UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2014/2015 – 3rd Year Examination – Semester 5

IT5404: Internet Application Development
Structured Question Paper

08th March, 2015
(TWO HOURS)

To be completed by the candidate

BIT Examination Index No: _____

Important Instructions:

- The duration of the paper is **2 (two) hours**.

- The medium of instruction and questions is English.

- This paper has **4 questions** and **13 pages**.

- **Answer all questions.** All questions 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.

Questions Answered

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

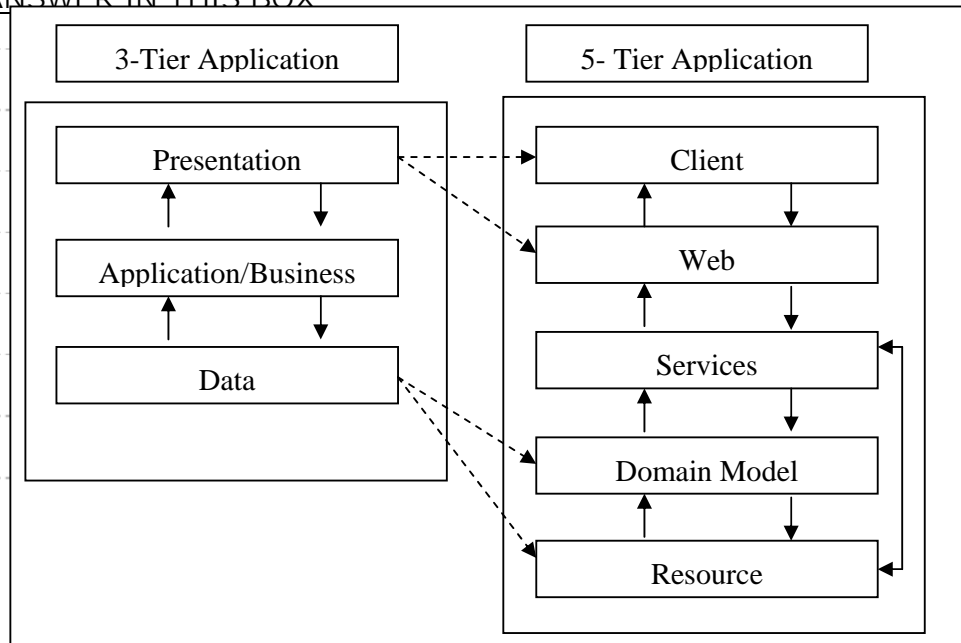| To be completed by the candidate by marking a cross (✗).	Question numbers				
	1	2	3	4	
To be completed by the examiners:					

1

1) (a) "It is important that we look at component-based application development because Web Services is dependent on its existence". Concerning this why are developers using constituents for their development? Write down two reasons to justify this statement.

(6 Marks)

> ### ANSWER IN THIS BOX
>
> 1. The ability to offer components built on standards that can easily be integrated into new and existing system
>
> 2. Having frameworks and programming models in place to guide developers to building consistent, highly sophisticated and highly organized applications (essentially plugging –in components to create a working application)
>
> 3. The need to generalize existing technologies and to re-use components in different layers of an application.
>
> 4. The need to have components that plug into the application or layers within the application and that can be managed separately
>
> Note: (any two answers out of four)

(b) Draw a block diagram of a 3-Tier Application and show how it could be elaborated as a 5-Tier application. Hint: Draw the diagrams side by side.

(6 Marks)

ANSWER IN THIS BOX

3-Tier Application	5- Tier Application
Presentation	Client
Application/Business	Web
Data	Services
	Domain Model
	Resource

