

ADVANCED
General Certificate of Education
2019

Centre Number							
	Candidate Number						

### **Software Systems Development**

Unit AS 1

Introduction to Object Oriented Development



# [SDV11] WEDNESDAY 22 MAY, AFTERNOON

TIME

2 hours.

#### **INSTRUCTIONS TO CANDIDATES**

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this

Write your answers in the spaces provided in this question paper.

Answer all seven questions.

#### **INFORMATION FOR CANDIDATES**

The total mark for this paper is 100.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

#### ADVICE TO CANDIDATES

You are advised to take account of the marks for each part question in allocating the available examination time.

	For Examiner's use only						
Question	Marks available	Marks	Remark				
1	9						
2	18						
3	18						
4	20						
5	14						
6	5						
7	16						

Total	100	

1 Underline the most appropriate word from those given in the brackets that will correctly complete each statement.

Examiner Only

Marks Remark

An object is an **(example, instance)** of a class that can perform a set of related activities that define its **(behaviour, operation)**.

Abstract classes (can, cannot) be instantiated.

An abstract class can only be used as a (super / base class, interface, derived / subclass) for other classes that (change, extend) it.

A class can inherit from **(one, many)** abstract class(es) and must **(overload, override)** all its methods/properties that are declared to be **(abstract, virtual)** methods/properties.

Polymorphism at run-time is a primary concept of object-oriented programming which is enabled through (early binding, late binding).

[9]

2	(a)			amental buil ages for the		s of progr	amming la	ınguag	es.	Examin Marks	er Only Remarl
		Advantaç	ge 1								
			ge 3								
	(b)		de to crea	te and popu eviated forn	ulate an ar						
		Jan	Feb	Mar			Nov	Dec			
									[3]		

(c) Two arrays, Months (1-dimensional), and MonthlyBookings (2-dimensional), have been designed to hold related data for the annual use of an activity centre.

An example of the contents of each array is shown below.

Examin	er Only
Marks	Remark

Months		Bookings (Child)
Jan	154	241
Feb	238	367
Mar	261	475
Apr	258	493
Dec	188	395

The price for an adult is £2.50 and for a child £1.50. Income is calculated as the number of Adult bookings multiplied by the adult price plus the number of Child bookings multiplied by the child price.

Assuming the **Months** and **MonthlyBookings** arrays are fully populated, write **methods** to:

Return the average income for the year;
-

		[6]	

e to user entry error.		
Name the basic catch-all exce	eption.	
	[1]	
crash if a date is entered incor	dling would be implemented to prevent a rectly.	
	[5]	
, ,	at their customers are 18 years of age or	
over to secure a higher level of	methods for C# and Java  date part of current date; add or subtract years from	
A range of date  C# DateTime methods DateTime.Now.Date	methods for C# and Java  date part of current date;	
A range of date  C# DateTime methods DateTime.Now.Date	methods for C# and Java  date part of current date; add or subtract years from a date;  rmat:  current date;	
A range of date  C# DateTime methods DateTime.Now.Date myDate.AddYears(n)  Java methods Date for Date() myDate.before(newDate) myDate.after(newDate) methods Calenda	methods for C# and Java  date part of current date; add or subtract years from a date;  rmat:  current date; returns true / false returns true / false	
A range of date  C# DateTime methods DateTime.Now.Date myDate.AddYears(n)  Java methods Date for Date() myDate.before(newDate) myDate.after(newDate) methods Calendar Calendar.getInstance(); cDate.add(Calendar.YEAR	methods for C# and Java  date part of current date; add or subtract years from a date;  rmat:  current date; returns true / false returns true / false current date R, n); add or subtract years	
A range of date  C# DateTime methods DateTime.Now.Date myDate.AddYears(n)  Java methods Date for Date() myDate.before(newDate) myDate.after(newDate)  methods Calenda Calendar.getInstance();	methods for C# and Java  date part of current date; add or subtract years from a date;  rmat:  current date; returns true / false returns true / false returns true / false where cDate is a Calendar	
A range of date  C# DateTime methods DateTime.Now.Date myDate.AddYears(n)  Java methods Date for Date() myDate.before(newDate) myDate.after(newDate) myDate.after(newDate)  // convert Date to Calendar for	methods for C# and Java  date part of current date; add or subtract years from a date;  rmat:  current date; returns true / false returns true / false ar format:  current date R, n); add or subtract years  mat  de); where cDate is a Calendar instance  mat	
A range of date  C# DateTime methods DateTime.Now.Date myDate.AddYears(n)  Java methods Date for Date() myDate.before(newDate) myDate.after(newDate) myDate.after(newDate)  // convert Date to Calendar for cDate.setTime(currentDate)  // convert Calendar to Date for	methods for C# and Java  date part of current date; add or subtract years from a date;  rmat:  current date; returns true / false returns true / false  ar format:  current date R, n); add or subtract years  mat  e); where cDate is a Calendar instance  mat  ())	

Note: Assume the	and passed to	 a rana 1011		
			[6]	
			[0]	

