

DEPARTMENT OF HIGHER EDUCATION
UNIVERSITY OF COMPUTER STUDIES
FIFTH YEAR (B.C.Sc. & B.C.Tech.)
MIDTERM EXAMINATION
MARCH, 2017
ENGLISH

ZONE IV

Answer All Questions.

Time Allowed: 3 Hours

I. Read the passage and answer the following questions.

(20 Marks)

Technology is moving at such a breakneck speed that it is enough to make your head spin. It can be difficult to keep up. However, with each new technological marvel come consequences. Much of the research conducted has shown the extent of the damage being done to our health by technology. It is a scary thought, and with teenagers and children being heavy consumers and users of these gadgets, they run the risk of being harmed the most.

The digital revolution in music has enabled people to download, store and listen to songs on a tiny, portable device called an MP3 player. The process is quick and afterwards you can have access to a library of thousands of songs that can fit into your palm. But experts say that continuously listening to loud music on these small music players can permanently damage hair cells in the inner ear, resulting in hearing loss. For instance, old-fashioned headphones have been replaced with smaller ones that fit neatly into the ear, instead of over them, which intensifies the sound. In addition to that, digital music does not distort and keeps its crystal clear sound, even on loud settings, which encourages children to crank up the volume. Combine that with the fact that many children will spend hours listening to their iPods, and you have the recipe for hearing loss. Put into further perspective, most MP3 players can reach levels of 120 decibels, which is louder than a chainsaw or lawnmower. When you consider 85 decibels is the maximum safe decibel level set by hearing experts over the course of a working day, and that children will listen to music at higher decibel levels than that for long periods of time, hearing will invariably suffer.

Apart from hearing damage, there are other serious health risks. We are living in a wireless world. Calls can be made and received on mobiles from anywhere and the internet can be accessed without the need for cables. The advantages are enormous, bringing ease and convenience to our lives. It is clear that mobiles and wireless technology are here to stay but are we paying the price for new technology? Studies have shown that the rapid expansion in the use of wireless technology has brought with it a new form of radiation called 'electropollution'.

Compared to two generations ago, we are exposed to 100 million times more radiation. The human body consists of trillions of cells which use faint electromagnetic signals to communicate with each other, so that the necessary biological and physiological changes can happen. It is a delicate, natural balance. But this balance is being upset by the constant exposure to electromagnetic radiation (EMR) that we face in our daily lives and it is playing havoc with

our bodies. EMR can disrupt and alter the way in which our cells communicate and this can result in abnormal cell behaviour. Some studies have shown that exposure to wireless technology can affect our enzyme production, immune systems, nervous system and even our moods and behaviour. The most dangerous part of the phone is around the antenna. This area emits extremely potent radiation which has been shown to cause genetic damage and an increase in the risk of cancer.

Research shows that teenagers and young adults are the largest group of mobile phone users. According to a recent Eurobarometer survey, 70 per cent of Europeans aged 12-13 own a mobile phone and the number of children five to nine years old owning mobiles has greatly increased over the years. Children are especially vulnerable because their brains and nervous systems are not as immune to attack as adults. Sir William Stewart, chairman of the National Radiological Protection Board, says there is mounting evidence to prove the harmful effects of wireless technologies and that families should monitor their children's use of them.

Besides the physical and biological damage, technology can also have serious mental implications for children. It can be the cause of severe, addictive behaviour. In one case, two children had to be admitted into a mental health clinic in Northern Spain because of their addiction to mobile phones. An average of six hours a day would be spent talking, texting and playing games on their phones. The children could not be separated from their phones and showed disturbed behaviour that was making them fail at school. They regularly deceived family members to obtain money to buy phone cards to fund their destructive habit. There have been other cases of phone addiction like this.

Technology may also be changing our brain patterns. Professor Greenfield, a top specialist in brain development, says that, thanks to technology, teenage minds are developing differently from those of previous generations. Her main concern is over computer games. She claims that living in a virtual world where actions are rewarded without needing to think about the moral implications makes young people lose awareness of who they are'. She claims that technology brings a decline in linguistic creativity.

As technology keeps moving at a rapid pace and everyone clamours for the new must have gadget of the moment, we cannot easily perceive the long-term effects on our health. Unfortunately, it is the most vulnerable members of our society that will be affected.

Question 1-5

Complete the table below

Write NO MORE THAN TWO WORDS AND/OR A NUMBER from the passage for each answer.

How MP3 players can threaten health

MP3 player features		Harmful results	Effects
Problem A	new 1..... fit inside ears	creates intense sound	
Problem B	2..... is distortion-free with clear quality sound	invites children to increase 3.....	damage to hair cells & loss of hearing
Problem C	capable of producing sound at 4.....	as loud as a lawnmower or chainsaw – over recommended safe 5.....	

Questions 6-10

Do the following statements agree with the claims of the writer in Reading Passage ? Write

YES if the statement agrees with the writer's views

NO if the statement contradicts the writer's views

NOT GIVEN if it is impossible to say what the writer thinks about this

6. There are considerable benefits to our wireless world.
7. Wireless technology is a permanent part of our lives.
8. Exposure to EMR can lead to criminal behaviour.
9. It is possible to become obsessed with technology.
10. Using technology always helps with academic success.

II. Fill in each numbered blank with a word from the list given. (10 Marks)

Write down only the number of the blank and the word that fills it.

<i>breakthrough</i>	<i>afford</i>	<i>that</i>	<i>it</i>	<i>patenting</i>
<i>outrageously</i>	<i>and</i>	<i>in</i>	<i>most</i>	<i>of</i>
<i>commercial</i>	<i>his</i>	<i>and</i>	<i>grasped</i>	<i>who</i>
<i>to</i>	<i>but</i>	<i>these</i>	<i>costly</i>	<i>if</i>

Historically, textile dyes were made from such natural sources as plants 1..... animal excretions. Some of 2....., such as the glandular mucus of snails, were difficult to obtain and 3..... expensive. Indeed, the purple colour extracted from a snail was once so 4..... that in society at the time only the rich could 5..... it. Further, natural dyes tended to be muddy 6..... hue and fade quickly. It was against this backdrop 7..... Perkin's discovery was made.

Perkin quickly 8..... that his purple solution could be used to colour fabric, thus making 9..... the world's first synthetic dye. Realising the importance of this 10....., he lost no time in 11..... it. But perhaps the 12..... fascinating of all Perkin's reactions to his find was 13..... nearly instant recognition that the new dye had 14..... possibilities.

Perkin originally named his dye Tyrian Purple, 15..... it later became commonly known as mauve (from the French for the plant used to make the colour violet). He asked advice 16..... Scottish dye works owner Robert Pullar, 17..... assured him that manufacturing the dye would be well worth it 18..... the colour remained fast (i.e. would not fade) 19..... the cost was relatively low. So, over the fierce objections of his mentor Hofmann, he left college 20..... give birth to the modern chemical industry.

III. (A) Choose the most suitable words.

(4 Marks)

They worked all night and *could / managed* to finish the report just in time.

In my country it *can / is able* to get very cold in the winter.

I was nearly late as the bus didn't come, but luckily I *could / managed* to get a taxi.

She didn't get good enough grades to go to her first choice of university but she *could / was able* to get a place at another one.

III. (B) Fill in the gaps below with the correct form of (not) have to , must, (not) need or should.

(8 Marks)

A: I'm going to Florence next week so I to buy a guidebook.

B: Ah, well, you're in luck. You buy a book because I've got a small guide to Florence I can lend you.

2. A:(you) wear a uniform at work?
- B: Yes, and I find it rather strange because I've never worn one before. When I was at school, we wear a uniform although the girls wear skirts and not trousers.
3. A: The bread's in the oven. Can you remind me to get it out in 20 minutes? I forgot like last time when I burnt the loaf.
- B: I'm sorry. I'm afraid I go now, so I won't be able to remind you. Can't you set a timer?
- A: Oh, (you/really) go? I'd hoped you'd stay to lunch and have some of my bread!

III.(C) Replace the underlined phrases with a suitable past modal phrase. (6 Marks)

The mummy of Djedmaatesankh, a young woman from the ninth century BC, lies behind a glass display in the Royal Ontario Museum. 2,800 years ago she lived in Thebes with her husband on the east bank of the river Nile. They were well-off, although as a double-income couple without children 1 it is likely they were unusual. Djedmaatesankh was a musician at the great Temple of Amun-Re at nearby Karnak, where her husband was a temple doorkeeper. 2 It is possible that their jobs at the temple provided the couple with a small wage and other benefits to supplement their main income from a piece of fertile Nile land on which 3 it is possible that they grew crops of barley, sesame, or dates.

