Qn	Solution	Marks
1	Refer to Decision Table at the end	7
2a	Sort A – Merge sort O(nlgn) Sort B – Quick sort O(nlgn) Sort C – Insertion sort O(n**2) Sort D – Bubble sort O(n**2)	4
2b	Just use the number on the balls as hash value O(n)	2
3a	```def fisher_yates_shuffle_itr(lst): end = len(lst) - 1 while end > 0: i = random.randint(0, end) lst[i], lst[end] = lst[end], lst[i] end = end - 1```	4
3b	Mark flow chart according to solution in 3a	4
3c	```def fisher_yates_shuffle_modified(lst, end): if end > 0: i = random.randint(0, end) if lst[i] == -1: fisher_yates_shuffle_modified(lst, end) else: if lst[end] != -1: lst[i], lst[end] = lst[end], lst[i] fisher_yates_shuffle_modified(lst, end - 1) else: lst[i], lst[end - 1] = lst[end - 1], lst[i] fisher_yates_shuffle_modified(lst, end - 2)```	4
4a	1 insert linkedlist node 2 insert bst node 3 insert data as a node into the new data structure 4 preorder display 5 linked list display in increasing order 6 find smallest 7 find biggest	7
4b	Use BST's tree traversal to find position in the linkedlist in which the newNode can be added instead of doing a linear search	2
4c	Just return self.head	1
5a	Protocols define **format** and **order** of messages exchanged and the **actions** taken after messages are sent or received.	3
5b	It provides a standardization for manufacturers and organizations to create hardware/software/equipment that are compatible to the version used by the current internet. A violation of protocol will lead to a breakdown of communication.	2
5c	The TCP/IP Model separates networking functions into discrete layers. Each layer performs a specific function and is transparent to the layer above it and the layer below it.	1
	A. Application Layer: supporting network applications, e.g. FTP, SMTP, HTTP	1
	B. Transport Layer: process-to-process data transfer, e.g. TCP, UDP	1
	C. Internet Layer: routing of packets from source to destination, e.g. IP	1
	D. Network Access Layer: support data transmission across the physical network e.g. Ethernet, Wireless 802.11ac/B/G/N	1 1
6a	1. Encrypt your data. 2. Backup your data. 3. ~~Use cloud services that provides viable backup option.~~ (Not preferred) 4. Anti-malware protection. 5. Fortify network security.	2
6b	A backup is a copy of your data that is made to protect against loss of that data while an archive is a copy of data made for long-term storage and reference.	1

6c	Version control software **keeps track of every modification to the code** in a special kind of database. If a mistake is made, developers can turn back the clock and **compare earlier versions** of the code to help **fix the mistake** while **minimizing disruption** to all team members.	2
7a	Data redundancy refers to the same data being stored more than once. In a flat file system, same person visiting the clinic multiple times will be recorded in multiple lines, and hence redundancy of the patient particulars will happen.	2
7b	Data privacy is a requirement for data to be available only to authorized users. In a flat file system, data are accessible by all users. In a rdbms, data can be controlled and be viewed by only the authorized users.	2
7c	UNF: RecordNo, Date, Time, PatientID, Name, Gender, Contact, Email, Observations, Fever, BloodPressure, MedName1, Instruction1, UnitPrice1, Quantity1, MedName2, Instruction2, UnitPrice2, Quantity2, … 1NF: MedLine (<u>RecordNo</u>, <u>MedName</u>, Date, Time, PatientID, Name, Gender, Contact, Email, Observations, Fever, BloodPressure, Instruction, UnitPrice, Quantity) 2NF: TreatmentRecord (<u>RecordNo</u>, Date, Time, PatientID, Name, Gender, Contact, Email, Observations, Fever, BloodPressure) MedLine (<u>RecordNo*</u>, <u>Med*</u>, Quantity) MedInfo (<u>MedName</u>, Instruction, UnitPrice) 3NF: PatientInfo (<u>PatientID</u>, Name, Gender, Contact, Email) TreatmentRecord (<u>RecordNo</u>, Date, Time, PatientID*, Observations, Fever, BloodPressure) MedLine (<u>RecordNo*</u>, <u>Med*</u>, Quantity) MedInfo (<u>MedName</u>, Instruction, UnitPrice)	6
7d	PatientInfo 1:n TreatmentRecord 1:n MedLine n:1 MedInfo	3
7e	TreatmentRecord: RecordNo MedLine: RecordNo, MedName, Quantity MedInfo: MedName	4
7f	Additional table of MC (MCNo, StartDate, NoOfDays) TreatmentRecord table with an additional optional field, with MCNo TreatmentRecord 1:1 MC	3
7g	Decision: Non-sql SQL: Expensive to upgrade performance and to scale up. Non-SQL: Can adapt to new business requirements without overhauling the database schema. (Flexible schema, 1 collection is needed) No SQL database system uses a horizontal scaling mechanism by using more servers. (scalability can be solved easily)	4
7h	Date picker, appointment date Dropdown list, appointment time	4
7i	The copyright law protects the content creator with exclusive rights which include the right of create derivative works based on the work.	3

		Hence, using the template may violate the copyright of the original owner of the bootstrap template.	
		Source for free or creative commons licensed bootstrap templates.	
7j		PUBLIC - Software engineers shall act consistently with the public interest. We should not allow them to have access to the data, as we are unable to control how they will make use of the data.	2
8a		Syntax Error: Syntax error is a structural error of a program such that the code violates grammar/rules of the programming language. identify error: ++= correction: += Runtime error refers to error which was not detected when the program was compiled, but is only revealed when a particular line is executed. identify error: `DECLARE sub_total: INT` correction: `DECLARE sub_total: FLOAT` Logic error is one which allows a program to run successfully, but produces an unintended or undesired result. identify error: `sub_total = unit_price ** quantity` correction: `sub_total = unit_price * quantity`	6
8b		Printing statements Try-except block	2
8c		1 mark for 3 classes 1 mark for correct use of public and private 1 mark for correct distribution of attributes 1 mark for identification of appropriate methods 1 mark for correct inheritance shown (upward pointing arrows)	5
8d		Polymorphism refers to the ability of different classes respond to the same methods in different ways. e.g	2
8e		Inheritance refers to subclass retaining properties and methods from its superclass. e.g	2

For Q2

Conditions	**C1**	C2	**C3**	C4	**C5**	C6	C7	C8
Park ambassador is within 50 m radius	Y	Y	Y	Y	N	N	N	N
Offender(s) is(are) adult(s)	Y	Y	N	N	Y	Y	N	N
The offender group has more than 3 persons	Y	N	Y	N	Y	N	Y	N
Actions								
Seek ambassador to educate offender	X		X					
Educate offender gently		X		X		X	X	X
Walk away					X			

Conditions	C1/3	C2/4/6/8	C5	C7/8
Park ambassador is within 50 m radius	Y	-	N	N
Offender(s) is(are) adult(s)	-	-	Y	N
The offender group has more than 3 persons	Y	N	Y	-
Actions				
Seek ambassador to educate offender	X			
Educate offender gently		X		X
Walk away			X	

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