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**INFORMATION TECHNOLOGY PAPER I
MATRIC
PRELIMINARY EXAMINATIONS 2018**

Marks: 180
Time: 3 hours
Reading Time: 10 minutes

Examiner: IT Cluster
Moderator: IT Cluster

NAME : _____

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of xx pages (including the extra pages and front cover). Please check that your question paper is complete.
2. Read the questions carefully and make sure that you answer all parts of each question.
3. Answer ALL questions in the space provided. TWO blank pages have been included at the end of the paper. Number each question clearly on these pages, should you use the space.
4. Show all working where applicable.
5. A non-programmable calculator may be used.
6. It is in your own interest to write legibly and to present your work neatly.

	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q7	Total
Possible Marks	10	10	50	42	14	42	10	180
Actual Marks								

Question 1**Terminology****10 Marks**

Define the following terms. Do NOT expand the acronym. You may use an example to support your answer once you have provided a definition. Please note that examples on their own will not be given any credit. Please do not use brand names.

1.1 Protocol (2)

Communication rules for transmitting data ✓

1.2. Polymorphism (2)

An object can be instantiated using different constructors in an inheritance hierarchy

1.3 Inheritance (2)

A class extends another class gaining access to fields and methods in the super class

1.4 Encapsulation (2)

Combination of fields and methods ✓ into a class ✓

1.5 SaaS (Software as a Service) (2)

A cloud based software licensing and delivery model ✓ in which software is licensed on a subscription basis and is centrally hosted. ✓

Question 2**Matching Columns****10 Marks**

Column A		Column B	Column C	
2.0	Computer Term	V	A.	An internet protocol for sending e-mails over the internet.
2.1	interrupt	E	B.	The attempt to obtain sensitive information such as usernames, passwords, and credit card details (and money), often for malicious reasons, by disguising as a trustworthy entity in an electronic communication.
2.2	copyleft	K	C.	A unique identifier assigned to a network interface controller for communications at the data link layer of a network segment.
2.3	mac address	C	D.	The capacity of a wired or wireless network communications link to transmit the maximum amount of data from one point to another over a computer network or internet connection in a given amount of time.
2.4	botnet	I	E.	A signal from a device attached to a computer or from a program within the computer that requires the operating system to stop and figure out what to do next.
2.5	hyperthreading	N	F.	Tricking or deceiving computer systems or other computer users. This is typically done by hiding one's identity or faking the identity of another user on the Internet.
2.6	phishing	B	G.	A hacking technique that places malicious code in SQL statements, via web page input.
2.7	POP3	J	H.	A unique string of numbers separated by full stops that identifies each computer using the Internet Protocol to communicate over a network.
2.8	jpg	M	I.	A number of internet computer that have been set up to forward transmissions to other computers on the internet without the knowledge of their owners.
2.9	sql injection	G	J.	An internet protocol for email retrieval.
2.10	bandwidth	D	K.	The practice of offering people the right to freely distribute copies and modified versions of a work with the stipulation that the same rights be preserved in derivative works down the line.
			L.	An image format used on the Web that provides lossless compression.
			M.	An image file, commonly used for photographs and other complex still images on the Web, is an image that has lossy compression.
			N.	A technology that allows a single microprocessor to act like two separate processors to the operating system.

Scenario

Consider the scenario below when answering the rest of the examination paper:

The Gauteng eye clinic is a specialised day clinic that provides facilities for surgical procedures that do not require over night treatment. The facilities offered at the hospital include:

- **Theatre:**
The eye hospital has six operating theatres with state of the art ophthalmic equipment.
- **Ward:**
The hospital ward has 20 beds and 6 recliner units.
- **Coffee Shop:**
Friends and family members can enjoy something to eat or drink.

The clinic is reliant on their IT infrastructure. It has been in operation for 5 years, so they have asked you to come in and advise them on certain upgrade options. Jason is the IT administrator at the eye clinic.