(c) Briefly explain the Resources Tier in a 5- Tier Application.
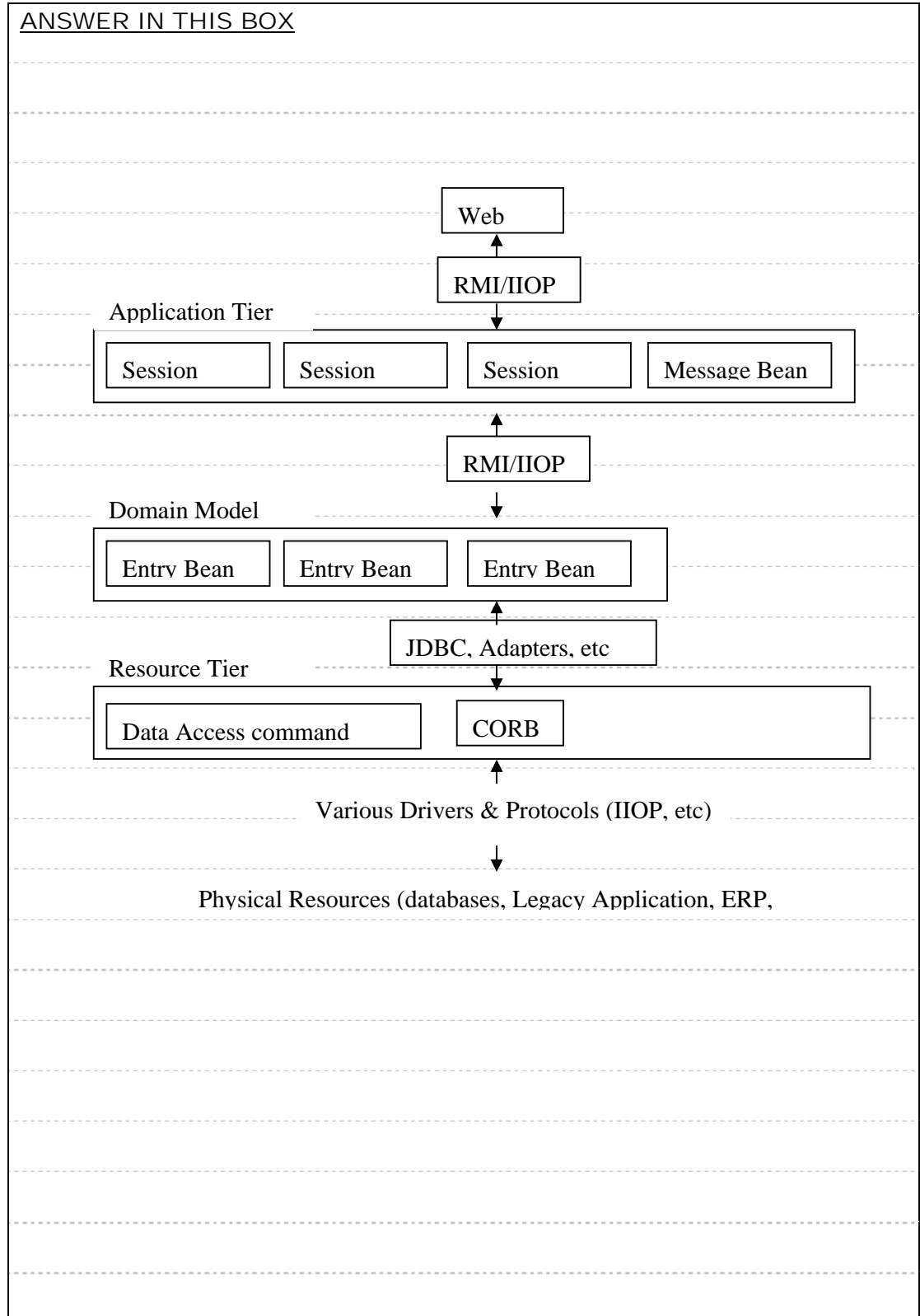
(6 marks)

ANSWER IN THIS BOX

Resource tier: (data/persistence tier) is the set of services that is responsible for the data access logic for retrieving and managing data from various physical resources or for providing access to other enterprise resources.

- Programming logic to communicate and to access database management systems

- XML processing logic to parse XML files (SAX, Dom)

- Components that wrap key enterprise systems such as customer Relationship Management (CRM) systems, Enterprise Relationship Planning (ERP) systems, Knowledge Management (KM) systems and legacy applications written in CORBA

- Logic to access native-XML databases such as Apache's Xindice

- Lower level logic to access binary files (Files I/O APIs)

Note: (expected answer is this with more details)

(d) Diagrammatically illustrate the 3-Tiers, their interactions, technologies and protocols used within the platform of J2EE and Enterprise Java Beans (EJB).

(7 marks)

ANSWER IN THIS BOX

```
                              ┌──────────┐
                              │   Web    │
                              └──────────┘
                                    ▲
                              ┌──────────┐
                              │ RMI/IIOP │
                              └──────────┘
                                    │
Application Tier                    ▼
┌──────────────────────────────────────────────────────────────────┐
│ ┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────────┐        │
│ │ Session  │  │ Session  │  │ Session  │  │ Message Bean │        │
│ └──────────┘  └──────────┘  └──────────┘  └──────────────┘        │
└──────────────────────────────────────────────────────────────────┘
                                    ▲
                              ┌──────────┐
                              │ RMI/IIOP │
                              └──────────┘
Domain Model                        ▼
┌────────────────────────────────────────────────┐
│ ┌───────────┐  ┌───────────┐  ┌───────────┐     │
│ │ Entry Bean│  │ Entry Bean│  │ Entry Bean│     │
│ └───────────┘  └───────────┘  └───────────┘     │
└────────────────────────────────────────────────┘
                                    ▲
                        ┌─────────────────────┐
                        │ JDBC, Adapters, etc  │
                        └─────────────────────┘
Resource Tier                       ▼
┌──────────────────────────────────────────────────────────────────┐
│ ┌─────────────────────┐      ┌──────────┐                         │
│ │ Data Access command │      │  CORB    │                         │
│ └─────────────────────┘      └──────────┘                         │
└──────────────────────────────────────────────────────────────────┘
                                    ▲
              Various Drivers & Protocols (IIOP, etc)
                                    │
                                    ▼
        Physical Resources (databases, Legacy Application, ERP,
```