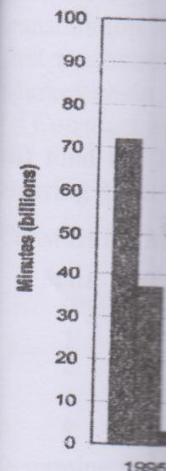
We can only guess at what Djedmaatesankh's life would have been like, and try to imagine what her problems were. 4 It is possible she was anxious about her inability to have children and certainly, as she approached her thirties, 5 it is highly likely that she worried about her health.

Looking upon a face from so long ago, a face not unlike that of any other young woman in Egypt today, ties us more personally to history. In a way that 6 was impossible for her to imagine, Djedmaatesankh has achieved a degree of fame in our 21st century, appearing in dozens of newspapers and magazines.

III.(D) Fill in the gaps with the correct form of (not) have to, ought to or must(n't) and the verbs in brackets. (12 Marks)

- Teacher: Do you think it's a good thing for young people to travel to different countries before settling down to a job?
- Student: Yes, I think it's a really exciting and interesting thing to do.
- Teacher: What 1.....(you/think) about if you're going to go travelling?
- Student: Well, you 2.....(consider) lots of things first. For example, you 3.....(have) enough money in the first place, so you 4.....(work) a bit first to save some money. Then another important thing to consider is who to go with. You 5.....(travel) with a friend, but it is probably safer and less lonely if you do. Also, you 6.....(learn) a bit about the countries before you go. It's a good idea to research cultural issues, so that you don't offend people by your behaviour. If you go to Nepal, for example, you 7.....(shout) or raise your voice in public, and you 8.....(always/walk) around a Buddhist temple in a clockwise direction. You 9.....(find out) these things before you go. What things 10.....(you/arrange) before you travel?
- Teacher: Well, to visit some countries you 11.....(have) a visa, so you 12.....(organize) that before you go.

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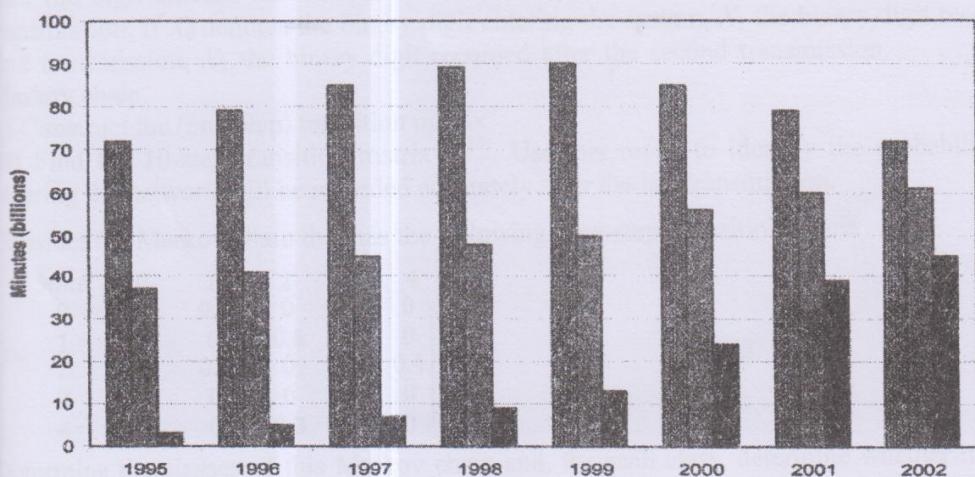
(A) The chart below shows the total number of minutes (in billions) of telephone calls in the UK, divided into three categories, from 1995-2002.

Summarise the information by selecting and reporting the main features, and make comparisons where relevant.

(8 Marks)

UK telephone calls, by category, 1995-2002

Call type:
■ Local – fixed line
■ National and International – fixed line
■ Mobiles (all calls)



(B) Describe something you did that was new or exciting.

(8 Marks)

You should write:

what you did

where and when you did this

who you shared the activity with

and explain why this activity was new or exciting for you.

(C) 1. When do people give gifts or presents in your country?

(2 Marks)

2. Do you think it's best to do new things on your own or with other people? Why?

(2 Marks)

Write about the following topic:

(20 Marks)

Learning a foreign language offers an insight into how people from other cultures think and see the world. The teaching of a foreign language should be compulsory at all primary schools.

To what extent do you agree or disagree with this view?

Give reasons for your answer and include any relevant examples from your own knowledge or experience.

Department of Higher Education
University of Computer Studies
Fifth Year (B.C.Sc. /B.C.Tech.)
Mid-Term Examination
Mathematics of Computing V (CST-501)
March, 2017
Zone IV

Answer All Questions.

Time allowed: 3 hours

Suppose that a communications network transmits binary digits, 0 or 1, where each digit is transmitted 10 times in succession. During each transmission, the probability is 0.99 that the digit entered will be transmitted accurately. In other words, the probability is 0.01 that the digit being transmitted will be recorded with the opposite value at the end of the transmission. For each transmission after the first one, the digit entered for transmission is the one that was recorded at the end of the preceding transmission. If X_0 denotes the binary digit entering the system, X_1 the binary digit recorded after the first transmission, X_2 the binary digit recorded after the second transmission, . . . , then $\{X_n\}$ is a Markov chain.

- (i) Construct the (one-step) transition matrix.
- (ii) Find the 10-step transition matrix $P^{(10)}$. Use this result to identify the probability that a digit entering the network will be recorded accurately after the last transmission.

Consider the Markov chain that has the following (one-step) transition matrix.

$$P = \begin{matrix} \text{State} & 0 & 1 & 2 & 3 & 4 \\ \begin{matrix} 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{matrix} & \begin{bmatrix} 0 & 0.8 & 0 & 0.2 & 0 \\ 0.2 & 0 & 0.5 & 0.3 & 0 \\ 0 & 0.5 & 0 & 0.1 & 0.4 \\ 0 & 0 & 0 & 1 & 0 \\ 0.3 & 0 & 0.3 & 0.4 & 0 \end{bmatrix} \end{matrix}$$

Determine the classes of this Markov chain and, for each class, determine whether it is recurrent or transient.

(12-marks)

A soap company specializes in a luxury type of bath soap. The sales of this soap fluctuate between two levels-“Low” and “High”- depending upon two factors: (1) whether they advertise, and (2) the advertising and marketing of new products being done by competitors. The second factor is out of the company’s control, but it is trying to determine what its own advertising policy should be. For example, the marketing manager’s proposal is to advertise when sales are low but not to advertise when sales are high. Advertising in any quarter of a year has its primary impact on sales in the following quarter. Therefore, at the beginning of each quarter, the needed information is available to forecast accurately whether sales will be low or high that quarter and to decide whether to advertise that quarter. The cost of advertising is \$1 million for each quarter of a year in which it is done. When advertising is done during a quarter, the probability of having high sales the next quarter is $\frac{1}{2}$ or $\frac{3}{4}$, depending upon whether the current quarter’s sales are low or high. These probabilities go down to $\frac{1}{2}$ or $\frac{1}{2}$ when advertising is not done during the current quarter. The company’s quarterly profits (excluding advertising costs) are \$4 million when sales are high but only \$2 million when sales are low. (Hereafter, use units of millions of dollars.)

- (i) Construct the (one-step) transition matrix for each of the following advertising strategies: (a) never advertise, (b) always advertise, (c) follow the marketing manager’s proposal.
- (ii) Determine the steady-state probabilities manually for each of the three cases in part (i).
- (iii) Find the long-run expected average profit (including a deduction for advertising costs) per quarter for each of the three advertising strategies in part (i). Which of these strategies is best according to this measure of performance?

(b) A video cassette recorder manufacturer is so certain of its quality control that it is offering a ~~com~~ ~~times for~~ ~~minutes~~ replacement warranty if a recorder fails within 2 years. Based upon compiled data, the company ~~noted~~ ~~that~~ ~~only~~ ~~1~~ ~~percent~~ ~~of~~ ~~its~~ ~~recorders~~ ~~fail~~ ~~during~~ ~~the~~ ~~first~~ ~~year~~, ~~whereas~~ ~~5~~ ~~percent~~ ~~of~~ ~~the~~ ~~recorders~~ ~~that~~ ~~survive~~ ~~the~~ ~~first~~ ~~year~~ ~~will~~ ~~fail~~ ~~during~~ ~~the~~ ~~second~~ ~~year~~. The warranty does not cover replacement recorders.

- (i) Formulate the evolution of the status of a recorder as a Markov chain whose states include absorption states that involve needing to honor the warranty or having the recorder survive the warranty period. Then construct the (one-step) transition matrix.
- (ii) Find the probability that the manufacturer will have to honor the warranty.

