adapters. | 4 |
| 3(a) Define the Fragment. Draw the Fragment life cycle method of Android. | 4 |
| (b) Write the necessary XML and Java codes for designing a simple calculator. | 4 |
| (c) What is SQLite? How does it differ from client-server database management systems? | 4 |
| 4(a) How to send the data from one Activity to Another Activity in Android applications- explain step by step. | 5 |
| (b) Differentiate between:
i. Intent and Service iv. Widget and OpenGL
ii. Bundle and Intent v. Adapter and Receiver
iii. Snackbar and RatingBar | 5 |
| (c) What is an Intent in Android? How many steps are in MainActivity to reach super Activity? | 2 |
| 5(a) Define listener and handler with example. What is the difference between listener and handler? | 5 |
| (b) Write the purpose of using Override and Overloading. | 3 |
| (c) Explain background of the following code: | 4 |
| <pre>@Override protected void onCreate(Bundle savedInstanceState) { super.onCreate(savedInstanceState); setContentView(R.layout.activity_main); loginButton = (Button) findViewById(R.id.loginButtonId); textView = (TextView) findViewById(R.id.textViewChild); loginButton.setOnClickListener(new View.OnClickListener() }</pre> | |
| 6(a) What are Internet protocols for mobile applications? | 2 |
| (b) What do you mean by Publishing? Explain its relevance in Mobile Applications? | 5 |
| (c) Define GPS. Explain the impact of GPS on mobile applications. | 5 |
| 7(a) Define iOS. Write the differences between the android and iOS. | 4 |
| (b) What is meant by multitasking? Does the iOS support multitasking? | 4 |
| (c) Which tool is required to develop the iOS application? Briefly explain about the tool. | 4 |

Institute of Information Technology (IIT)
Jahangirnagar University

4th Year 2nd Semester B.Sc (Hons.) Final Examination 2018

Subject: Information Technology

Course: IT-4259 (Computer Network Security)

Time: 3 Hours

Full Marks: 60

Answer any FIVE of the following questions.

1. a) What is web security? List some tools that may be used to achieve the security of a website. [3]
b) Describe the processes of establishing a secure connection using SSL. [3]
c) Who are the key participants in a SET session? Why SET protocol was designed? [3]
d) How does SET protocol work? Differentiate between SSL and SET. [3]

2. a) What is a KDC? How can Alice send a confidential message to Bob using the KDC? [3]
b) When the number of people using a KDC increases, the system becomes unmanageable and a bottleneck can result. How to solve this problem? [2]
c) What does 'symmetric-key agreement' mean? Illustrate the processes of creating a symmetric-key between Alice and Bob using Diffie-Hellman Key Agreement protocol. [4]
d) What are the approaches to distribute a public key? What information a digital certificate carries? [3]

3. a) Illustrate the general idea behind asymmetric-key cryptography. [2]
b) Distinguish between cryptography and cryptanalysis. [2]
c) Suppose you are the network administrator of an organization. To provide confidentiality of your organization's data, you have to choose either symmetric-key or asymmetric-key cryptosystem. Which system do you want to choose for the organization and why? [3]
d) In asymmetric-key cryptography, the public-private key-pairs can be used in two different ways. What are these two ways? Briefly describe with proper illustrations. [3]
e) **Three Pass Protocol** can be used to send sensitive information across an insecure network. [2]
Give a postal analogy.

4. a) List some mathematical fields which are widely used in network security. What is binary operation? Is not division a binary operation? [3]
b) What does Z , Z_{14} and Z^{*}_{14} mean? Using Euler's Phi-Function, determine the number of elements in-
i) Z^{*}_{57} ii) Z^{*}_{49} iii) Z^{*}_{37} iv) Z^{*}_1 [3]
c) Assume that A and B are two integers in N modulus. Write the appropriate condition such that -
(i) A is the multiplicative inverse of B
(ii) A is the additive inverse of B . [4]
Using extended Euclidean algorithm, determine the multiplicative inverse of 15 in 28 modulus.
d) An encryption key is given as 2 5 4 3 6 1. Determine the corresponding decryption key. [2]

5. a) What is product cipher? Illustrate the functionality of product cipher with figure. [3]
b) Explain the steps of DES Round function. [4]
c) Illustrate the importance of P-box in DES. [2]
d) Give the general idea behind 'confusion' and 'diffusion' [3]

6. a) Explain briefly the concepts: one-way function, one-way hash function, trapdoor one-way function. [4]
- b) Explain why a stream cipher fails to protect message integrity. [4]
- c) Describe how a one-way hash function may be used for message authentication. [4]
7. a) A message can be authenticated either by hash code or MAC code. Give proper illustrations for these two methods. [5]
- b) Differentiate between **any TWO**- [3]
- i) Digital Signature and Cryptosystem
 - ii) MAC Algorithm and Hash Algorithm
 - iii) Conventional Signature and Digital Signature
- c) Briefly describe three services provided by a digital signature. [2]
- d) Define hash function. State the importance of hash function in network security. [2]