Question 3**System Technologies****50 Marks**

Jason has received a quote for a new server. The specifications are given in the table below.

Processor	Intel® Xeon® processor E3-1225 v5/ 3.3GHz • 8 MB L3 Cache • 4 Cores • 3.30 GHz Clock Speed • Max Turbo speed 3.7GHz
Memory	8GB DDR4 RAM installed (Maximum RAM 64GB DDR4)
Slots	1 PCIe x16 3.0 1 PCIe x4 3.0 1 PCI
Ports	8 x USB3, Gigabit ethernet
Storage	1 TB SATA HDD 6 SATA ports Supports RAID Level RAID 0, RAID 1, RAID 5, RAID 10
DVD	Slimline DVD drive
OS	Microsoft® Windows Server® 2012 OR Red Hat® Enterprise Linux® OR Microsoft Windows Server with Hyper-V® VMware vSphere ESXi®
Networking	Data link protocol ethernet, Fast ethernet, Gigabit Ethernet
Graphics	On board graphics

3.1 The CPU has a clock speed of 3.30GHz and a Max Turbo speed of 3.7GHz.

Intel® Turbo Boost Technology 2.0¹ accelerates processor and graphics performance for peak loads, automatically allowing processor cores to run faster than the rated operating frequency if they're operating below power, current, and temperature specification limits.

3.1.1 Define the term clock speed. (1)

Clock speed is the rate at which a processor can complete a processing cycle. ✓
It is typically measured in megahertz or gigahertz. ✓

3.1.2 Explain the concept of overclocking (2)

Overclocking involves increasing the clock speed of the computer's CPU past the rate at which it was originally designed to run. ✓

This is achieved by increasing the system clock or adjusting the clock multiplier. ✓

3.1.3 Explain one benefit of the turbo boost technology over overclocking. (2)

It is managed automatically by the system and only operates at peak loads so will get the performance improvement when required ✓ but there will be less risk of damage to components due to overheating as is the case with overclocking. ✓

3.2 The processor has 8MB of L3 cache.

3.2.1 What is the purpose of cache memory? (2)

Cache memory stores blocks of data prefetched from RAM ✓ in the hope that these instructions or data will be needed next by the CPU. ✓

3.2.2 Where would L3 cache be located? (1)

On the motherboard close to the CPU ✓

3.3 The maximum amount of RAM that can be installed in this computer is specified as being 64 GB.

3.3.1 Briefly explain the purpose of RAM.

(1)

Stores the programs currently in use by the CPU and the data associated with them ✓

3.3.2 RAM can be either static (SRAM) or dynamic (DRAM). Use the table below to help categorise them.

(4)

	Feature	Where used
SRAM	Faster access than DRAM do not need to be refreshed ✓	Cache ✓
DRAM	Capacitors that need to be refreshed ✓	DIMMS ✓

3.3.3 How many bits would you expect the address bus to be considering that RAM can be a mx of 64Gb

(1)

64 ✓

3.4 In one of the reviews on the server Jason found the following comment:

**Pros :**

Affordable; Easy access for upgrades and maintenance; Excellent management capabilities

**Cons :**

No hot-swap capabilities as standard; No embedded OS deployment tools;

3.4.1 Explain the term “hot-swap capabilities”. (2)

Being able to replace a device✓ or component while the computer is running. ✓

3.4.2 Would this be a critical factor for the day clinic? Support your answer. (2)

Yes ✓ – cannot risk downtime ✓

3.5 The server supports 2 types of storage HDD and DVD. (4)
Compare the two types of storage in terms of capacity and technology

	Technology	Storage capacity
HDD	Magnetic storage - mechanical✓	Large capacity up to 1 TB✓
DVD	Optical storage- laser✓	Approx. 4.7GB ✓