(23-~~min~~)

3. (a) Midtown Bank always has two tellers on duty. Customers arrive to receive service from a teller at a mean rate of 40 per hour. A teller requires an average of 2 minutes to serve a customer. When both tellers are busy, an arriving customer joins a single line to wait for service. Experience has shown that customers wait in line an average of 1 minute before service begins.
- (i) Describe why this is a queueing system.
- (ii) Determine the basic measures of performance— W_q , W , L_q , and L —for this queueing system.

- (b) Suppose that a queueing system has two servers, an exponential interarrival time distribution with a mean of 2 hours, and an exponential service-time distribution with a mean of 2 hours for each server. Furthermore, a customer has just arrived at 11:00 A.M.
- (i) What is the probability that the next arrival will come before 12:00 noon?
- (ii) Suppose that no additional customers arrive before 12:00 noon. Now what is the probability that the next arrival will come between 12:00 noon and 1:00 P.M.?
- (iii) What is the probability that the number of arrivals between 11:00 A.M. and 12:00 noon will be 1, and 2 or more?
- (iv) Suppose that both servers are serving customers at 12:00 noon. What is the probability that neither customer will have service completed before 12:10 P.M.?

(20-~~min~~)

4. (a) A service station has one gasoline pump. Cars wanting gasoline arrive according to a Poisson process at a mean rate of 15 per hour. However, if the pump already is being used, these potential customers may *balk* (drive on to another service station). In particular, if there are n cars already at the station, the probability that an arriving potential customer will balk is $n/3$ for $n = 1, 2, 3$. The time required to service a car has an exponential distribution with a mean of 4 minutes.
- (i) Construct the rate diagram for this queueing system.
- (ii) What is the steady-state probability distribution of the number of cars at the station?
- (iii) Find the expected waiting time (including service) for those cars that stay.
- (b) Airplanes arrive for takeoff at the runway of an airport according to a Poisson process at a mean of 20 per hour. The time required for an airplane to take off has an exponential distribution with a mean of 2 minutes, and this process must be completed before the next airplane can begin to take off. Because a brief thunderstorm has just begun, all airplanes which have not commenced takeoff have just been grounded temporarily. However, airplanes continue to arrive at the runway during the thunderstorm to await its end. Assuming steady-state operation before the thunderstorm, determine the expected number of airplanes that will be waiting to take off at the end of the thunderstorm, which lasts 30 minutes.

(15-~~min~~)

5. (a) The William Graham Entertainment Company will be opening a new box office where customers come to make ticket purchases in advance for the many entertainment events being held in the area. Simulation is being used to analyze whether to have one or two clerks on duty at the box office. By simulating the beginning of a day at the box office, the first customer arrives 5 minutes after opening, and then the interarrival times for the next four customers (in order) are 3 minutes, 9 minutes, 1 minute, and 4 minutes, after which there is a long delay until the next customer arrives. The

times for these first five customers (in order) are 8 minutes, 6 minutes, 2 minutes, 4 minutes, and 7 minutes.

- ① For the alternative of a single clerk, plot a graph that shows the evolution of the number of customers at the box office over this period.
 - ② Use this figure to estimate the usual measures of performance— L , L_q , W , W_q , and the P_n for this queuing system.

Consider the M/M/1 queueing theory model. Suppose that the mean arrival rate is 5 per hour, the mean service rate is 10 per hour. Starting with the system empty, use next-event incrementing to perform the simulation by hand until two service completions have occurred. Obtaining uniform random numbers as instructed at the end of the question No 5.

Use the mixed congruential method to generate a sequence of five *two-digit* random integer numbers such that $x_{n+1} \equiv (15x_n + 19) \pmod{52}$ and $x_0=46$. Convert these random integer numbers to uniform random numbers as closely as possible.

Obtaining uniform random numbers as instructed at the end of the question No.5. Use the acceptance-rejection method to generate three random observations from the triangular distribution having the probability density function

$$f(x) = \begin{cases} x & \text{if } 0 \leq x \leq 1 \\ 1 - (x - 1) & \text{if } 1 \leq x \leq 2 \\ 0 & \text{otherwise.} \end{cases}$$

(30-marks)

The sequence of uniform random numbers is used 0.096, 0.569, 0.665, 0.764, 0.842, 0.492, 0.224, 0.950, 0.610, 0.145, 0.484, 0.552, 0.350, 0.590, 0.430, 0.041 for No.5 (b), (d).}

• **Remote Action:** Inception allows us to exert an influence on an object running in another process.

10) Choose either of the last alternative in the following questions (10 marks)

here customers are held in the box office. The process has failed to meet any of the following requirements: A. Absent time failure, B. Omission failure, C. Failure to justify, D. Failure to include all relevant information, E. Omission failure, F. Timing failure, G. Planning failure.

**Department of Higher Education
University of Computer Studies
Fifth Year (B.C.Sc./B.C.Tech.)**

**Mid Term Examination
Distributed Computing System (CST-502)**

March, 2017

Zone IV

Answer all questions

Time allowed: 3 hours

1. (a) State whether the following statements are **TRUE** or **FALSE**. (10 marks)

1. The harnessing of many small devices' computational behavior will be transparently and intimately tied up with their physical function.
2. In Domain Name System, the name table was kept in many master file that could be downloaded to any computers that needed it.
3. In Distributed Systems, networking has become a pervasive resource and devices can be connected at any time and in any place.
4. Resource sharing can be achieved more efficiently between threads than between processes because threads share an execution environment.
5. The purpose of caches is to be shared by several clients and increase the availability and performance of the services by reducing the load on the wide area network and web servers.
6. If the two processes read their clocks at the same time, their local clocks may supply same time values.
7. A network operating system that produces a single system image like this for all the resources in a distributed system.
8. Remote Method Invocation allows an object to invoke on an object running in another Java Virtual Machine.
9. Switching between threads sharing the same execution environment entirely at kernel level involves no domain transition and is relatively cheap.
10. Java RMI is a multi-language solution allowing objects written in a variety of languages to interoperate.

- (b) Choose **correct** or the **best alternative** in the following: (10 marks)

1. CORBA provides (A. Remote method invocation, B. Remote object invocation, C. Remote procedure call) which allows an object in a program running on one computer to invoke a method of an object on another computer.
2. Web resource names of URLs that include the domain names of computers prevent (A. Access transparency, B. Replication transparency, C. Failure transparency).
3. A process has halted and will not execute any further steps of its program ever when it suffers (A. Byzantine failure, B. Omission failure, C. Timing failure).

4. (A. Web server, B. Search engine, C. Web crawlers) enable users to look up summaries of information available on web pages at sites throughout the Internet.
5. (A. Middleware, B. TCP, C. UDP) provides some error detection and correction, but it cannot recover from major network interruptions when a user attempts to transfer a very large file over a potentially unreliable network.
6. Standard (A. UDP, B. Request reply protocol, C. TCP) implementations have been found to work poorly over wireless networking media which tend to exhibit higher rates of packet loss than wired media.
7. A (A. monolithic kernel, B. microkernel, C. kernel code) can contain some server processes that execute within its address space, including file servers and some networking.
8. Remote Procedure Call provides a (an) (A. stub, B. identifier, C. name) on the client side, a separate one for each remote procedure.
9. Remote Method Invocation (A. allows a thread to invoke a method on a remote object, B. allows a thread to invoke memory on a remote object, C. allows a process to invoke a method on a remote object).
10. An exception (A. catch, B. throw, C. garbage collection) may be defined, whenever particular unexpected conditions or error arise.

2. (a) Define **Any Four** of the following: (8 marks)

- (i) Null RPC
- (ii) Thin Client
- (iii) Service Interface
- (iv) Bandwidth
- (v) Application Server
- (vi) Computer Supported Cooperative Working (CSCW)

(b) Difference between **Any Three** of the following: (12 marks)

- (i) Mobile and Ubiquitous computing
- (ii) At-least-once semantic and At-most-once semantic
- (iii) Validity and Integrity
- (iv) Activation and Deactivation
- (v) Thread synchronization and Thread scheduling

3. (a) (i) Explain the ability to work well when there is a significant increase in the number of resource and the number of users.

(ii) Which significant consequences have the definition of distributed system?

(b) Compare and contrast cloud computing with more traditional client-server computing. What is novel about cloud computing as a concept?

