



**UNIVERSITY OF COLOMBO, SRI LANKA**

**UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING**

**DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)**  
*Academic Year 2010/2011 – 2nd Year Examination – Semester 3*

***IT3105: Object Oriented Analysis and Design***  
***PART 2 – Structured Question Paper***

**28<sup>th</sup> February, 2015**  
**(ONE HOUR)**

**To be completed by the candidate**

BIT Examination Index No: \_\_\_\_\_

**Important Instructions:**

- The duration of the paper is **1 (one) hour**.
- The medium of instruction and questions is English.
- This paper has **2 questions** and **09 pages**.
- **Answer All questions.**
- All questions will carry equal marks.
- **Write your answers** in English using the space provided **in this question paper**.
- Do not tear off any part of this answer book.
- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper.  
If a page is not printed, please inform the supervisor immediately.
- **Non-programmable Calculators may be used.**

**Questions Answered**

Indicate by a cross (×), (e.g.  × ) the numbers of the questions answered.

To be completed by the candidate by marking a cross (×).	Question numbers	
	1	2
To be completed by the examiners:		

1) An Information System needs to be developed for ‘Dream Motors’ company. Dream Motors is a company which imports and sells Brand-New and Re-conditioned motor vehicles. Currently, the company deals only with Motor cars and SUVs. They are planning to expand sales to passenger vans and motor coaches as well in the near future. Important information regarding each vehicle are Chassis No, Engine No, Make (Toyota Nissan etc) , Model (Axio, Allion etc), Year of Manufacture, Country of Manufacture, Cylinder Capacity (1.5 cc, 1.8 cc etc.), Vehicle type (Motor Car, SUV), Fuel Type (Petrol Diesel), Mileage (0 for Brand New Vehicles), purchased price and selling price. There are different options that may be available with vehicles such as power mirrors, power shutters, retractable mirrors, cruise control, multifunction keys, push start etc. Each vehicle may have one or more of these options. Information about customers who buy a vehicle needs to be recorded. NIC/Passport number, name, address and contact number are important. Customers can pay for a purchase using different types of payment methods. A payment clerk enters the payment details into the system. Customers who have purchased vehicles from Dream Motors can upgrade their vehicles after using them for some years by exchanging the old vehicles with new vehicles. The old vehicle is valued and that value known as Exchange Value is given as a discount for the new vehicle purchase. Information regarding the exchange is maintained. There is a warranty period for vehicles sold by Dream Motors. For a Brand new Vehicle, 50,000 Km warranty is given and for a Re-conditioned motor vehicle, warranty is for 25,000 km. Customers can claim for a free repair of the vehicle during this period if some fault occurs. Information regarding such repairs are also maintained. Customers can view such information after login into the system. The Manager of Dream Motors should be able to get different types of reports regarding purchases and sales of the company. Customer details, Vehicle details, Purchase requests, Maintenance Requests are handled by the Registration Clerk.

(a) Identify the *actors* in the system.

<p><b><u>ANSWER IN THIS BOX</u></b></p> <p><b>Payment Clerk, Customer, Manager, Registration clerk</b></p> <p>-----</p> <p>-----</p> <p>-----</p> <p style="text-align: right;"><b>(04 Marks)</b></p>
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(b) Identify five (5) *usecases* for the above system.

<p><b><u>ANSWER IN THIS BOX</u></b></p> <p><b>Payment, Enter Customer Details, Enter Vehicle Details, Enter Purchase Details, Request Maintenance, Reporting, Inquiry, Exchange vehicles</b></p> <p>-----</p> <p>-----</p> <p>-----</p> <p style="text-align: right;"><b>(10 Marks)</b></p>
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(c) 'Vehicle' is one of the classes identified in the system.

i. Identify five (5) attributes of the 'Vehicle' class.

