



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

**SYSTEM ANALYSIS AND DESIGN
NQF LEVEL 4**

(10041004)

**13 November 2019 (X-Paper)
09:00–12:00**

Nonprogrammable calculators may be used.

This question paper consists of 16 pages and 1 addendum.

**TIME: 3 HOURS
MARKS: 200**

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
 2. Read ALL the questions carefully.
 3. Number the answers according to the numbering system used in this question paper.
 4. Start each section on a NEW page.
 5. Use only a black or blue pen.
 6. Write neatly and legibly.
-

SECTION A**QUESTION 1**

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK.

1.1.1 Which combination of statements regarding grey-box testing is correct?



- i. Grey-box testing is a combination of white-box and black-box testing.
- ii. Grey-box testing is well suited for testing web applications.
- iii. With grey-box testing the internal structure of the system is not known at all.
- iv. With grey-box testing the internal structure of the system is partially known.

- A i, ii, iii
- B i, iii, iv
- C i, ii, iv
- D i and iv only

1.1.2 The main purpose of a ... diagram is for the system analyst to know who interacts with the system.

- A use-case
- B entity-relationship
- C class
- D process-flow








1.1.3 Which combination of statements regarding the principles of graphical user interface design are correct?

- i. GUI design should be structured meaningfully.
- ii. GUI design should be consistent.
- iii. GUI design should be tailored according to hardware performance.
- iv. GUI design should be tailored for expert users.

- A i and ii only
- B i, ii, iii
- C i and iv only
- D i, ii, iv




- 1.1.4 Which combination of statements regarding system analysts are correct?
- i. Create and design a business strategy and accompanying policies
 - ii. Study the current computer system of an organisation 
 - iii. Train end-users to use the system and compile user manuals
 - iv. Conduct testing on an information system
- A i, ii, iii
B ii, iii, iv
C i, ii, iv
D ii and iii only
- 1.1.5 A ... can be used to represent a respondent's feelings about a topic/question.
- A Likert scale
B rubric
C check list
D criteria
- 1.1.6  People whose jobs involve sponsoring and funding an information system (IS) project to develop, operate and maintain an IS:
- A Information workers
B Internal system users
C System owners
D System builders
- 1.1.7 Which combination of statements regarding interviews are correct?
- i. Knowing how to ask questions in an interview is a critical skill.
 - ii. Different types of questions can be asked in an interview.
 - iii. An interview is a cost-effective method of gathering information.
 - iv. Shy and introverted people are less likely to respond to questions in an interview. 
- A i, ii, iii
B i, ii, iv
C i and iv only
D ii and iv only
- 1.1.8 A horizontal bar, typically located at the topmost part of a windows-based GUI from which functions can be selected:
- A Status bar
B Tool bar
C Title bar 
D Menu bar

1.1.9 Which combination of statements regarding a system-requirement document are correct? 

- i. Also referred to as system-requirement specifications
- ii. Provides a detailed description of a system being developed
- iii. Describes functional and nonfunctional requirements of a system
- iv. Often used as a preliminary step to create a brief overview of the system




- A i, ii, iii
- B ii, iii, iv
- C i and ii only
- D i and iv only

1.1.10 The functionality of the system or what the information system will do is called the ... of the system.

- A business need 
- B intangibles
- C requirements
- D sponsors





(10 × 1) (10)

1.2 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.2.1–1.2.10) in the ANSWER BOOK.

- 1.2.1 The Computing Technology Industry Association (CompTIA) is a non-profit trade association for IT professionals. 
- 1.2.2 A text-only interface is also referred to as a command-line interface.
- 1.2.3 In the computer industry biometrics are only used for validation purposes.
- 1.2.4 A big-bang adoption strategy is when a new system is installed in stages for only a small number of users.
- 1.2.5 The Turing test is used to determine if a machine exhibits intelligent behaviour.
- 1.2.6  A requirements analysis is not a critical step in determining the outcome of a project.
- 1.2.7 A post-implementation review is usually conducted as a project is nearing completion to determine if objectives have been met.
- 1.2.8 Offline data entry refers to the entry or storage of information without requiring a network connection.
- 1.2.9 Data security is a focus area only for the chief information officer in an organisation. 
- 1.2.10 Using the printer of an organisation to print personal documents is an example of unethical practice.