(c) Describe how processes can communicate with each other and how threads communicate with each other. (20marks)

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ed, whenever
(8 marks)
4. (a) (i) Describe the three types of models that are intended to provide a relevant aspect of distributed system design.
(ii) How to store of the recently used data objects for a cache and proxy?
(b) A search engine is a web server that responds to client requests to search in its stored indexes and (concurrently) runs several web crawler tasks to build and update the indexes. What are the requirements for synchronization between these concurrent activities?
(c) When a remote object is to be passed for the first time, the module is asked to create a remote object reference, describe what to do remote object reference. **(20marks)**
5. (a) (i) Which main components may happen delay for remote invocation, besides network transmission times? Explain detail.
(ii) How to apply the optimization region copying when one or another process attempt to modify a page?
(b) What is components and which types of interface are specified in terms of a contract?
(c) Describe one important difference for two leading examples of distributed object middleware with reasons. **(20marks)**

(12 marks)

**Department of Higher Education
University of Computer Studies
Fifth Year (B.C.Sc)
Mid Term Examination
Information Security and Assurance (CS-503)
March, 2017
Zone IV**

Answer all questions.

Time allowed: 3 hours

- I. Which of the following are True/False: (10 Marks)
1. The value of information is one of the demand drivers for information security professionals.
 2. A very small fraction of the threats will cause real damage to the organization.
 3. An information asset is a digitally stored content owned by an individual or organization.
 4. Partners include any third party sharing a business relationship with the organization.
 5. A good key should be difficult to guess.
 6. An individual relationship to the organization is referred to as their role of affiliation.
 7. Passphrase is sequence of words that serves as a password.
 8. Logs are records of the performance of a machine.
 9. The security file is largely a repository of login and logout attempts by default.
 10. Policies also provide roadmaps for new employees and users.

- II. Match the relevant information. (10 Marks)

List A

- (1) Integrity
- (2) Zero-day exploit
- (3) Legal assets
- (4) Vulnerabilities
- (5) Block encryption
- (6) Tokens
- (7) Perimeter firewall
- (8) Recovery point
- (9) utmp file
- (10) Information classification

List B

- (a) the contractual arrangements that guide the use of hardware and software assets within the organization.
- (b) as weaknesses in information systems that give threats the opportunity to compromise assets.
- (c) guarding against improper information modification or destruction.

- (d) physical objects that must be presented to prove the user's identity.
- (e) indicates who is logged in to the system at the present moment.
- (f) when the computer is turned back to the owner for normal operations.
- (g) the process of converting a plaintext block into an encrypted block.
- (h) the policy which outlines the definition of criticality and sensitivity of the asset.
- (i) exploit compromises a previously unknown vulnerability in computer software.
- (j) the firewall that lies between the external network and the organization.

III. Choose the **correct** answer.

(20 Marks)

- (1) Windows 95/98: Microsoft released Windows 95 on -----, 1995.
 - (a) August 14
 - (b) August 27
 - (c) August 24
- (2) ----- virus: on May 5, 2000, this virus was released by a student in the Philippines.
 - (a) I LOVE YOU
 - (b) Trojan Horse
 - (c) Y2K
- (3) ----- controls are the security measures built into the information system itself.
 - (a) Physical
 - (b) Technical
 - (c) Procedural
- (4) In most organization, system administrators take on the bulk of the ----- of maintain information security.
 - (a) responsibilities
 - (b) reliabilities
 - (c) creativities
- (5) Vision statements speak only to ----- and communicate the values and beliefs of the organization.
 - (a) customer
 - (b) employee
 - (c) user
- (6) ----- assets are also documented from the perspective of disaster response.
 - (a) Information
 - (b) Personal
 - (c) Legal
- (7) A ----- action involves the tangible or palpable aspect of an asset.
 - (a) physical
 - (b) social
 - (c) internal
- (8) Data entry errors are unfortunately common, but particularly dangerous in the ----- area.
 - (a) Environment
 - (b) Health
 - (c) Network
- (9) A key is a ----- of symbols that control the operations of encipherment and decipherment.
 - (a) series
 - (b) sequence
 - (c) array
- (10) The process of dividing a message into blocks and encrypting each block separately is known as -----.
 - (a) CBC
 - (b) CBE
 - (c) ECB
- (11) ----- based tokens are complex algorithms to generate a series of passwords.
 - (a) Time
 - (b) Sequence
 - (c) Hardware
- (12) Observable physical differences among people are called ----- markers.
 - (a) biometric
 - (b) collective
 - (c) symmetric
- (13) A personal identification number is a short 4-6 digits, ----- password.
 - (a) symbol
 - (b) digital
 - (c) numerical
- (14) A password policy is a set of ----- for using passwords.
 - (a) rule
 - (b) technique
 - (c) methods

- (15) B
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- (18) Tim
- (a)
- (19) A
- (a)
- (20) KS
- (a)

- IV. Define A
1. Conf
 2. Threa
 3. Proce
 4. Malw
 5. Top-d
 6. Requi
 7. SQL i
 8. Hash f
 9. Identit
 10. Passw
 11. Incide
 12. Warni
 13. Priority
 14. Policy
 15. Kerber

- V. (a) (i) Wha
- (ii) Wha
- (b) How is j

- VI. (a) Name an
- (b) One tra
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- the asset
software.
L
- (20 Marks)**
- student in the
n system itself.
he _____ of
les and beliefs of
response.
us in the _____
ncipherment and
block separately
of passwords.
markers.
ssword.
- (15) Business ----- Analysis is the identification of services and products that are critical to the organization.
(a) Image (b) Impact (c) Index
(16) Technical members of the ----- are selected depending on the threat action.
(a) ISP (b) PII (c) IRT
(17) System ----- use logging information on to do performance analysis on the production instance of the application.
(a) developers (b) administrators (c) viewers
(18) Timelines are essential part of the ----- process.
(a) analysis (b) design (c) software
(19) A popular term used in IT policies is ----- resources.
(a) data (b) information (c) human
(20) KSU's policy is an ----- example of an Incident Management Policy.
(a) actual (b) excellent (c) essential

IV. Define Any Ten of the followings:

(20 Marks)

1. Confidentiality
2. Thread
3. Procedural vulnerability
4. Malware
5. Top-down approach
6. Required asset
7. SQL injection attack
8. Hash functions
9. Identity management
10. Password capturing
11. Incident response policy
12. Warning
13. Priority
14. Policy
15. Kerberos

- (a) (i) What is an incident response policy? Why is it useful? **(5 Marks)**
(ii) What is an incident timeline? Why is it useful? **(5 Marks)**
(b) How is public key cryptography used to provide digital signature? **(10 Marks)**

- I. (a) Name and briefly describe three advantages and disadvantages to single sign-on.

(10 Marks)

- (b) One traditional military constraint based on the Geneva conventions and the UN Charter is called proportionality, the idea that a punishment should be fit the crime. Given the risks of cyber-attacks identified in the earlier questions, do you think cyber-attacks are more likely to cause disproportional harm to civilians than conventional weapons? **(10 Marks)**

Department of Higher Education
University of Computer Studies

Fifth Year (B.C.Sc.)

Mid Term Examination

Computing Applied Algorithm (CS-504)

March, 2017

Zone IV

Answer all questions

Time allowed: 3 hours

Answer Any Five of the following:

(10 marks)

- (i). Binary search tree
- (ii). Minimum-cost spanning tree
- (iii). Biconnectivity
- (iv). Parallel computer
- (v). Four classes of shared-memory SIMD Computers
- (vi). Cube connection network
- (vii). Running time

(a) (i). Build the binary search tree for the following reserved word strings:

“for”, “char”, “class”, “new”, “if”, “public”, “break”, “else”, “do”, “package”.

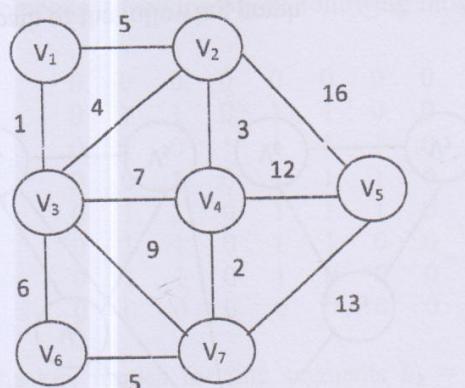
(ii). Insert two words “byte” and “import” into this binary search tree.

(iii). Delete the words “char” and “public” from the binary search tree. (9 marks)

(b) Describe the dynamic programming algorithm to compute roots of optimal subtrees.

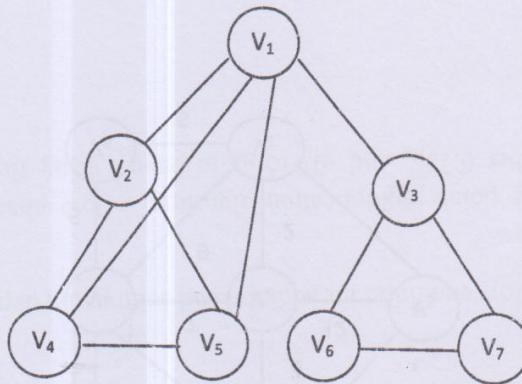
(6 marks)

(a) Find the minimum-cost spanning tree for the following graph. (8 marks)



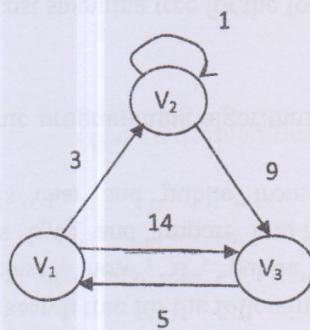
(b) Find the depth-first spanning tree of the following graph.