(ii)	Exception Handling should be implemented to ensure that a system will not crash due to a user error in the Applicant Data Entry option. Three integers, dayDOB, monthDOB and yearDOB, are used for the data entry format and are passed as a date to an Applicant object, myApp, using the SET method:	Examino Marks	er Only Remark
	C# myApp.ApplicantDOB = new DateTime( int yearDOB, int monthDOB, int dayDOB );		
	Java myApp.setApplicantDOB(new Date( int yearDOB, int monthDOB, int dayDOB ));		
	Write the Exception Handling code that will ensure errors (illegal date, non-adult) in an applicant's date of birth are detected and an appropriate error message output.  Note: Assume that a customised Exception called DOBException has been implemented by the Applicant class in the check for a valid adult age.		
	[6]		

4	(a)	Using examples for illustration describe what you understand by the following class terms.	Exam Marks	ner Only Remark
		overloading		
			_	
			_	
		example	_	
			_	
			_	
			_	
		interface	_	
			_	
			_	
		example		
			_	
			_	
			3]	

(b)	A class <b>Book</b> has been designed to hold data about available books for a school sale.  Examiner Only  Marks Remark												
	<pre>pub {</pre>	private String private String private String private String private double private int private int	bookNo; author; title; price; noCopies; noSold;	//ISBN No									
	(i)	Write code to instantia data on 50 books.	te an array, a	arrBook, capable of holding	[4]								

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12303 **11 [Turn over** 

5	The following class method has been designed to validate a book code made up of ten characters.										
	pub {	lic boolean validBookCode( string bookCode)									
		<pre>if( validBookFormat( string bookCode)   if( validBookRelationship( string bookCode)      return true;</pre>									
	}	return false;									
	(a)	Giving your reason, select an appropriate visibility option, from the list given below in brackets, for the methods validBookFormat and validBookRelationship. Underline your selection.									
		( public private protected)									
		Reason									
		[2]									
	(b)	Write the code for the method validBookFormat() that will return true if the <b>format</b> of a book code consists of 10 digits or 9 digits followed by the character X.									
		[4]									

#### **BLANK PAGE**

(Questions continue overleaf)

- (c) Write the code for the method validBookRelationship() that will return true if a remainder of zero is given after the following process:
  - Multiply each digit of the book code by the numbers 10 to 1 descending from left to right.

(If the final character is an X it should be replaced with the number 10 for the process)

- Sum the result of each product.
- Divide the sum by 11.
- Determine if the remainder is zero.

Example 0201530813 is a valid code.

Example 0201	3300	77013	ave	alla v	code	·.				(if character X replace with 10)
Book Code	0	2	0	1	5	3	0	8	1	3
Multiply book code digit by	10	9	8	7	6	5	4	3	2	1
Sum products	0+	18+	0+	7+	30+	15+	0+	24+	2+	3 = 99
Divide by 11			ç	99/ 1	11 =	9 <b>R</b> e	ema	inde	r 0	

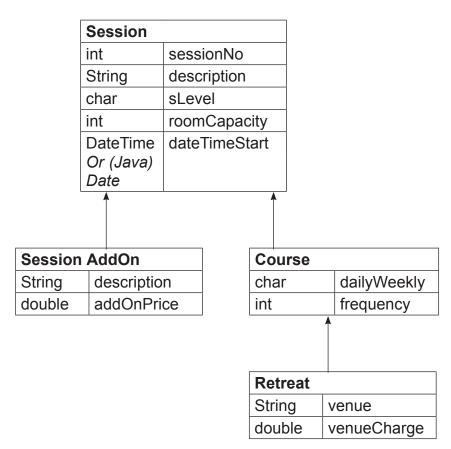
#### www.xtrapapers.com

			Examine	
			Marks I	Remark
		[8]		

YogaLife is a centre offering Yoga from beginner to trainer level. Add-ons such as consultations or meditations are also available. Apart from one-off taster sessions, clients can prepay for courses of 4, 6 or 8 sessions. A Retreat is a course held at an off-site venue.

## Examiner Only Marks Remark

#### Inheritance Diagram for YogaLife



(a)		ntify which inheritance term best describes the associations for towing:	he	Examine Marks	er Only Remark
	(i)	The class <b>Course</b> to the class <b>Session</b> ;	[4]		
	(ii)	A method <b>Cost()</b> in the class <b>Course</b> to a method <b>Cost()</b> in <b>Session</b> . (The method Cost() in the class <b>Session</b> returns the unit cost of a session based on the session level);	ניו		
			[1]		
	(iii)	An array of type <b>Session</b> also holding courses and retreats.			
			[1]		
(b)		ould the term abstract be applied to the class Session?			
		lerline your choice. Yes / No	[1]		
	Giv	e a reason for your choice.			
			[1]		

Usi	ng the Inheritance Diagram for YogaLife given in question <b>6</b> :		ner Only
(a)	Complete the following code for the class <b>Course</b> :	Marks	Remark
	• class header;		
	• field definitions;		
	field / parameterised constructor;		
	public class Course {		
	[7]		

(b)	Write the method <b>Cost()</b> for the class <b>Course</b> that will return the cost of a course. The cost is calculated by the method Cost() available in class Session multiplied by the frequency.	Examiner Only  Marks Remark
	[4]	
(c)	Write the method <b>MaxProfit()</b> for the class <b>Retreat</b> that will return the maximum profit possible for a retreat. It is calculated as the cost of the course multiplied by the capacity, less the charge for the venue.	
	THIS IS THE END OF THE QUESTION PAPER	

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