3.6 The server supports RAID Level RAID 0, RAID 1, RAID 5, RAID 10

3.6.1 Describe two features for **RAID 1**. (2)

Blocks are mirrored across 2 two disks, ✓No striping or parity✓

Good performance, good redundancy

3.6.2 Describe two features of **RAID 5**. (2)

Blocks are striped across disks ✓and distributed parity for redundancy✓

- Minimum 3 disks.
 - Good performance (as blocks are striped).
 - Good redundancy (distributed parity).
 - Use this for DB that is heavily read oriented. Write operations will be slow.
-

3.6.3 Would you recommend **RAID 1** or **RAID 5** for the clinic? (1)

RAID 1 will be sufficient for their needs✓

3.6.4 What configuration changes would be required to the server to support the option you specified in 3.6.3? (1)

RAID 1 – extra disk (min of 2)

RAID 5 – extra 2 disks

- 3.7 The server does not get sold with an operating system.
The operating systems supported by the server are:

VMWare
Ubuntu
Windows Server 2016

The server currently running at the clinic is using Windows Server 2012.

- 3.7.1 Describe TWO functions that are required by a SERVER operating system. (2)

Advanced-level hardware, software and network configuration services✓

Install/deploy business applications and/or web applications✓

Provides central interface to manage users, implement security and other administrative processes✓

Manages and monitors client computers and/or operating systems✓

Any 2

- 3.7.2 VMWare supports virtualisation

- 3.7.2.1 Define virtualisation (2)

Process of creating logical computing resources✓ from available physical resources✓

- 3.7.2.2 Describe how server virtualisation could be of benefit to the clinic. (1)

Instead of buying multiple servers could configure separate virtual servers – one for admin, one for medical data✓

- 3.8 The clinic need to safeguard the data on their computers. You need to detail a backup policy for them to make sure they can recover from processing errors and a disaster situation. (3)

Include the following three factors:

- Medium for backup
- Location of backups
- Frequency of backups

Medium: External HDD, cloud storage, DVD, multiple devices rotated

Location: Store in separate location

Frequency: daily incremental, Weekly full

- 3.9 The clinic have contracted a developer to create a mobile app that the patients can use to pre-register.

- 3.9.1 The developer will use a high-level language to develop the software application.

- 3.9.1.1 Describe two advantages for a programmer when using a high-level programming language. (2)

Closer to human language – easy to learn✓

High level of abstraction programmer do not need to manage workings of computer✓

Instructions can be written in fewer lines of code✓

Access to pre-written libraries✓

- 3.9.1.2 Give an example of a high-level programming language. (1)

Java, delphi, C ... any✓

- 3.9.2 State two challenges faced by programmers when they develop software applications for smart phone / mobile devices. (2)

Small display area✓

Limited CPU/ RAM – program must respond quickly✓

Must be supported on multiple platforms✓

Limited storage space✓

- 3.9.3 Name ONE operating system developed specifically for smart phones. (1)

Android✓

- 3.10 Cloud technology has been widely adopted by healthcare organisations as the healthcare industries have realised the potential of cloud computing and how it can help them give quality service to patients. Jason would like you to help him better understand the potential.

- 3.10.1 Name three characteristics that distinguish cloud computing from traditional hosting. (3)

Services are hosted on the internet, sold on demand✓

Flexible – user can have as much or as little as they need - scalable✓

Service is fully managed by the provider – user only needs PC and access to the internet. ✓

- 3.10.2 What would the advantage of cloud computing be to the doctors? (2)

Able to access info from any location 24/7✓

Easy to share info with other doctors✓

Anything reasonable

3.11 Describe two potential risks of using cloud computing.

(2)