(10 marks)



(c) Find the shortest-path of the following graph.

(12 marks)



4. (a) Describe the TWO-SEQUENCE MEDIAN algorithm and analysis the complexity of this algorithm for finding median of two sorted sequences. (10 marks)

(b) According to CREW MERGE algorithm, merge the following two sequences with the number of processors $N = 4$.

$$A = \{10, 11, 12, 15, 19, 20, 23, 24, 28, 29, 32, 33\}$$

$$B = \{13, 14, 16, 17, 18, 21, 22, 25, 26, 27, 30, 31\}$$

(10 marks)

5. (a) Sort the input sequence $S = \{8, 9, 7, 8, 6\}$ by using CRCW SORT algorithm. How many processors are used in this algorithm? (10 marks)

(b) Sort the input sequence $S = \{7, 20, 13, 9, 15, 8, 11, 19, 10, 16, 14, 5, 17, 12, 18, 6\}$ by using CREW SORT, the number of processors is $N = 4$. (8 marks)

(c) Describe the EREW SORT algorithm. (7 marks)

Department of Higher Education

University of Computer Studies

Fifth Year (B.C.Sc.)

Mid Term Examination

Advanced Artificial Intelligence (CS-504)

March, 2017

Zone IV

Time allowed: 3 hours

Answer all questions.

Answer the followings.

(30 marks)

- (a) Describe three possible sources of complexity for Forward Chaining.
- (b) Discuss the basic syntactic elements of First Order Logic with examples.
- (c) Describe a comparison between declarative and procedural extremes in agent design.
- (d) Decide whether the following sentence is valid, unsatisfiable and satisfiable by using truth table.
 $(\text{Smoke} \Rightarrow \text{Fire}) \Rightarrow (\text{Smoke} \Rightarrow \neg \text{Fire})$
- (e) Are they valid? If not explain why they are not valid.
 - i. $\forall x \neg \text{Likes}(x, \text{Broccoli}) \Leftrightarrow \neg \exists x \text{ Likes}(x, \text{Broccoli})$
 - ii. $\forall x \text{ Bunny}(x) \Rightarrow \text{Cute}(x)$
 - iii. $\forall x [\text{Crown}(x) \vee (\exists x \text{ Brother}(\text{Richard}, x))]$
- (f) Consider a vocabulary with only three propositions A, B and C. How many models are there for the following sentence?
 $(A \vee B) \wedge (\neg B \vee C) \Rightarrow (A \vee C)$

- (a) We have defined four different binary logical connectives. (20 marks)

- i. Are there any others that might be useful?
- ii. How many binary connectives can there be?
- iii. Why are some of them not very useful?

- (b) Assume that a knowledge base contains the following rules;

$\text{Clever} \Rightarrow \neg \text{Worried}$

$\text{Stupid} \Rightarrow \text{Scared}$

$\neg \text{Clever} \Rightarrow \text{Stupid}$

Use Resolution strategy to prove KB entailed ($\text{Worried} \Rightarrow \text{Scared}$)

- (c) Draw the corresponding AND -OR graph by using Forward Chaining for the following Knowledge base of Horn clauses.

$Y \Rightarrow Z$

$X \wedge W \Rightarrow Y$

$X \wedge S \Rightarrow W$

$Y \wedge R \Rightarrow X$

$R \wedge S \Rightarrow X$

S

R

(d) Show that $A \Rightarrow (P \vee C) \Leftrightarrow (A \wedge \neg P) \Rightarrow C$ by using standard logical equivalent rules.

3. (a) Write the axioms describing the predicates GrandParent , BrotherInLaw ,Son, FirstCousin and n^{th} Cousin. (5 marks)

(b) Represent the following sentences in First Order Logic. (10 marks)

- i. Every student who studies Artificial Intelligent passes the exam.
- ii. The empty set has no elements adjoined into it.
- iii. Only those trees that are tall have long roots.
- iv. A sibling is another child of one's parents.
- v. There are exactly two purple mushrooms.

4. (a) Briefly explain why NLP is difficult using example. (15 marks)

(b) Explain the use of Hidden Markov Model in part of speech tagging task.

(c) Suppose we build a N-gram language model that make use of a second-order Markov assumption. Provide the equations used to build the language model and calculate the Maximum Likelihood Estimation (MLE) from a training corpus. (Be sure to define all variable in equation and use clear notation.)

5. Using the following mini corpus and its bi-gram language model, calculate Maximum Likelihood Estimation (MLE) and Expected Likelihood Estimation (ELE) use Lidstone's Law with $\lambda = 0.5$ for test sentence " Cher read Moby Dick". Here Vocabulary size is $|V|=11$.

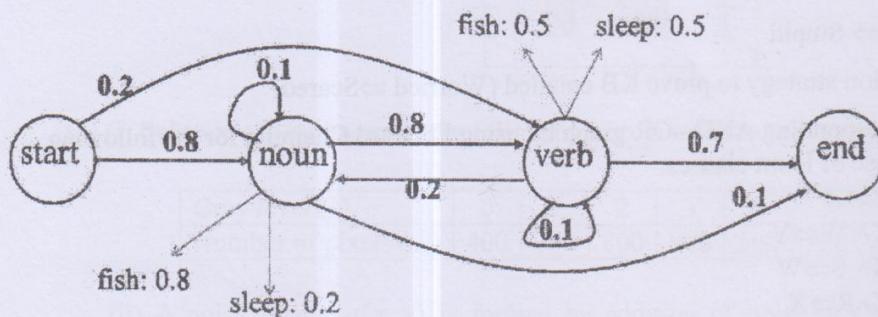
<s> John read Moby Dick</s>

<s> Mary read a different book</s>

<s> She read a book by Cher</s>

(10 marks)

6. Suppose a language consists of two words: "fish" and "sleep" and two possible part of speech tags, noun and verb. In our training corpus, the word "fish" appears 8 times as a noun, 5 times as a verb, and the word "sleep" appears twice as a noun and 5 times as a verb. Using the following Hidden Markov Model, as a special case of Viterbi Algorithm or Bayesian inference tag the sentence "fish sleep".



(10 marks)

Answer ALL

1. (a) List the cr

(b) Write an a

(c) What is t

padding f

(i) 1000 b

(ii) 3000 l

(iii) 1000

2. (a) Compare

(b) Write tw

the verifi

(c) List and

result of

x= 1324

y= 1434

z= 1544

3. (a) List the c

(b) In the Di

(i) Wha

(ii) Wha

(iii) Wh

**Department of Higher Education
University of Computer Studies
Fifth Year (B.C.Sc.)**

Mid Term Examination

Computer Vision and Interactive Computer Graphics (CS-504)

March, 2017

Zone IV

Answer all questions

Time allowed: 3 hours

Define **ANY FIVE** of the following terms: (10 marks)

- | | | |
|-------------------|----------------------------|-------------------------|
| (i) Purity | (ii) Region growing | (iii) Feature |
| (iv) Chromaticity | (v) Perspective projection | (vi) Computer animation |

Describe **ANY FOUR** of the following:

(16 marks)

- (i) Differences between Scene description and Action specification in an animation specification
 - (ii) Differences between Visible Line and Surface Identification
 - (iii) Differences between Shades, Tints and Tones of the color
 - (iv) Differences between Three-Dimensional and Stereoscopic Views
 - (v) Differences between 8-connectivity and m-connectivity

Answer the following:

(20 marks)

- answer the following.

 - (a) Why is depth information important in displaying objects? What are the different ways to represent the solid objects with depth cueing?
 - (b) Write short note on RGB color model.
 - (c) What are the steps involved in designing animation sequence? Explain any two of these.
 - (d) List and explain main steps in edge detection.

