MONASH University

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Semester Two (Block B) 2018
Examination Period

Faculty of Information Technology

EXAM CODES: **FIT5192**

TITLE OF SUBJECT: **ENTERPRISE AND INTERNET APPLICATIONS DEVELOPMENT**

EXAM DURATION: 3 hours writing time

READING TIME: 10 minutes

THIS PAPER IS FOR STUDENTS STUDYING AT:(tick where applicable)

☐ Berwick	☐ Clayton	☐ Malaysia	☐ Off Campus Learning	☐ Open Learning
☐ Caulfield	☐ Gippsland	☐ Peninsula	☐ Enhancement Studies	☐ Sth Africa
☐ Parkville	☑ Other (specify) **Suzhou, China**			

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OPEN BOOK	☐ **YES**	☑ **NO**
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SPECIFICALLY PERMITTED ITEMS **if yes, items permitted are:**	☐ **YES**	☑ **NO**

Candidates must complete this section if required to write answers within this paper

STUDENT ID: _ _ _ _ _ _ _ _ _ STUDENT NAME: _ _ _ _ _ _ _ _ _ _

A (10)	B (40)	C(10)	D(40)	Total (100)

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FIT5192 Module One – Enterprise Applications Development for the Web (Total Marks: 50)

Part A (Multiple choice SINGLE answer): Attempt ALL questions in this part. There is no penalty for an incorrect answer. There is only one correct answer for each question. Mark your answer by entering the option of your choice in the table below.

10 x 1 marks = 10 marks

ANSWER GRID A

Question	**Your Choice** (Please choose from A, B, C, D or E)
Q1	
Q2	
Q3	
Q4	
Q5	
Q6	
Q7	
Q8	
Q9	
Q10	

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A-Q1. Ref: M1-L3-S16
Which thread or threads should handle the heavy processing in a GUI application?

A. The Initial Thread
B. **The Worker Thread**
C. The Event Dispatch Thread
D. A and B above
E. B and C above

A-Q2. Ref: M1-L4-S5
What are the ways to implement persistence in Java?

A. Serialization, Database Storage and File Storage
B. File Storage, JDBC and Database Storage
C. Serialization, ORM and File Storage
D. ORM, JDBC and Database Storage
E. **Serialization, JDBC and ORM**

A-Q3. Ref: M1-L5-S24
In the JSF lifecycle, for the initial request the stages are?

A. **Restore View, Render Response**
B. Restore View, Apply Request Values, Render Response
C. Restore View, Apply Request Values, Process Validations, Render Response
D. Restore View, Apply Request Values, Process Validations, Update Model Values, Render Response
E. Restore View, Apply Request Values, Process Validations, Update Model Values, Invoke Application, Render Response

A-Q4. Ref: M1-L5-S15
Which of the following corresponds to the default scope for a managed bean (in other words, if no scope annotation is specified by the bean developer)?

A. @ApplicationScoped
B. @SessionScoped
C. **@RequestScoped**
D. @ViewScoped
E. @FlowScoped

A-Q5. Ref: M1-L6-S9
When client side validation is implemented, why should server side validation be repeated?

A. Client side validation can be bypassed by knowledgeable users
B. Client side validation cannot be relied on
C. A hacker can inject malicious input into a form
D. **All of the above**
E. None of the above

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A-Q6. Ref: M1-L7-S36
Which is the simplest approach to modelling inheritance?

A. The single table strategy is the simplest approach
B. The joined table strategy is the simplest approach and is space efficient
C. The joined table strategy is the simplest approach but is less space efficient
D. The table-per-class strategy is the simplest approach and is space efficient
E. The table-per-class strategy is the simplest approach but is less space efficient

A-Q7. Ref: M1-L8-S11
Stateful session beans (EJBs):

A. Can be shared across multiple clients
B. Are used for tasks that must be performed in a single step
C. Must be assigned to a single client
D. Do not preserve conversation between components and clients
E. None of the above are true

A-Q8. Ref: M1-L8
Which of the following provides a binding between the 'name' property of the managed bean 'user'?

A. #{empty user.name}
B. #{user.name}
C. #{user[name]}
D. #{user.age % 2 ? "SurName" : "LastName"}
E. None of the answers

A-Q9. Ref: M1-L9-S16
What is the default type of method call in EJBs?