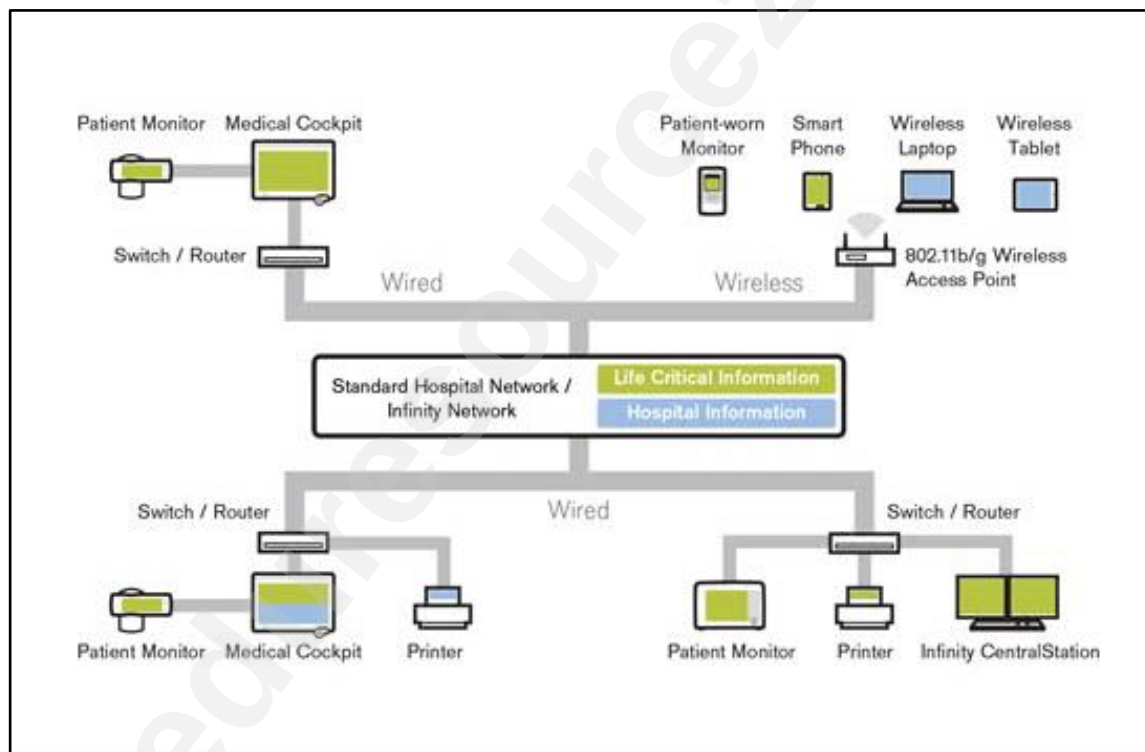
Problems if internet slow or down✓
Security risks✓

Question 4**Networks****42 Marks**

The network at the clinic is a hybrid wired and wireless solution. They have strict requirements as detailed below:

- Seamless fast roaming & continuous communication
- Secure network for sensitive medical data
- Separate guest network
- Access Points and wireless controllers High Availability
- Modern 802.11n standard to support higher throughput allowing a faster data exchange between the server and the staff computers and stations.

They have received proposals from a number of service providers and are in favour of the solution shown below.



[Source: https://www.draeger.com/en-us_us/Hospital/Products/Patient-Monitoring/Network-Solutions/Infinity-OneNet]

4.1 Explain the following network terms.

4.1.1 Network topology

(1)

The physical or logical layout of computers in a NW✓

4.1.2 Give an example of a network topology use in the diagram above

(1)

Star ✓

4.1.3 Backbone

(2)

A **backbone** is a part of computer network that interconnects various pieces of network. ✓ Normally, the backbone's capacity is greater than the networks connected to it. ✓

4.1.4 What type of cable will be used to set up the backbone?

(1)

Fibre-optic✓

- 4.2 It is critical that the patient information being transmitted over the wireless network is secure. The clinic will not support the use of WEP (Wired Equivalent Privacy) or WPA have specified that the WLAN must support WPA-2 (WiFi Protected encryption) only.