2 | (a) Write down the purpose of the following different element declaration symbols used to establish the content model of the element as shown below.

```
<! ELEMENT resume (intro, (education | experience+)+,
hobbies? , references*)>
.
```

(7 Marks)

ANSWER IN THIS BOX

Element declaration symbols	Purpose
Parentheses (( ))	Encloses a sequence or choice group of child elements
Comma (,)	Separate the items in a sequence, which establishes the order in which they must appear
Pipe (	)	Separate the items in a choice group of alternatives
No symbol	Indicates that a child element must appear exactly once
Question Mark (?)	Indicates that a child element must appear exactly once or not at all
Plus sign (+)	Indicates that a child element must appear at least once
Asterisk (*)	Indicates that a child element can appear any number of times

5

(b) "The following is another way to express the exact link by spelling all of the pertinent XLink attribute values". Explain this according to the given line numbers (i), (ii),(iii),(iv), (v) and (vi).

```
<students xmlns : xlink = http://www.w3.org/1999/xlink
   (i)     xlink : type = "simple"
   (ii)    xlink : href = "students.xml"
   (iii)   xlink : show = "replace"
   (iv)    xlink : actuate = "user"
   (v)     xlink : role = "students"
   (vi)    xlink : title = "Student  List" >
Current Students
</students>
```

(6 Marks)

ANSWER IN THIS BOX

(i) XLink attributes are specified in order to fully describe the link. The type

attribute is set to simple, which indicates that this is a simple link.

(ii) href attribute for reference/attaché a file

(iii)The show attribute has the value replace, which indicates that the target resource

is to replace the current document when the link is traversed.

(iv) The actuate attribute has the value user, which indicates that link must be

actuated by the user for traversal to take place.

(v) The role attribute is set to indicate the meaning (function) of the link.

(vi) The title string that serves as a name for a link

6

(c) Write down a code to change the text appearance of "University of Colombo School of Computing" using appropriate values given below using the XSL-FO Language.

(font size=10pt, text align=end, background colour=blue, text colour=red, font family=serif)

(6 Marks)

ANSWER IN THIS BOX

```
<fo:block font-size="10pt"  text-align="end"  background-
color="blue"  color="red" font-family= "serif">

University of Colombo School of Computing

</fo:block>
```

(d) Write the correct query using proper syntax to display the following referencing attributes in XQuery.

```
(i)   To find all the year attributes of vehicle elements

(ii)  Return all of the vehicle elements that have year
      attributes as well
(iii) to find all of the vehicles with a colour of red or a
      price greater than 1300000,
```

(6 Marks)

ANSWER IN THIS BOX

```
(i) for $v in //vehicle/@year

    return $v

(ii) for $v in //vehicle[@year]

    return $

(iii) for $v in //vehicle[color='red' or price > '1300000']

    return $v
```

3 (a) List down six (6) operator types that are available in PHP with a brief description of each.

(6 Marks)

ANSWER IN THIS BOX

Type	Description
Arithmetic	Perform common arithmetical operations, such as addition and subtraction
Assignment	Assign values to variables
Bitwise	Perform operations on individual bits in an integer
Comparison	Compare values in a Boolean fashion (true or false is returned)
Error Control	Affect error handling (several new ones in PHP5)
Execution	Cause execution of commands as though they were shell commands
Incrementing/ Decrementing	Increment or decrement a variable
Logical	Boolean operators and AND, OR and NOT that can be used to include or exclude
String	Concatenates (joins together) strings
Array	Performs operations (such as append or split) on arrays

(b) What would be the output of the following PHP code?

```php
<?php
$first_name = "Kamal";
$last_name = "Guruge";
$whole_name = $first_name  . " " .  $last_name;
echo "First name plus last name = <b>$whole_name</b>";
```

(4 Marks)