A. @Stateful
B. @Stateless
C. @Asynchronous
D. Undefined, must be declared explicitly
E. @Synchronous

A-Q10. Ref: M1-L11-S25
Which of the following is NOT a JAAS authentication method?

A. Basic authentication
B. Form-based authentication
C. Client authentication
D. Mutual authentication
E. Server authentication

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PART B (Short answer questions): Attempt ALL questions in this part. (Total 40 marks)

Question B1. [6 marks] Ref: M1-L2-S11

What is the Three-tier Architecture approach? Describe the potential advantages and disadvantages of this approach and provide an example using the Java EE platform.

[6 marks]

The three tiers involved in this architecture approach are Client, Business and Database. This approach helps separate the presentation logic (the user interface for the client) from the business logic (the application server). In the context of a Java EE application, the client would be served a JSF page, the business logic would be supported via an EJB which would communicate with the database via an Entity Manager.

Pros:
• It is easier to change or replace any tier without influencing the others tiers.
• Improves code reusability as similar business logic can be reused in many clients or applications.
• Enhanced scalability/load balancing because of the separation of the application and database.
• Adequate security policies can be enforced within the server tiers without hindering the clients. In addition, access to data can now be granted on a service-by-service basis.
• It provides better fault recovery as redundant servers can be used to recover the system from network or server failures.

Cons:
• It is more difficult to develop as considerations need to be made for multi-threading, security, distribution, deployment and administration support.

Question B2. [2+2=5 marks] Ref: M1-L2-28 to 30

B2.1
What are the containers used in the Java EE platform?

[2 marks]

- EJB
- Web
- App client
- Applet

B2.2
Describe some of the services provided by the containers on the Java EE platform.

[3 marks]

Example of services provided by Java EE containers include:
- EJB & servlet lifecycles
- State management
- Multithreading
- Resource pooling and etc.

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Question B3. [4 marks] Ref: M1-L5-S7

Briefly describe the usage of following Java server Faces Architecture: [4 marks]

JSF component	Brief description of usage
Faces Servlet and optional faces-config.xml	FacesServletis the main Servlet for the application and can optionally be configured by a faces-config.xmldescriptor file.
Facelets and Java Server Pages (JSP)	Facelets are the view declaration language for JSF that can be used for creating web pages. It is typically implemented through an XML document such as XHTML. Its purpose is to enable code reusability and easy access to managed beans via EL statements.
Converters and Validators	Converters convert a component's value (Date, Boolean, etc.) to and from markup values (String). Validators are responsible for ensuring that the value entered by a user is valid (most of the validation can be delegated to Beans)
Backing Beans	The business logic is made in backing beans, which also control the navigation between pages.

Question B4. [2+2=4 marks] Ref: M1-L4

B4.1
What is the link between Java Persistence API (JPA) entities and the Java Persistence Query Language JPQL?

[2 marks]

- Each object (entity) is typically related to a table in the database via ORM.
- Each instance is typically related to a row in a table via ORM
- JPQL provides a way to map the relationships (in the database) to the objects (entities) in the program, these can then be queried.

Or similar etc.

B4.2
What are some of the benefits of using the criteria API to query entities versus JPQL and other lower level query languages?

[2 marks]

- Queries written using Criteria API are type-safe.
- Most of the errors are discovered at compile time

Or similar etc.