- 4.2.1 List two shortcomings of WEP as a wireless protocol. (2)

Very short key (40 bits) can easily be broken. ✓

Single shared key for users – symmetric cryptography. ✓

- 4.2.2 Describe two features of WPA-2 protocol that make it more secure than WEP. (2)

Dynamically creates a per packet key 256 bit key : ✓ Stronger encryption algorithm AES ✓

Authentication of all users ✓

Message Integrity check to ensure messages not being spoofed. ✓

- 4.3 For each of the statements below, match the appropriate device/term from the following list:

gateway, router, firewall, proxy server

- 4.3.1 A device that regulates traffic between two dissimilar networks. (1)

gateway

- 4.3.2 A server that acts as an intermediary for requests from clients seeking resources from other servers. (1)

Proxy server

- 4.3.3 A network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules (1)

firewall

- 4.3.4 A device that connects a local area network (LAN) to another local area network that uses the same protocol. (1)

router

- 4.4 The clinic have been advised that they should consider implementing a wireless mesh network to replace the WLAN.

- 4.4.1 What is a Wireless Mesh Network (WMN)? (2)

In a WMN network connection is spread out among dozens or even hundreds of wireless mesh **nodes** ✓ that "talk" to each other to share the network connection across a large area. ✓

- 4.4.2 Name two advantages of a WMN over a WLAN. (2)

WLAN – wireless access points are connected via cable to LAN if it goes down needs to be replaced.

Need cabling to add extra points

WMN – easy to add extra nodes ✓

WMN – self correcting if one node is not working ✓

WMN – less expensive to set up – no cabling required. ✓

- 4.5 The clinic would like to have a separate guest network. Explain how a VLAN could be used to achieve this. (2)

VLAN give us the capability to partition a L2/Ethernet into multiple logical L2/Ethernet networks. This allows us to ensure that traffic from one VLAN does not mix with traffic from another VLAN. ✓

The clinic could have the admin and doctors on one VLAN and the wireless accesspoints on a separate VLAN✓

- 4.6 The clinic use a video server to provide entertainment for the patients. It has been suggested that it would be useful to use BitTorrent to source video materials.

- 4.6.1 What is BitTorrent? (2)

A protocol that enables multiple peers on a nw to upload and download files between each other✓ instead of using a server as a source✓. Large files are split into smaller segments to improve upload and download speeds. Once a peer has a file it becomes a seed that other peers can use.

- 4.6.2 Name ONE advantage and ONE disadvantage to using BitTorrent (2)

Advantage: faster download speeds as files as there may be a number of parallel connections.

Disadvantage: May be subject to copyright infringements

- 4.7 The doctors like to use video conferencing to consult with specialists in other parts of the country for educational purposes.

- 4.7.1 Name the protocol used for video conferencing. (1)

UDP

- 4.7.2 Explain how the internet has enabled the use of video conferencing. (2)

Can use internet infrastructure to make the connection ✓

No special equipment required. – can use laptop with skype, facetime ✓

- 4.7.3 Discuss ONE way in which the doctors could make use of social media services to connect with other medical facilities. You will need to include an example of a social media service in your description. (2)

Facebook groups to share news/info ✓

Follow colleagues on twitter

..... anything reasonable

- 4.8 The clinic has requested that SSL should be implemented as an encryption protocol.

- 4.8.1 Define encryption. (2)

A security process to ensure that data being transmitted over a wireless NW is difficult to read

the process of encoding information ✓ in such a way that only the person (or computer) with the **key** can decode it ✓

- 4.8.2 How will the clinics website address (<http://GTEyes.co.za>) change once SSL has been implemented? (1)

<https://GTEyes.co.za> ✓

- 4.8.3 The **Public Key** Infrastructure (**PKI**) allows users of the internet to securely and privately exchange data and money securely. (4)

Choose from the words below to complete the paragraph about the PKI.