ANSWER IN THIS BOX

First name plus last name = Kama Guruge

8

(c) The client side (of the consumer) of this application is represented by the nusoap-hello-client.php. Given below is a listing of this script. Explain the lines (i) to (vii), and write what it does.

```php
<? php

(i)  require_once ('nusoap.php');
(ii) $client = new soapclient
        ('http://localhost/soap/nusoap/nusoap-hello-
        server.php');
(iii)  $params = array ('massage' =>'world');
(iv) $response = $client-> call ('helloWorld',$params);
(v)  if ($client ->fault )
        {
(vi) print "ERROR! " . $client ->faultstring. "\n";
        }else {
(vii)  print $respose;
        }
?>
```

(5 Marks)

ANSWER IN THIS BOX

(i)	Include the NuSOAP classes and fuctions
(ii)	Create a new SOAP client using NuSOAP's soapclient-class
(iii)	Define the parameters we want to send to the server's helloworld() function. This argument should be sent as an array
(iv)	Send a request to the server, and store its response in $response
(v)	Check to see if there was an error generated by the server
(vi)	If there was an error, print an error message
(vii)	Print the server –response

(d) What would be the output of the following PHP code?

```
<body>
 <?php
   $x=1;
   while($x<=5) {
   echo "The number is: $x <br>";
   $x++;
   }
 ?>
</body>
```

(5 Marks)

ANSWER IN THIS BOX

The number is 1
The number is 2
The number is 3
The number is 4
The number is 5

(e) What would be the output of the following PHP code?

```
<body>
  <?php
    $i=1;
      do{
        $i++;
         echo "The number is " . $i. "<br/>";
         }
        While ($i<=5);
    ?>
  </body>
```

(5 Marks)

ANSWER IN THIS BOX

The number is 2
The number is 3
The number is 4
The number is 5
The number is 6

4   (a) Compare the Component Object Request Broker Architecture (CORBA), Distributed Component Object Model (DCOM) and Enterprise Java Beans (EJB) according to the given table, illustrating the Protocol(s), Programming environment and Operating Systems.

(6 Marks)

ANSWER IN THIS BOX

Details	CORBA	DCOM	EJB
Protocol(s)	IIOP	DCOM	RMI (Remote Method Invocation) or RMI/IIOP
Programming Environments	C,C++,Java, COBOL, Smalltalk, Ada Lisp, Python, IDL script and others	VB and Visual C++	Java
Operating Systems	Various	Windows	Various

(b) List down the basic features and characteristics of SOAP.

(6 Marks)

ANSWER IN THIS BOX

- SOAP is an XML-based protocol to let applications exchange information over HTTP or more simple: SOAP is a protocol for accessing a Web Service.
- SOAP stands for Simple Object Access Protocol.
- SOAP is a communication protocol.
- SOAP is a format for sending messages.

- SOAP is designed to communicate via Internet.
- SOAP is platform independent.
- SOAP is language independent.
- SOAP is based on XML.
- SOAP is simple and extensible.

- SOAP allows you to get around firewalls.

- SOAP is a W3C standard.

(c) Briefly explain the Building Blocks of SOAP.

(6 Marks)

ANSWER IN THIS BOX

• A SOAP message is an ordinary XML document containing the following elements.
– Envelope: (Mandatory) :   Defines the start and the end of the message
– Header: (Optional)   :   Contains any optional attributes of the message used in
                 processing the message, either at an intermediary point or at
                 the ultimate end point
– Body: (Mandatory)   : Contains the XML data comprising the message being   sent
– Fault: (Optional)   : An optional Fault element that provides information about
                 errors that occurred while processing the message

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(d) When the SOAP receiver accepts the SOAP message, its overall function is to disassemble the message, evaluate it and then process it. Briefly explain the main activities for which a SOAP receiver is responsible.

(7 Marks)

ANSWER IN THIS BOX

1. Interpreting headers specified by the transport protocol, such as the content type encoding headers, and any other headers
2. Unpackaging the message sent by transport protocol to retrieve the SOAP based XML SOAP Message
3. Parsing and validating the SOAP massage to ensure that the XML conforms to the XML-subset demanded by the SOAP specification.
4. Also verifying that the SOAP envelope structure is valid
5. Processing header entries that omit the SOAP-ENV: actor attribute, or the attribute that contains this SOAP Node's URL.
6. If they are marked as SOAP-ENV:must Understand="true", this SOAP processor must generate a fault and forward it to SOAP sender. If a fault does not occur upon carrying out the processing of the header entries, this SOAP node may add any new headers and continue parsing the rest of the document.
7. Forwarding the SOAP message to any intermediaries that were ignored, assuming that the actor attribute contained a different URI that was not intended for this SOAP node.
8. This includes header entries added by this SOAP node.

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