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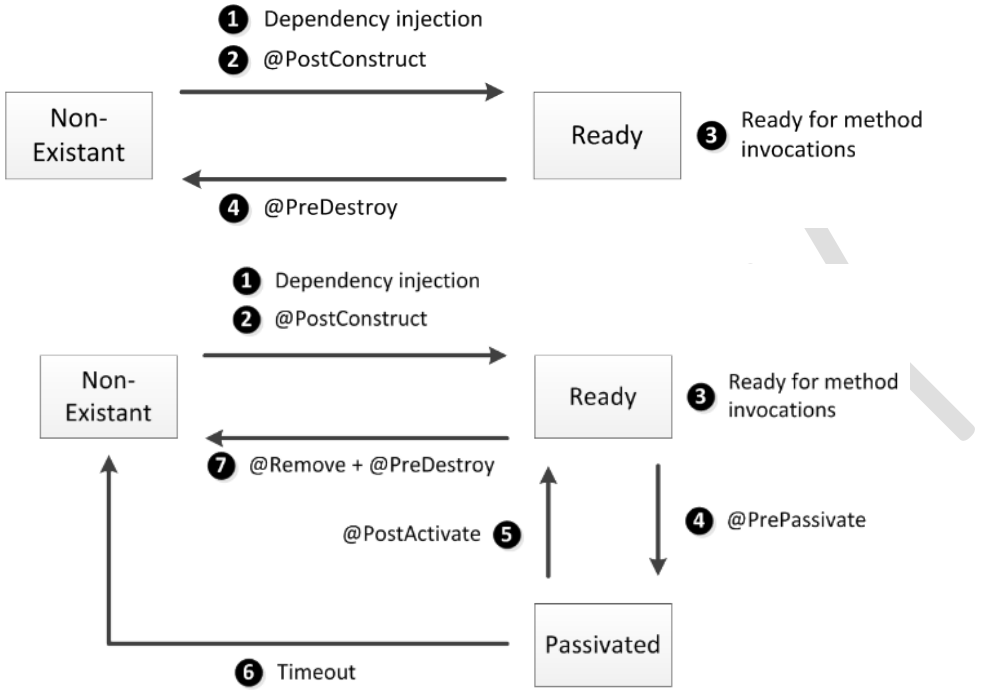
Question B5. [2+2+2=6 marks] M1-L9-S9

Given the below lifecycle diagrams of Stateless and Stateful session beans:



B5.1

Why is there a difference between the lifecycle diagrams of Stateless and Stateful session beans?

[2 marks]

- As there is no state in a stateless session bean, it does not need to be passivated
- Similarly, as a stateless session bean has no state to preserve, it can be shared across clients and so does not need to timeout.

Or similar etc.

B5.2

What would the @PrePassivate and @PostActivate annotations be used for in an Enterprise application?

[2 marks]

- These are used to annotate methods that are called before passivation and after passivation
- The Prepassivate function would normally prepare the object for serialisation, giving up any specific resources that can't be serialised
- The Postactivate function would prepare the object for deserialisation and then also obtain the specific resources that were given up before serialisation.

Or similar etc.,

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B5.3
Under what circumstances would it be appropriate to use a stateful EJB Session Bean? Provide an example of where this could be used.

[2 marks]

Question B6. [6 marks] Ref: M1-L5-26to40

Describe each of the 6 stages of the Java Server Faces (JSF) page lifecycle.

[6 marks]

JSF Lifecycle Stage	Description
Restore View	If initial request, then a blank view generated and returned, otherwise the view is restored and continue on life cycle.
Apply Request Values	Any request parameters are applied to the managed bean. Any errors, then the response is rendered otherwise continue on life cycle.
Process Validations	Any validation applied, if errors then response is rendered otherwise continue on life cycle.
Update Model Values	Model values are updated and continues on life cycle.
Invoke Application	The application logic is executed
Render Response	The output is returned to the user (including any error messages

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Question B7. [2+4=6 marks] M1-L6-S14

B7.1
What is the required format for a password processed by the following regular expression validation tagged XML code:

[2 marks]

```
<h:inputSecret id="password"
     value="#{user.password}"> <f:validateRegex
     pattern="((?=.*\d)(?=.*[a-z])(?=.*[A-Z])
     (?=.*[@#$%\!\?]).{8,20})" />
</h:inputSecret>
```

B7.2
Explain how the Form-based Authentication approach works via JAAS and how user credentials are validated on the server.

[4 marks]

- Using JAAS, which provides a set of APIs that enable various services within the Java EE platform to support authentication and enforce access control lists (ACL) upon user roles.
    - JAAS makes it possible to secure Java EE applications by dictating which areas of the application are restricted (such as an EJB or URL location) and who they are restricted to (authenticated users).
    - Typically it is used to separate different user roles in an application such as a general user and an administrator. This enables developers to add user authentication and registration to their applications with the support of an established, validated security framework.
- Supports various authentication schemes such as:
    - Basic authentication
    - Form-based authentication
    - Digest authentication
    - Client authentication
    - Mutual authentication
- Provides a seamless authentication method across the application

Or similar etc.