(10 × 1) (10)

- 1.3 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–S) next to the question number (1.3.1–1.3.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.3.1	Limit or scope of a system defined as the difference between the environment and the system 	A	in-house development
		B	input
1.3.2	Information systems that support company-wide operations and data-management requirements	C	prototype
		D	storage
1.3.3	Allows for maximum flexibility in an interviewee's response	E	boundary
		F	processing
1.3.4	Data that comes from the environment in which the system will be operating	G	system
		H	closed question 
1.3.5	Contract which protects commercial software from copyright infringement	I	enterprise systems
		J	system analysis and design
1.3.6	Method of studying a system by examining its component parts and their interactions	K	outcome
		L	data
1.3.7	Occurs when an organisation develops the required business tools/applications on their own 	M	end-user license agreement
1.3.8	Early working version of an information system built to test a concept or process	N	open-source licensed
		O	entity
1.3.9	Action or process of closely monitoring something or someone	P	observation
		Q	open-ended question
1.3.10	Result or consequence of a process	R	interview 
		S	survey

(10 × 1) (10)


1.4 Choose the correct term from those given in brackets. Write only the term next to the question number (1.4.1–1.4.10) in the ANSWER BOOK.

1.4.1 (Virtual reality/Virtualisation) allows people to interact with a virtual environment created by a computer. 

1.4.2 A dongle is an example of a (hardware/software) control used to enforce system security.

1.4.3 An (intranet/extranet) is a secure private network, accessible only within an enterprise, which allows access to an information system.


1.4.4 A (data-flow/entity-relationship) diagram shows which information enters a system, is processed and then stored.

1.4.5 Software that is licensed as (open source/freeware) can be used for free but can be edited, modified or sold. 

1.4.6 A (user-requirement/system-requirement) specification is a document that describes the features of a software application.

1.4.7 A (closed/open) question allows for short and concise responses from a respondent.

1.4.8 (A virus/Spyware) is malicious software that collects information about you without your consent.


1.4.9 A (qualitative/quantitative) risk analysis identifies risks using a predefined rating score. 

1.4.10 A (sensor/neuron) is a device that detects a physical property such as heat and responds to it.

(10 × 1) (10)
[40]

TOTAL SECTION A: 40


SECTION B**QUESTION 2**

2.1 As a final-year student about to enter the world of work, it is important to be aware of good practices expected from an IT professional. 

Discuss FIVE good qualities expected from an IT professional in the computer industry. (Include the quality and one aspect or fact thereof as part of your answer.) (5 × (1+1)) (10)

2.2 Define each of the following terms:

2.2.1 Professionalism


2.2.2  Employment equity

(2 × 2) (4)
[14]

QUESTION 3

Read the scenario and answer the questions.


3.1 You have been employed as a systems analyst at Mangaung TVET College. Your manager has indicated that the college is embarking on a project in developing a web portal named: **MangaungTVETOnline** for staff and students. Using the web portal, the students will be able to register online, check their results and check any other relevant information regarding their studies at the college. The college has estimated the cost of developing the web portal to be R750 000 with a 15% chance of failure. The college management has also decided to have the web portal (application) hosted on a server of the college. Due to the sensitive nature of the information being stored, there is also an element of risk involved.

3.1.1 Briefly explain FOUR possible risks that the planned college web portal could be exposed to, being part of the internet.  (4)



3.1.2 Explain how each of the risks identified in QUESTION 3.1.1 can be mitigated. (4)

3.1.3 List THREE factors that could cause this project to fail. (3)

3.1.4 Calculate the expected risk in Rands should the project fail. (2)

3.1.5 Determine the probability of the project succeeding. Express your answer as a percentage.  (1)



3.1.6 Calculate the expected impact in Rands should the project be successful. (2)

- 3.1.7 List THREE actions the college must consider when managing risks.  (3)
 - 3.1.8 Your manager has indicated that all passwords for student logins will be encrypted.
Briefly explain the purpose of encrypting users' passwords. (2)
 - 3.2 Differentiate between *risk assessment* and *risk management*. (2 + 2) (4)
 - 3.3 Name THREE tasks that security controls perform.  (3)
 - 3.4 List FOUR criteria the ICT industry has settled on to determine if a project is a success. (4)
- [32]**

QUESTION 4

Read the following scenario and answer the questions.