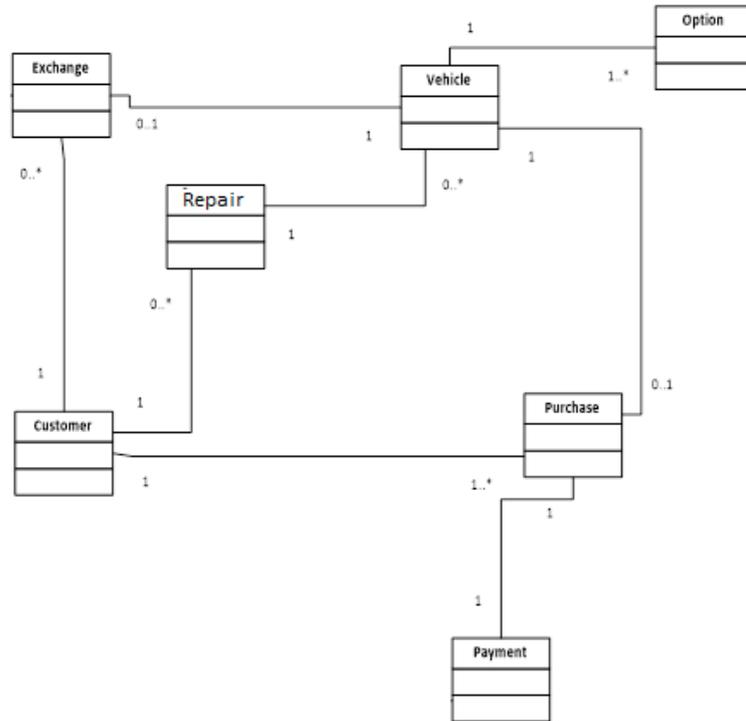
<p><b>ANSWER IN THIS BOX</b></p> <p><b>Chassis Number, Engine No, Make, Model, Year of Manufacture, Country of Manufacture, Cylinder Capacity , Vehicle type, Fuel Type, Mileage, Purchased price and Selling price.</b></p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p style="text-align: right;"><b>(05 Marks)</b></p>
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ii. Identify three(3) methods in 'vehicle' class

<p><b>ANSWER IN THIS BOX</b></p> <p><b>getMotorCarDetails, getBrandNewMotorVehicles, getJapaneseVehicles, getReconditionedMotorVehicles, getOptionDetails, getContactDetails</b></p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p style="text-align: right;"><b>(06 Marks)</b></p>
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- (d) Customer, Purchase, Repair, Vehicle, Option, Exchange and Payment are some of the classes identified in designing the system. Identify the relationships between these classes and draw the class diagram in UML by indicating the multiplicities.

**ANSWER IN THIS BOX**



(35 Marks)

- (e) If 1.5% discount and 1.0% discount are given when the purchase is done using a cheque and for a transaction using a bank draft respectively, how do you modify the class diagram drawn in 1 (d) to accommodate this requirement?

**ANSWER IN THIS BOX**

Create 2 new classes as Bank draft and cheque. Inheritance relationship between Payment and Check , Payment and Bank draft.

**(20 Marks)**

- (f) Payment is one of the scenarios in this system. Name the objects need to communicate in the Payment scenario.

**ANSWER IN THIS BOX**

Customer, Payment, Vehicle

**(20 Marks)**

- 2) (a) Consider the following list of UML models and match the most suitable answer for the given questions given in the table.

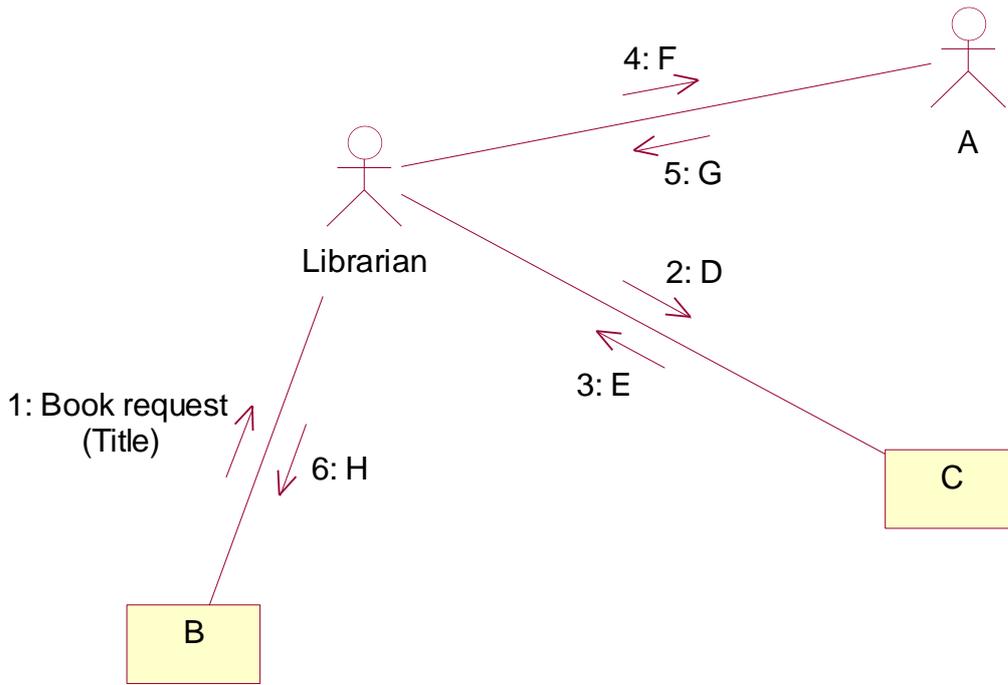
Class Diagram, State Diagram, Component Diagram, Deployment Diagram, Package Diagram, Use Cases, Collaboration Diagram.