Certification Authority, digital signature, digital certificate, public key, private key

A **Certification Authority** _issues and verifies a _**digital certificate** that includes the ____ **public key**, _____ that is used to encrypt a message that the receiver will unlock with their _____ **private key**

- 4.9 A number of clients have commented that when they search for the clinic's website it does not appear on the first page of the search engine. Describe how they could use SEO to improve their ranking in the search engine. (2)

SEO – improve text on the webpages to include keywords✓

Make sure web is being linked to – include in medical directories and is referencing other webs✓

4.10 Websites often use scripting to add features to the site.

4.10.1 Distinguish between server-side and client-side scripting. (2)

Server side: a technique used when developing web pages where scripts are run on a web server to produce a response for each client request to the website. ✓

Client side: Scripts run in the clients browser script embedded in HTML ✓

4.10.2 Give an example of client scripting that would be useful in this scenario. (1)

Calendar to check appointment dates/times, calculator or currency convertor. ✓

Question 5**Social Implications****16 Marks**

5.1 Healthcare is one of the industries that is benefitting from BIG DATA. (4)

The medical profession is drowning in data. Medical offices and hospitals submit data about medical conditions and immunizations, but without big data, those data are meaningless. Using analytics normalizes raw patient data to fill gaps in public health records that can affect regulations as well as providing better care.

Describe how BIG DATA can benefit the healthcare industry in terms of:

- Benefit to the doctors
- Benefit to the patients

Doctors – able to get info on trends, share data between doctors, diagnosis – match symptoms to a larger database✓✓

Patients - their info can be shared between doctors, fewer tests, less expensive, doctors can monitor them remotely – monitoring devices eg BP✓✓✓

5.2 Telemedicine, defined as the remote diagnosis and treatment of patients, has obvious benefits for a country like South Africa. Discuss the benefits and challenges of telemedicine in South Africa. (4)

Benefits: nurses and doctors in remote areas have access to specialists for better diagnostics. ✓

Patients are able to upload their info / readings for remote monitoring. Don't need to travel to see doctors ✓

Challenges: lack of infrastructure, technology, broadband✓

5.3 You have been asked to run an educational session for the staff to make them aware of the risks of social engineering. (4)
Describe TWO popular social engineering techniques that the clinic staff may be exposed to.

Shoulder surfing - visitors could watch the nurses admin staff ✓✓

Role playing – chatting to clinic staff – extract info from them✓✓

Phishing – emails sent redirecting to a spoofed website...

Downloaded from eduresourceza.com

- 5.4 It is the responsibility of the clinic to protect the patient's data.
Describe what measures the clinic should put in place to protect the data from a ransomware attack.

(4)

Install a good firewall ✓
Install a good AV SW and keep up to date ✓
Backup data ✓
Encrypt sensitive data : eg passwords ✓
Strong passwords
Install SW patches and keep up to date

SECTION C

Software development

52 Marks

QUESTION 6

[42]

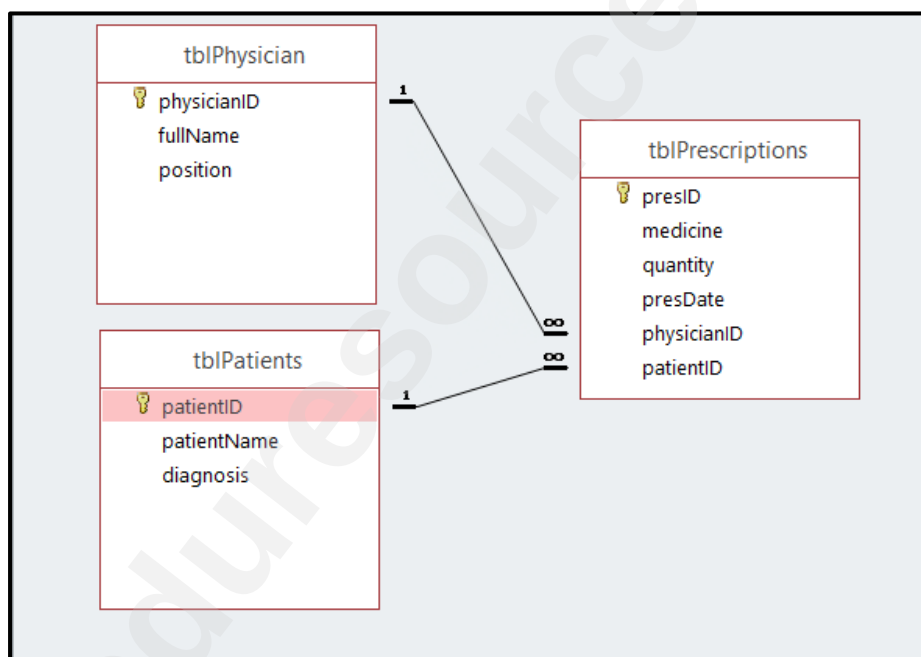
- 6.1 The hospital has its data is stored in a very large relational database.
Describe two advantages to using a database.