You have been employed at Computer Design Solutions (CDS) as a junior systems analyst. CDS specialises in providing enterprise resource planning (ERP) systems to its customers. The entire team of analysts must first gather data and necessary information that would help them to select an ERP solution that will best suit the customer's business.

- 4.1 Define each of the following terms:
 - 4.1.1 *Probing*. 
 - 4.1.2 *Rapport*.
 - 4.1.3 *Ambiguous question*. (3 x 2) (6)
- 4.2 The senior analyst has asked you to tabulate the advantages and disadvantages of the document review, observation and interview data gathering methods. 

Use the following table as a guide, and state one advantage and one disadvantage for each method:

METHOD	ADVANTAGE	DISADVANTAGE
Document review		
Observation		
Interview		

(3 + 3) (6)


- 4.3 The senior analyst has decided that CDS will use an online survey to gather information. 
State FOUR advantages of using an online survey. (4)
- 4.4 The senior analyst has asked you to design TWO closed-ended questions using multiple choice questions to gather information from the end-users of CDS's systems. (2 × 2) (4)
- NOTE:** Each multiple-choice question must have FOUR possible options.
- 4.5 The senior analyst has asked you to design TWO closed-ended questions using a rating scale which will be used post-implementation of an ERP system to gauge user satisfaction.  (2 × 2) (4)
- NOTE:** Each question must use a rating scale of between 1 (strongly disagree) and 5 (strongly agree).

[24]**QUESTION 5**

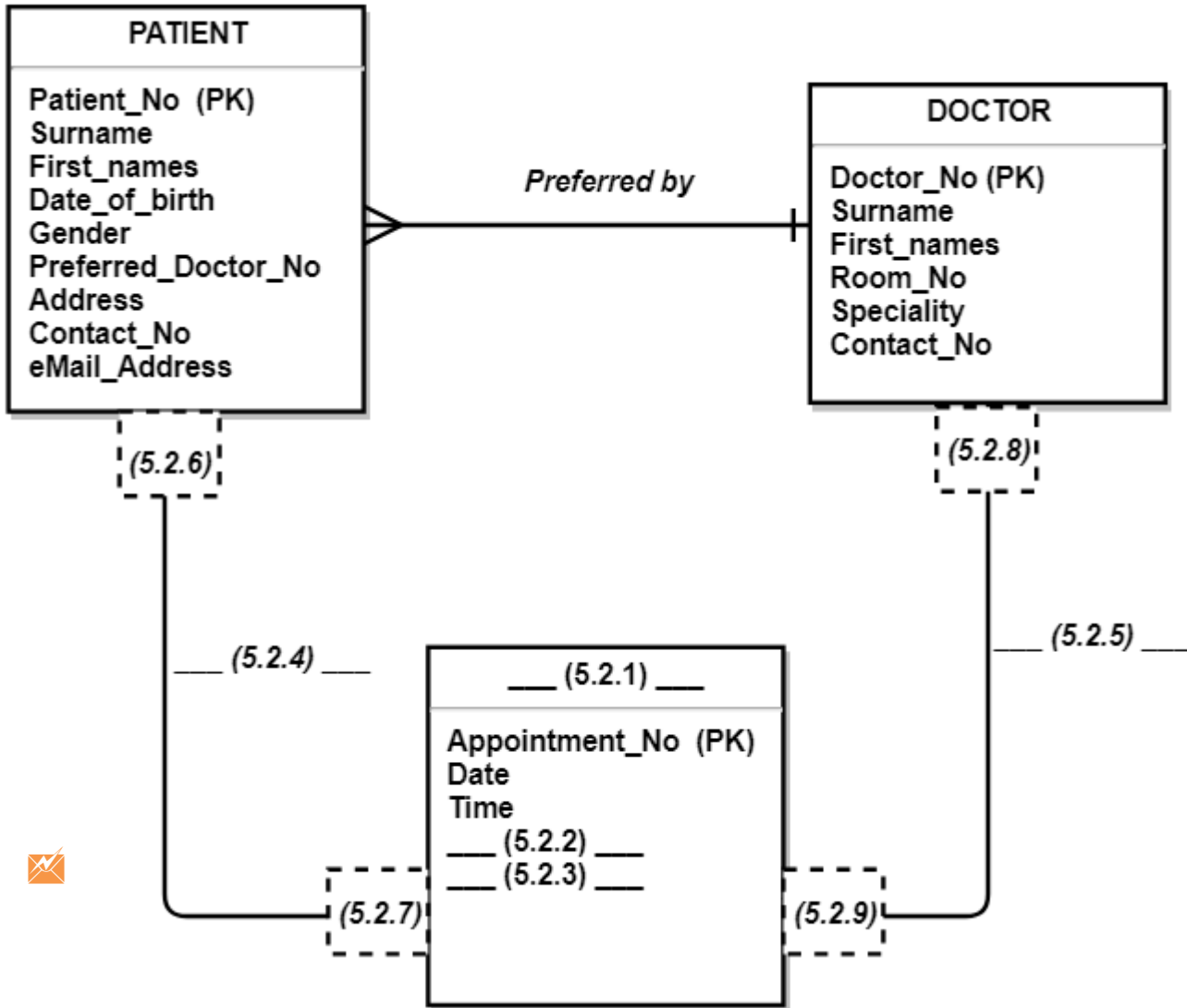
Read the following scenario and answer the questions.