(a) Perform connected component labeling of the following binary image using 4-connectivity and 8-connectivity. (8 marks)

0	0	0	0	0	0	0	0
0	1	1	0	1	1	0	0
0	1	0	1	1	1	1	0
0	0	1	0	1	1	1	0
0	1	1	0	1	1	1	0
0	1	1	0	1	1	0	0
0	1	1	0	1	0	0	0
0	0	0	0	0	0	0	0

(b) How to equalize the key frames for line segments $L_k = 15$ and $L_{k+1} = 11$ in term of equalizing edge count by describing the equations and preprocessing rule which are used in this equalization? (8 marks)

5. (a) Consider the image segment shown below. For $V = \{0, 1, 2\}$ compute the lengths of the shortest 4-, 8-, and m-path between p and q . If a particular path does not exist between these two points, explain why. (6 marks)

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

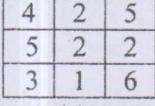
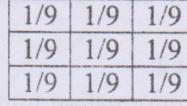
Answer

1. Answer

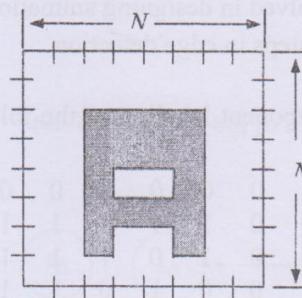
- (b) (i) Perform gray level slicing on the 8-bits image shown below by using two approaches: background intensity changing and background intensity preserving. The specified range of gray levels $[A, B]$ is [125, 155]. (4 marks)

121	205	217	156	151
139	127	157	117	125
252	117	236	138	142
227	153	178	197	242
201	106	129	251	240

- (ii) Filter the 3x3 image in (a) by using box filter of size 3x3 in (b). (8 marks)

	
(a)	(b)

6. (a) Segment the image shown below using the split and merge procedure. Let $P(R_1) = 1$. We have all pixels in R_1 have the same intensity. Show the quadtree corresponding to your segmentation. (6 marks)



- (b) (i) Enhance a 3-bit image of the following histogram data by histogram equalization. (7 marks)

Gray level (k)	0	1	2	3	4	5	6	7
Number of pixels (n_k)	400	700	800	900	500	400	196	200

- (ii) A noisy image $g(x, y)$ is formed by addition of noise $\eta(x, y)$ to an original image $f(x, y)$, where the noise has zero average value and it is uncorrelated at every pixel coordinates. If an image $\bar{g}(x, y)$ is formed by averaging K different noisy images, then show that the expected value of \bar{g} , $E\{\bar{g}(x, y)\}$ is equal to the original image $f(x, y)$. (7 marks)

**Department of Higher Education
University of Computer Studies
Fifth Year (B.C.Sc)
First Term Examination
CS-505 (Data Mining)
March, 2017
Zone IV**

Answer all questions.

Time Allowed: 3 hours

I. Choose the Correct Answer.

(20marks)

1. In data mining tasks, the attribute to be predicted is commonly known as the ----- variable.
(a) dependent (b) explanatory (c) independent
2. Descriptive data mining tasks are often exploratory in nature and frequently require ----- techniques to validate and explain the results.
(a) preprocessing (b) postprocessing (c) mining
3. In predictive modeling, regression is used for ----- target variables.
(a) discrete (b) continuous (c) discrete and continuous
4. The goal of the predictive modeling tasks is to learn a model that minimizes the error between the predicted and true values of the ----- variable.
(a) target (b) explanatory (c) independent
5. A data set can often be viewed as a collection of -----.
(a) samples (b) variable (c) feature
6. Data objects are described by a number of ----- that capture the basic characteristics of an object.
(a) attributes (b) points (c) vectors
7. Ordinal attribute is referred to as ----- attribute.
(a) numeric (b) quantitative (c) qualitative
8. Asymmetric ----- attribute is particularly important for association analysis.
(a) discrete (b) continuous (c) binary
9. ----- data also referred to as temporal data, where each record has a time associated with it.
(a) Sequence (b) Spatial (c) Sequential

10. Time series data is a special type of ----- data in which each record is a time series.
(a) sequence (b) sequential (c) spatial
11. ----- is the closeness of measurements to the true value of the quantity being measured.
(a) Bias (b) Accuracy (c) Precision
12. ----- is the combining of two or more objects into a single object.
(a) Sampling (b) Aggregation (c) Transformation
13. ----- is a commonly used approach for selecting a subset of the data objects to be analyzed.
(a) Aggregation (b) Sampling (c) Normalization
14. A ----- is typically used with categorical attribute that have a relatively small number of value.
(a) pie chart (b) box plot (c) scatter plot
15. ----- error is the expected error of the model on previously unseen records.
(a) Generalization (b) Training (c) Apparent
16. In the ----- method for evaluating the classifier performance, the original data with labeled examples is partitioned into two disjoint sets, called the training and the test sets.
(a) holdout (b) cross-validation (c) bootstrap
17. In association analysis, a collection of zero or more items is termed -----.
(a) support count (b) an itemset (c) confidence
18. A----- itemset is defined as a frequent itemset for which none of its immediate supersets are frequent.
(a) closed (b) maximal frequent (c) closed frequent
19. K-means is a -----, partitional clustering technique.
(a) prototype-based (b) graph-based (c) density-based
20. DBSCAN is a -----, partitional clustering technique.
(a) graph-based (b) density-based (c) prototype-based

- II. (a)** There are three standard approaches to feature subset selection. Explain about these approaches. (6marks)
- (b)** Discuss the data cubes related operations in multidimensional data analysis techniques. (6marks)

(c) For the f

- i. $x = 0$
- ii. $x = 1$
- iii. $x = 2$
- iv. $x = 3$

(d) Given th

Compute

III. (a) What is

(b) Discuss
inducti

(c) Consider

- i. Com
- ii. Com
- iii. Com
- iv. Com
- v. Whi

(c) For the following vectors, x and y , calculate the indicated measures.

- | | |
|---|---------------------|
| i. $x = (22, 1, 42, 10)$, $y = (20, 0, 36, 8)$ | Euclidean Distance |
| ii. $x = (22, 1, 42, 10)$, $y = (20, 0, 36, 8)$ | City Block Distance |
| iii. $x = (1,0,1,0,0,0,1)$, $y = (1,0,0,0,0,1,1)$ | Jaccard Similarity |
| iv. $x = (3,2,0,4,0,2,0,3)$, $y = (4,0,0,3,0,1,0,2)$ | Cosine Similarity |
- (4marks)

(d) Given the following measurements for the attribute age;

18, 22, 25, 42, 28, 43, 33, 35, 56, 28

Compute the *mean*, *variance* and *standard deviation*. (4marks)

III. (a) What is model overfitting? List the potential causes of model overfitting. (5 marks)

(b) Discuss about how to handle model overfitting in the context of decision tree induction. (5marks)

(c) Consider the training examples shown in Table 1 for a binary classification problem.

i. Compute the Gini index for the overall collection of training examples.

ii. Compute the Gini index for the **Student** attribute.

iii. Compute the Gini index for the **Age** attribute using multiway split.

iv. Compute the Gini index for the **Income** attribute using multiway split.

v. Which attribute is better, Student, Age, or Income? (10marks)

Table 1 Data set for problem III(c)

ID	Student	Age	Income	Class
1	Y	Youth	Low	C1
2	Y	Middle	Medium	C1
3	Y	Middle	Medium	C1
4	Y	Middle	High	C1
5	Y	Middle	VeryHigh	C1
6	Y	Middle	VeryHigh	C1
7	N	Middle	Low	C1
8	N	Middle	Low	C1
9	N	Middle	Medium	C1
10	N	Senior	High	C1
11	Y	Youth	High	C0
12	Y	Youth	VeryHigh	C0
13	Y	Youth	Medium	C0
14	Y	Senior	VeryHigh	C0
15	N	Senior	Low	C0
16	N	Senior	Low	C0
17	N	Senior	Medium	C0
18	N	Senior	Medium	C0
19	N	Senior	Medium	C0
20	N	Senior	High	C0

of the techniques.
laimant correctly
(8 marks)

following:
(6 marks)

Answer all Questions

**Department of Higher Education
University of Computer Studies**

Fifth Year (B.C.Sc)
Mid Term Examination
Web Engineering (CS-505)
March, 2017
Zone IV

Time allowed: 3 hours

Fill in the blanks. (7 marks)

- (a) For WebApp, there are three main types users:, registered user and registered homeowners.
- (b) An interaction model can be composed of one or more of the sequence diagrams,, state diagrams and/or user interface prototypes.
- (c) In early days, most people created computer programs using information,, intuition, and art.
- (d) The conversation between user and a Web application can be a or active.
- (e) WebE actions of Modeling are and design.
- (f) An analysis class encompasses that describe it and that effect behavior required of the class.