(2)

Centralisation of data, structure of data to remove anomalies, ✓

Easy querying of data ✓

6.2



- 6.2.1 Name the type of relationship between the **tblPhysician** and **tblPrescriptions** tables.

(1)

one to many

- 6.2.2 The **physicianID** field appears in both the **tblPhysicians** table and the **tblPrescriptions** table.

What is the purpose of the **physicianID** field in the **tblPrescriptions** table? (2)

It is a foreign key used to create the link/relationship between the two tables ✓ – matches the primary key tblPhysician ✓

6.3 Explain the purpose of using **GROUP BY**, **DESC** and **TOP 5** in the following SQL statement. (3)

SELECT TOP 5 diagnosis, count(*) AS Number
FROM tblPatients
GROUP BY diagnosis
ORDER BY count(*) DESC;

TOP 5 – will limit the records in the result set to the first 5 records as determined by the ORDER BY sequence ✓

GROUP BY – often used with aggregate functions to group the result set by one or more columns. ✓

DESC – will sequence the result set in Descending order ✓

6.4 The theatre schedules are drawn up daily in spreadsheet. The clinic would like to incorporate this information into the database.

Consider the following details:

- When a patient is booked for a procedure they receive a unique **Booking ID**.
- Each patient has a unique **Patient ID** and their details are saved to an existing table **tblPatients** when they register, which has the following fields.

tblPatients(PatientID, PatientSurname, PatientFirstName, CellNo)

Examine an extract of the booking register in the table below.

BookingID	Theatre	Procedure Date	Procedure Start	ProcedureCode	ProcedureDesc	Procedure duration	PatientID	Doctor	Specialisation	Contact number
B1	T1	18/06/2018	08:00	CAT	Cataract surgery	01:00	P1	Dr John Dorian	Ophthalmologist	0828503234
B2	T1	18/06/2018	09:00	COR	Cornea Surgery	01:30	P2	Dr John Dorian	Ophthalmologist	0828503234
B3	T2	18/06/2018	08:00	ELS	Eyelid surgery	02:00	P3	Dr Elliot Reid	Plastic surgeon	0749987760
B4	T2	18/06/2018	09:00	CAT	Cataract surgery	01:00	P4	Dr Molly Clark	Ophthalmologist	0116675590
B5	T3	18/06/2018	13:00	COR	Cornea Surgery	01:30	P5	Dr John Dorian	Ophthalmologist	0828503234
B6	T1	20/06/2018	08:00	ELS	Eyelid surgery	02:00	P6	Dr Elliot Reid	Plastic surgeon	0749987760
B7	T1	20/06/2018	09:00	CAT	Cataract surgery	01:00	P7	Dr Molly Clark	Ophthalmologist	0116675590

6.4.1 The data needs to be normalized.

6.4.1.1 Explain the purpose of normalization.

(2)

Normalization is a database design technique ✓ which organizes tables in a manner that reduces redundancy and dependency of data. ✓ It divides larger tables to smaller tables and links them using relationships.

6.4.1.2 The normalisation process will remove data anomalies.

(2)

Name and identify one type of anomaly that could occur in the above table.