BDS Medic Clinic is a private clinic that meets the health needs of the community. More than 300 people from the community are registered as patients. The clinic uses a number of different doctors and employed a receptionist. Patients are usually assigned to a preferred doctor but can arrange an appointment with any available doctor if needed. New patient information is captured by the receptionist. When a new patient's details are captured, they receive a unique patient number. To schedule an appointment to consult the doctor, or if the patient wishes to cancel an appointment, the patient must contact the receptionist. When the patient arrives for an appointment his/her details are confirmed. When the patient visits the doctor, the doctor can see the medical history of the patient. After the appointment, the doctor inputs details about the consultation and the applicable prescriptions and treatment. Billing information also supplied to the patient, after the visit.

- 5.1 Draw a context-level data-flow diagram for the medical appointments system of the clinic to model the main data flows using the given information.  (11)


5.2 An inexperienced systems analyst attempted to create an ERD based on the scenario above as well as the printout of the appointments shown on the ADDENDUM. The incomplete ERD is given below. In each case write down the **question number** and the missing part. **Do NOT redraw the ERD.** Take note: The diagram uses the Crows foot notation. Indicate applicable foreign key fields with an FK postfix.



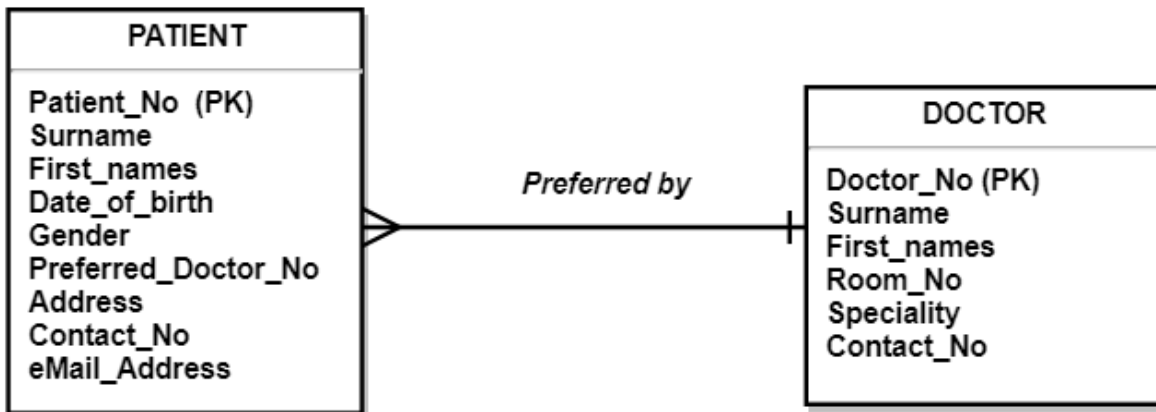
(9 × 1)