<b><u>ANSWER IN THIS BOX</u></b>		
	<b>Statement</b>	<b>Most Suitable Model</b>
<b>A.</b>	How will our system interact with the outside world?	
<b>B.</b>	What objects do we need? How will they be related to each other?	
<b>C.</b>	How will the objects interact?	
<b>D.</b>	What states should our objects be in?	
<b>E.</b>	How are we going to modularise our development?	
<b>F.</b>	How will our software components be related?	
<b>G.</b>	How will the software be deployed?	

**(21 Marks)**

- (b) Consider the following chain of events for "Borrow Book" use case in a library case study and the partially completed Communication diagram for the given scenario.

- The Customer goes to the librarian and asks for the book “*Systems Analysis and Design Methods by Jeffrey L. Whitten, Lonnie D. Bentley*”
- The Librarian looks in the index for the name of the book. She finds the index card for the book, which says that the book is located at shelf 5S.
- The Librarian asks the assistant to retrieve the book from shelf 5S.
- The assistant gets the requested book and returns it to the librarian.
- The librarian checks out the book and hands it to the customer.



Identify the labels A-H to complete the Communication diagram for the given scenario.

**ANSWER IN THIS BOX**

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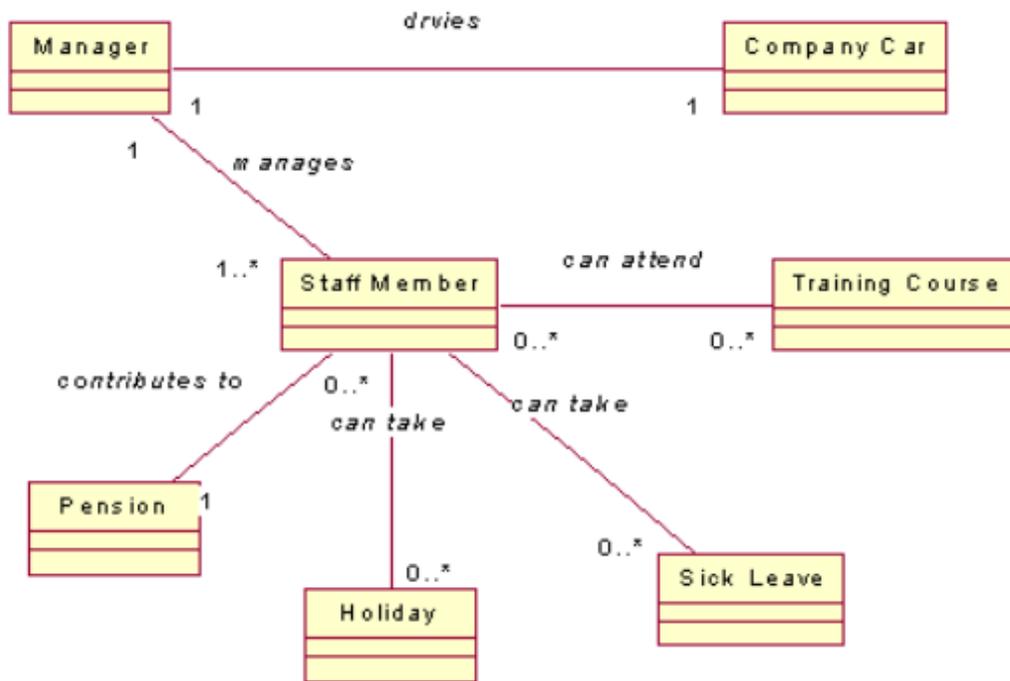
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**(20 Marks)**

(c) Consider the following class diagram and indicate whether the statements which follow are *true* or *false*.



**ANSWER IN THIS BOX**

Statement	True / False
Each Manager manages one or more staff members.	
One or more Staff Member contribute to one Pension.	
Each Manager contributes to one pension.	
Each Staff Member should take at least one Holiday	
Each Manager manages zero or more days of Sick Leave.	

**(25 Marks)**

(d) Create an activity diagram based on the following narrative.

The purchasing department handles purchase requests from other departments in the company. People in the company who initiate the original purchase request are the "customers" of the purchasing department. A case worker within the purchasing department receives that request and monitors it until it is ordered and received. Case workers process the requests for purchasing products under Rs.1,500, write a purchase order, and then send it to the approved vendor. If purchase requests is Rs.1,500 or over it must first be sent out for a bid from the vendor that supplies the product. When the bids return, the case worker selects one bid. Then, the case worker writes a purchase order and sends it to the approved vendor. Indicate the responsibility of *In-house customer*, *Purchasing Department*, and *Vender* in the diagram.

**ANSWER IN THIS BOX**

**(34 Marks)**

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