Update anomaly : data needs to be updated in more than one place ✓ – eg if doctor has a new telephone number. ✓

Insert – cannot meet requirements of primary key ✓ – cannot add new doctor if no booking for him ✓

- 6.4.2 Suggest a 3NF relational structure for the database. Write your answer in the standard relational format:

(10)

tablename (field1, field2, ...)

You need to underline all primary and foreign keys by underlining the field. Underline primary keys with TWO lines and foreign keys with ONE line.

tblBookings(<u>BookingID</u> , <u>procedureCode</u> , procedureDate, procedureStart, <u>patientID</u> , <u>Doctor</u>)
tblProcedures(<u>procedureCode</u> , procedureDescription),
tblDoctors(<u>Doctor</u> , specialisation, contactNumber)
Link (<u>BookingID</u> , <u>ProcedureCode</u> , <u>PatientID</u> , <u>Doctor</u>)
Tables ✓✓✓
Primary keys ✓✓✓
Foreign key ✓✓✓ format ✓

- 6.5 A new program will need to be developed to make use of the new tables in the database and to programmatically create the booking register. This will require the creation of a **Booking** class.

(9)

The basic requirements of this class will be:

- A constructor method to initialise the fields.
- Accessor methods for each of the fields.
- Mutator methods for each of the fields
- A toString() method to neatly display the fields
- A method to calculate the cost of the procedure. This method will need to be used by another class.

Booking objects will each have three fields namely: **the booking id, the procedure code, the patient name.**

You are required to draw a class diagram for the Booking class according to the specification shown above. Use the space provided in the grid below for your answer. You should make appropriate selections for your field types. Include appropriate details for each method header.

Booking
Properties - String bookingID ✓ private ✓ - String procCode - String patientName
Methods ✓ public + Constructor (String b, String pc, String pn) ✓✓ + getBookingID(): String ✓ + getProcCode(): String + getPatientName(): String + setBookingID(bid : String) ✓ + setProcCode(pc : String) + setBookingID(pn : String) + calcCost():double ✓ + toString (): String ✓

- 6.6 In the new application you make use of an array of booking objects using the following declaration:

```
Booking bookings [] = new Booking [50];  
int size = 0;
```

- 6.6.1 What is the purpose of the size field?

(1)

To keep track of the number of elements added to the bookings array

--

- 6.6.2 Write an algorithm for a method called **findBooking**, which will accept a String parameter for the **bookingID** and perform a sequential search through **bookings**, **terminating when the booking is found**. The method should return the position of the booking in the array if the item is found or -1 if the item is not found. (10)

```
i ← 0
flag ← false
pos ← -1
while (i < size AND flag = false)
    if (booking code for bookings[i] = bookingID)
        flag ← true
        pos ← i
    endif
    i ← i+1
end while
return pos
```

QUESTION 7**[10]**

- 7.1 Jason has been teaching himself to code. In one of his practice tasks he needed to create a program to convert a binary number to a decimal number. (8)

He used the following algorithm to code his program, but he is not getting the correct output. Help him to debug his logic by the use of a trace table:

Use the binary value 10_2 to test the algorithm

```

1 input binary
2 len ← length of binary

3 decimal ← 0

4 loop i from 0 to len
5   digit ← character at position i in binary
6   decimal ← decimal + (2i * digit)
7 end loop

8 output "The decimal number is " + output

```

Use the trace table template below. The first line has been completed for you.

Line No	binary	len	decimal	i	i<len	digit	output
1	10						
2		2					
3			0				
4				0	T		
5						1	
6			1				
4				1	T		
5						0	
6			1				
4				2	F		
8							The decimal number is 1

- 7.2 Identify the error and how you would correct it. (2)

digit ← character at position (len-i-1) in binary

EXTRA SPACE – WRITE DOWN EACH QUESTION NUMBER

EXTRA SPACE – WRITE DOWN EACH QUESTION NUMBER

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