(9)
[20]

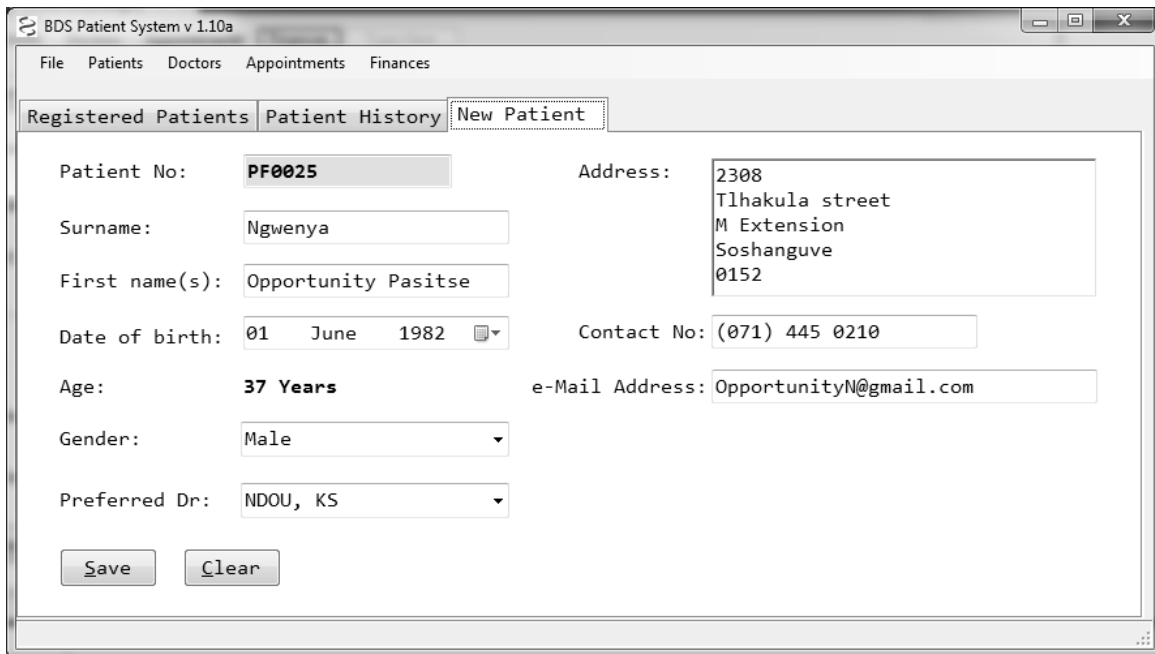
QUESTION 6

6.1 Read the following descriptions and study the given diagram (FIGURE 1) and UI (FIGURE 2) and answer the questions that follow. 

BDS Medic Clinic has asked you to analyse the following user interface (UI) created by a developer to capture the registration of a new patient. The applicable tabsheet (New Patient) contains various UI controls. The various controls are used to capture data to be saved to the corresponding (Patient) table in the BDS database as presented in the following entity relationship diagram.







 **FIGURE 1**



6.1.1 Is the input interface well designed? (1)

6.1.2 Substantiate the answer to QUESTION 6.1.1.  (1)

6.1.3 Name the type of control used to input the *Gender* and *Preferred Doctor*. (1)

- 6.1.4 Give ONE reason why the developer chose the control named in QUESTION 6.1.3.  (1)
- 6.1.5 Name another control that can be used to input the *Gender*. (1)
- 6.1.6 Give THREE reasons why users should be involved when creating the designs of the input/output interfaces of a system. (3)
- 6.1.7 State TWO reasons why it is important to test the design. (2 × 1) (2)
- 6.1.8 Suggest a suitable field type (i.e. datatype) for the Patient_No field based on the sample data in the Figure 2 screen. (1)
- 6.1.9 Identify the name of the Foreign key field as part of the PATIENT entity. (1)
- 6.1.10 What does the following symbol mean in the diagram as presented in Figure 1?   (1)
- 6.1.11 Explain why the Age is displayed on the UI but not represented (or stored) in the PATIENT table/entity (1)
- 6.1.12 Suggest any two validation rules that could be applied to validate the e-Mail address field entered by the user. (2 × 1) (2)
- 6.2 Differentiate between *online* and *offline* forms.  (2 × 1) (2)
- [18]**

QUESTION 7





- 7.1 Read the following snippet and answer the questions.