Choose the correct answer. (23 marks)

1. The communication activity is comprised of three actions:
(a) formulation, elicitation, and negotiation (b) research, definition, and action
(c) listening, teaching, and prototyping (d) none of the above
2. An umbrella activity
(a) shields the project when problems arise (b) is deployed only on a "rainy day"
(c) occurs throughout a WebE project (d) none of the above
3. Which of the following is not a deployment task:
(a) deliver the WebApp increment to a server (b) test navigation
(c) establish an online feedback mechanism (d) evaluate end-user interaction
4. Most WebApp projects encountered realities:
(a) requirements evolve over time (b) changes will occur frequently
(c) time lines are short (d) all of the above
5. Which framework activity serves as the entry point for the WebE process flow:
(a) deployment (b) planning (c) communication (d) modeling

6. Which of the following is not a stakeholder:
(a) business manager (b) end user
(c) Web developer (d) all of the above

7. The intent of elicitation is to
(a) gather requirements from all stakeholders (b) identify security technologies
(c) define the tools to construct the WebApp (d) all of the above

8. Which of the following signs indicate that a WebApp project is in trouble?
(a) changes are managed poorly (b) the chosen technology changes
(c) deadlines are unrealistic (d) all of the above

9. One of the outputs of analysis modeling is a
(a) content model (b) stakeholder model
(c) interface design model (d) user guide

10. Which of the following guidelines is not part of a team walkthrough
(a) set an agenda (b) prepare in advance
(c) question the producer aggressively about possible errors (d) take written notes

11. Which of the following is not a design goal for WebApps:
(a) consistency (b) navigability (c) complexity (d) identity

12. In managing changes for WebApps, changes are categorized into how many classes?
(a) 5 (b) 4 (c) 3 (d) 2

13. Any WebApp can be begun as a simple informational site and evolve into another category over time.
(a) True (b) False

14. A WebE team should produce only those work products that will serve as a foundation for work to be conducted in subsequent tasks.
(a) True (b) False

15. It is reasonable to state that the communication activity is iterative in nature.
(a) True (b) False

16. The construction activity incorporates both code generation and testing.
(a) True (b) False

17. Negotiation is something you should use to gain a significant advantage over the people you're negotiating with.
(a) True (b) False

18. A stakeholder is being
19. In order to
20. It is always
21. A design
 complete
22. Any Web
 over time
23. In the course
 physical
III. Answer the following questions
(a) Define Web
(b) List out the
(c) What technologies
(d) Define Web
(e) What do you
(f) Discuss problems

7. Define Web Application. Explain categories of Web Application. (10 marks)

7. Explain WebE activities that are part of a generic framework. (10 marks)

I. What is the purpose of using WebE process framework? Discuss Umbrella activities.
(OR)
Discuss about input to analysis modeling and output models from it? (10 marks)

I. Differentiate analysis and design. What are the structural elements of content model?
(OR)
Explain Web Application quality. (10 marks)

Department of Higher Education
University of Computer Studies
Final Year (B.C.Tech.)
Mid Term Examination
Computer Organization and Design (CT-503)
Zone IV
March, 2017

Answer all questions.

Time allowed: 3 hours

- (a) Write the short notes on the following:
(i) Embedded Computer
(ii) Server
(iii) Compiler
(iv) System Software
(v) Supercomputer
(vi) machine language (6 marks)
- (b) Consider three different processors P1, P2, and P3 executing the same instruction set with the clock rates and CPIs given in the following table. (10 marks)

Processor	Clock Rate	CPI
P1	3 GHz	1.5
P2	2.5 GHz	1.0
P3	4 GHz	2.2

- (i) What is the performance of each processor expressed in instructions per second?
(ii) If the processors each execute a program in 10 seconds, find the number of cycles and the number of instructions.
(iii) We are trying to reduce the time by 30% but this leads to an increase of 20% in the CPI. What clock rate should we have to get this time reduction?
- (a) A favorite program runs in 10 seconds on computer A, which has a 2 GHz clock. We are trying to help a computer designer build a computer, B, which will run this program in 6 seconds. The designer has determined that a substantial increase in the clock rate is possible, but this increase will affect the rest of the CPU design, causing computer B to require 1.2 times as many clock cycles as computer A for this program. What clock rate should we tell the designer to target? (8 marks)
- (b) Discuss about the five MIPS addressing modes. (8 marks)
- (a) What is the MIPS assembly code for the following C segment?
while (save[i] == k)
i += 1;
Assume that i and k correspond to registers \$s3 and \$s5 and the base of the array save is in \$s6. (6 marks)

- 3.(b) What is the corresponding MIPS machine code for this MIPS assembly codes. (10 marks)
- (i) add \$s1,\$s2,\$s3 (ii) sw \$s1,100(\$s2) (iii) sll \$s1,\$s2,10
 (iv) beq \$s1,\$s2,100 (v) j 1000

- 4.(a) What is the MIPS assembly code for the following C procedure that calculates factorial? (10 marks)

```
int fact (int n)
{
  If (n<1) return (1);
  else return (n * fact (n-1));
}
```

Assume that parameter variables n corresponds to the argument register \$a0. (8 marks)

- 4.(b) Compare the following C codes with Array Version and Pointer Version of clear in MIPS assuming that, two parameters "array" and "size" are found in the register \$a0 and \$a1. Allocate i and p to register \$t0. (8 marks)

```
clear1 (int array[ ], int size)
{
  int i;
  for (i = 0; i < size ; i +=1)
    array[i]=0;
}

clear2 (int *array, int size)
{
  int *p;
  for (p = &array[0]; p < &array[size]; p= p+1)
    *p = 0;
}
```

- 5.(a) Show the IEEE 754 binary representation of the number -0.625_{10} in single and double precision. (8 marks)

- 5.(b) (i) Compare the first version and improved version of division hardware with diagram.
 (ii) Using the 4-bit version of the algorithm to save pages, let's try dividing 10_{10} by 3_{10} . (10 marks)

- 6.(a) Describe the overflow condition for addition and subtraction depend on the operands. (4 marks)

- 6.(b) Draw the floating point multiplication algorithm flow chart and use this algorithm to multiply the number 0.75_{10} and -0.375_{10} in binary using floating point multiplication algorithm. (14 marks)

Answer all

1. Answer Any 7
 (i). Binary search
 (ii). Minimum spanning tree
 (iii). Biconnected components
 (iv). Parallel algorithm
 (v). Four color theorem
 (vi). Cube coloring
 (vii). Running time of an algorithm

2. (a) (i). Build the tree using "while" loop
 "for", "do-while", "switch"
 (ii). Insert the node
 (iii). Delete the node

(b) Describe the algorithm

3. (a) Find the minimum of the function

Department of Higher Education

University of Computer Studies

Final Year (B.C.Tech.)

Mid Term Examination

Network Security (CT-504)

Zone-IV

March, 2017

Answer ALL questions.

Time allowed: 3 hours

(15 marks)

1. (a) List the criteria for a cryptographic hash function and define the second criterion. (6 marks)
(b) Write an algorithm in pseudocode for CMAC. (6 marks)
(c) What is the length of the block size and message digest size in SHA-512? What is the padding for SHA-512 if the length of the message is:
(i) 1000 bits
(ii) 3000 bits
(iii) 10000 bits (8 marks)

(10 marks)

2. (a) Compare and contrast a conventional signature and a digital signature. (6 marks)
(b) Write two algorithms for the Schnorr scheme: one for the signing process and one for the verifying process. (6 marks)
(c) List and define three kinds of identification witnesses in entity authentication. Find the result of Conditional (x,y,z) if
 $x = 1324\ 5678\ ABCD\ 2345\ 3456\ 5678\ ABCD\ 2468$
 $y = 1434\ 5678\ ABCD\ 2345\ 3456\ 5678\ ABCD\ 2468$
 $z = 1544\ 5678\ ABCD\ 2345\ 3456\ 5678\ ABCD\ 2468$ (8 marks)

(10 marks)

3. (a) List the duties of a KDC. (6 marks)
(b) In the Diffie-Hellman protocol, $g=7$, $p=71$, $x=2$ and $y=5$
(i) What is the value of $R1$ and $R2$?
(ii) What is the value of the symmetric key?
(iii) What is the attack on Diffie-Hellman protocol? (6 marks)

(c) Define biometrics and distinguish between two the broad categories of the techniques.