SARS PROMOTES EFILING SYSTEM BY GOING PAPERLESS

In a drive to encourage taxpayers to use eFiling for all tax transactions, the South African Revenue Services (SARS) has removed boxes for the submission of income-tax returns and other paper documents. Acting SARS commissioner, Mark Kingon, said the main reason for taxpayer visits was to file a tax return. Millions of people went into a branch unnecessarily because their returns could have been filed through the eFiling system.

The new system, fully tested and implemented on 1 July 2018, will no longer provide certain printed forms at branches, including forms used to register as a taxpayer, a VAT vendor and an employer. Forms used to apply for tax directives will also be discontinued. The increase in digital transactions means a significant saving on paper, printing and courier costs for both SARS and the taxpayer.

[Adapted from: <https://www.iol.co.za/mercury/news/sars-promotes-efiling-by-going-paperless-15789826>]

- 7.1.1 State TWO main purposes of testing. (2)
- 7.1.2 Prior to going live, the eFiling system would have undergone a number of different tests such as system testing.  (2)
- List THREE other phases of computer-system testing. (3)
- 7.1.3 Who would typically conduct the last phase of testing? (1)
- 7.1.4 With an increase in digital transactions, the eFiling system would have undergone TWO important types of system testing. (2)
- Name the TWO types of system testing. (2)
-  7.1.5 Explain the FOUR aims of the tests named in QUESTION 7.1.4. (4)
- 7.2 Define the term *test data*. (2)
- 7.3 Define the term *anomaly*. (2)
- 7.4 Draw and label a simple set of diagrams to depict the various strategies in which a new system could be implemented to replace an old system. (4 × 2) (8)
- 7.5 A post-implementation evaluation assesses the overall quality of the information system  (2)
- List any six aspects that are measured as part of the post-implementation evaluation process. (6 × 1) (6)
- 7.6 State THREE ways how the post-implementation evaluation process could be conducted (3)
- 7.7 Give the typical timeframe for a post-implementation review to be carried out. (1)
- 7.8 Name TWO types of maintenance that can be carried out on information systems.  (2)
- [36]**

QUESTION 8

8.1 Define each of the following terms:

8.1.1 Robot



8.1.2 Fuzzy logic

(2 × 2) (4)

8.2 State TWO main categories of neural networks.

(2)

8.3 State TWO uses of robots.

(2)

8.4 List FOUR applications of artificial intelligence.



(4)

8.5 List the FOUR main components of an expert system.

(4)

[16]

TOTAL SECTION B: 160
GRAND TOTAL: 200

ADDENDUM

BDS PRIVATE CLINIC		2					
CONSULTATION APPOINTMENTS							
Doctor_No D1001	Doctor_Surname NDOU	First_names Katlego Simon	Room_No A113	Appointment Time 10:30AM	Patient_No PF0025	Patient Surname Ngwenya	Patient Firstnames Opportunity Pasitse
	Appointment_No 2019/0025/63	Appointment Date 2019/08/29		Appointment Time 10:30AM		Patient Surname Smith	Patient Firstnames Alex
	Appointment_No 2019/0375/86	Appointment Date 2019/08/29		Appointment Time 11:00AM		Patient Surname Eisha	Patient Firstnames Very Sick
Doctor_No D1010	Doctor_Surname VAWDA	First_names Ingrid	Room_No B110	Appointment Time 13:40PM	Patient_No PF0067	Patient Surname Patel	Patient Firstnames Pravesh
	Appointment_No 2019/0067/92	Appointment Date 2019/08/28		Appointment Time 13:40PM		Patient Surname Phosa	Patient Firstnames Jeremiah
	Appointment_No 2019/0023/97	Appointment Date 2019/08/29		Appointment Time 14:10PM			