In the Fiat-Shamir protocol, what is the probability that a dishonest claimant correctly responds to the challenge 20 times in a row? (8 marks)

4. (a) Name seven types of packets and three types of messages used in PGP. (6 marks)

(b) What is the length of the key material if the cipher suite is one of the following:

- (i) SSL_RSA_WITH_NULL_MD5
- (ii) SSL_RSA_WITH_NULL_SHA
- (iii) TLS_RSA_WITH_DES_CBC_SHA
- (iv) TLS_RSA_WITH_3DES_EDE_CBC_SHA
- (v) TLS_DHE_RSA_WITH_DES_CBC_SHA
- (vi) TLS_DH_RSA_WITH_3DES_EDE_CBC_SHA

(6 marks)

(c) Encode the message "Examination" using the following encoding scheme:

- (i) Radix-64
- (ii) Quoted-printable

(8 marks)

5. (a) Distinguish between two modes of IPSec. (6 marks)

(b) Draw a diagram similar to Figure 1 for the following: the key in each case is SKEYID_d:

- (i) Hash1
- (ii) Hash 2
- (iii) Hash 3

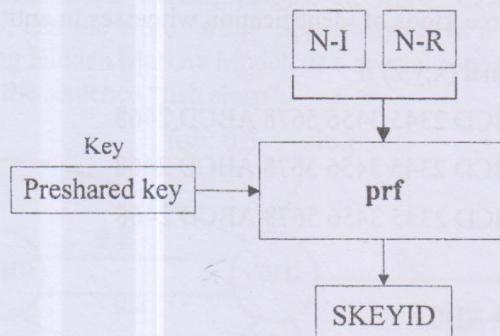


Figure 1

(6 marks)

(c) Define the goal of each phase in the Handshake protocol. (8 marks)

Answer all Questions

Fill in the blank

- (a) For WebApp
- homeowner
- (b) An interact
-, sta
- (c) In early da
- intuition, an
- (d) The convers
- (e) WebE action
- (f) An analysis
- required of t

Choose the correct answer

- 1. The communic
- (a) formulati
- (c) listening,
- 2. An umbrella a
- (a) shields t
- (c) occurs t
- 3. Which of the f
- (a) deliver t
- (c) establish
- 4. Most WebApp
- (a) requirem
- (c) time line
- 5. Which framew
- (a) deploym

Department of Higher Education
University of Computer Studies

Fifth Year (B.C.Tech.)

Mid Term Examination

Image Processing and Computer Vision (CT-505)

March, 2017

Zone IV

Answer all questions.

Time allowed: 3 hours

$\left) + 4\sin\left(\frac{5\pi}{3}t\right)\right.$

efficients a_k such

(5 marks)

$+ e^{-3t}u(t)$ is

1 (a) What is an image? What is a digital image? What is digital image processing?

(b) Visualize how you understand general image processing system.

2 (a) Explain about the fundamental steps in digital image processing.

(b) Consider the two image subsets, S_1 and S_2 shown in the following figure .

For $V = \{1\}$, determine whether these two subsets are (a) 4 adjacent,(b) 8 adjacent

system.

(c) m-adjacent..

(15 marks)

	S_1					S_2					
0	0	0	0	0	0	0	0	1	1	0	
1	0	0	1	0	0	1	0	0	0	1	
1	0	0	1	0	1	1	0	0	0	0	
0	0	1	1	1	0	0	0	0	0	0	
0	0	1	1	1	0	0	1	1	1	1	

(5 marks)

3 (a) What is the smoothing Filter? .Explain about Lowpass special filtering and Median filtering.

(b) Suppose that a digital image is subjected to histogram equalization .Show that a second pass of histogram equalization will produce exactly the same result as the first pass.

4 (a) Write short notes on "Basic Highpass Spatial Filtering ".

(b) Show that the Fourier transforms and their inverses are linear processes.

5. (a) Briefly discuss about the model of image degradation/restoration process.

(b) List the types of noise, characterized by a probability density function (PDF).

Department of Higher Education
University of Computer Studies
Final Year (B.C.Tech.)
Mid Term Examination
Digital Signal Processing (CT-505)
Zone IV
March, 2017

Answer All Questions.

Time Allowed: 3 hours

- (a) A continuous-time signal $x(t)$ is shown in Figure 1(a). Sketch and label carefully each of the following signals: (8 marks)

(i) $x(2t + 1)$

(ii) $x(4 - \frac{t}{2})$

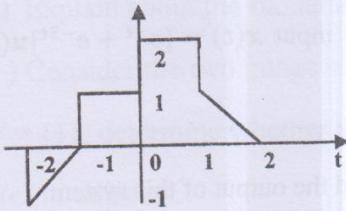


Figure 1(a)

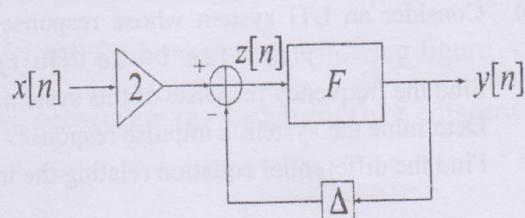


Figure 1(b)

- (b) Consider the system as shown in Figure 1(b): Here, the system F is defined by the input-output relationship $F\{z[n]\} = z[n] - z[n - 1]$, and Δ is the unit delay $\Delta\{w[n]\} = w[n - 1]$. Write down the linear difference equation describing this system. (4 marks)

- (c) (i) For the following input-output relationship, determine whether the corresponding system is linear, time invariant or both.

$$y(t) = t^2 x(t - 1) \quad (4 \text{ marks})$$

- (ii) A discrete time system is given as,

$y[n] = y^2[n - 1] + x[n]$. A bounded input of $x[n] = 2\delta[n]$ is applied to the system. Assume that the system is initially relaxed. Check whether this system is stable or unstable. (4 marks)

- 2 (a) Calculate the convolution of the two signals that are $x[n] = \begin{cases} 1, & 0 \leq n \leq 4 \\ 0, & \text{otherwise} \end{cases}$

and $h[n] = \begin{cases} \alpha^n, & 0 \leq n \leq 6 \\ 0, & \text{otherwise} \end{cases}$ (12 marks)

- (b) Let $x(t)$ be the input to an LTI system with unit impulse response $h(t)$, where $x(t) = e^{-at}u(t)$, $a > 0$ and $h(t) = u(t)$. Compute $x(t) * h(t)$. (8 marks)

- 3 (a) Consider an LTI system whose input $x(t)$ and output $y(t)$ are related by the differential equation $\frac{d}{dt}y(t) + 4y(t) = x(t)$. The system also satisfies the condition of initial rest. If $x(t) = e^{(-1+3j)t}u(t)$, what is $y(t)$? (10 marks)

- (b) (i) Consider a causal LTI system whose input $x[n]$ and output $y[n]$ are related by the difference equation $y[n] = \frac{1}{4}y[n-1] + x[n]$. Determine $y[n]$.
If $x[n] = \delta[n-1]$. (4 marks)
- (ii) Consider a discrete-time LTI system whose impulse response is $h[n] = \alpha^n u[n]$, $-1 < \alpha < 1$ if the input to this system is a periodic signal $x[n] = \cos(\frac{2\pi n}{N})$. Determine the corresponding system output $y[n]$ and the frequency response of $h[n]$. (6 marks)

- 4 (a) For the continuous-time periodic signal $x(t) = 2 + \cos(\frac{2\pi}{3}t) + 4\sin(\frac{5\pi}{3}t)$, determine the fundamental frequency ω_0 and the Fourier series coefficients a_k such that $x(t) = \sum_{k=-\infty}^{\infty} a_k e^{j k \omega_0 t}$. (5 marks)

- (b) Consider an LTI system whose response to the input $x(t) = [e^{-t} + e^{-3t}]u(t)$ is $y(t) = [2e^{-t} - 2e^{-4t}]u(t)$.

Find the frequency response of this system.

Determine the system's impulse response.

Find the differential equation relating the input and the output of this system.

(15 marks)

- 5 (a) A causal and stable LTI system S has the impulse response

$$h(t) = e^{-at}u(t), a > 0.$$

What is the output $(Y(j\omega), y(t))$ of S when the input is $x(t) = e^{-bt}u(t), b > 0$?

(9 marks)

- (b) An LTI system with impulse response $h_1[n] = \left(\frac{1}{3}\right)^n u[n]$ is connected in parallel with another causal LTI system with impulse response $h_2[n]$.

The resulting parallel interconnection has the frequency response

$$H(e^{j\omega}) = \frac{-12+5e^{-j\omega}}{12-7e^{-j\omega}+e^{-j2\omega}}. \text{ Determine } h_2[n]. \quad (5 \text{ marks})$$

- (c) Consider a causal and stable LTI system S whose input $x[n]$ and output $y[n]$ are related through the second-order difference equation

$$y[n] - \frac{1}{6}y[n-1] - \frac{1}{6}y[n-2] = x[n]$$

Determine the frequency response $H(e^{j\omega})$ and the impulse response $h[n]$ for the system S. (6 marks)

Answer all ques

1 (a) What is a

(b) Visualize

2 (a) Explain

(b) Consider

For $V = \{1\}$, de

(c) m-adj

3 (a) What
Median

(b) Suppos
a secon
the first

4 (a) Write s

(b) Show

5. (a) Briefl

(b) List th