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Question B9. [1+3=4 marks] M1-L7-S8

Consider the following annotated entities and then answer the questions on the following page (Note: constructors, getter and setter methods omitted for brevity):

Code snippet A:

```
@Embeddable
@Access(AccessType.PROPERTY)
Public class PhoneNumber implements Serializable {

      Private String countryCode;
      Private String areaCode;
      Private String phoneNumber;
      […]
}
```

Code snippet B:

```
@Entity
Public class Staff implements Serializable {

      @Id
      @GeneratedValue
      @Column(name = "Staff_id")
      private int staffId;

      @Column(nullable = false);
      private String firstName;

      private String middleName;

      @Column(nullable = false);
      private String lastName;

     @Embedded
      Private PhoneNumber contactNumber;
      […]
}
```

Code snippet C:

```
Staff staff1 = new Staff("Sam", "S", "Smart", new
PhoneNumber("61", "03", "98778987"));

Staff staff2 = new Staff("Willy", "", "Wise", new
PhoneNumber("61", "03", "98778789"));

entityManager.persist(staff1);
entityManager.persist(staff2);
);
```

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B9.1
What type of object relation exists between the classes defined in the Code snippets A and B?

[1 mark]

Composition relationship

B9.2
After execution of the Code snippet C, how would the data be stored within the database?
(Please draw a picture showing all table entries, column headers, data types and row instances.)

[3 marks]

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FIT5192 Module Two – Internet Applications Development (Total Marks: 50)

Part D (Multiple choices SINGLE answer): Attempt ALL questions in this part. There is no penalty for an incorrect answer. There is only one correct answer for each question. Mark your answer by entering the option of your choice in the table below.

10 x 1 marks = 10 marks

ANSWER GRID D

Question	**Your Choice** (Please choose from A, B, C, D or E)
D-Q1	
D-Q2	
D-Q3	
D-Q4	
D-Q5	
D-Q6	
D-Q7	
D-Q8	
D-Q9	
D-Q10	

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D-Q1. Ref: M2-L1-S29
In terms of the Flow Bohl usability guidelines which has the least significant positive impact for novice users?

A. Consistency
B. Familiarity
C. Flexibility and Efficiency
D. Feedback
E. Navigation

D-Q2. Ref: M2-L2-S6, 18
What are some of the problems with traditional ASP web applications and the _VIEWSTATE hidden field?

A. The server needs to store a large amount of data for each client
B. The application developer needs to create a hidden _VIEWSTATE control on every page
C. A large amount of data is passed to and from the server in each page refresh
D. All of the above
E. None of the above

D-Q3. Ref: M2-L3-S25
What do we mean by nested Master pages?

A. Master pages that inherit from higher level Master pages
B. Master pages that inherit from more than one higher level Master page at each level
C. Master pages that are defined inside each other
D. All of the above
E. None of the above

D-Q4. Ref: M2-L4-S33
What is/are the way(s) that IIS implements authentication?

A. HTML based authentication
B. Anonymous authentication
C. Advanced authentication
D. All the above
E. None of the above

D-Q5. Ref: M2-L4-S26
The site map information is configured in the:

A. web.config file
B. web.sitemap file
C. site map control
D. site map node control
E. None of the above

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D-Q6. Ref: M2-L4-S17
Why do we have custom validators?

A. So Customer details can be validated
B. To validate Custom data from a web application, ensuring data quality and integrity
C. To combine the functionality of the standard validators into one validation control
D. To create specific validation code that can't easily be done using normal validators
E. All of the above

D-Q7. Ref: M2-L5-S14
The AccessDataSource control can link to:

A. Oracle
B. MySQL
C. Access
D. SQL Server
E. All the above

D-Q8. Ref: M2-L6-S4
Which of the following is the default GridView Data Column type?

A. BoundField
B. ButtonField
C. CheckBoxField
D. CommandField
E. HyperlinkField

D-Q9. Ref: M2-L7-S19
Why is it important to set a maximum file upload size in Web Applications?

A. To give the user an indication of the file sizes that should be uploaded
B. One way to stop a file upload attack on the server
C. So that files smaller that this limit are not accepted by the server
D. All the above
E. None of the above

D-Q10. Ref: M2-L9-S17
The jQuery selector '#data' needs to match the:

A. ID of the relevant DOM object
B. Name of the relevant DOM object
C. Type of the relevant DOM object
D. All the above
E. None of the above

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PART D (Short answer questions): Attempt ALL questions in this part. (Total 40 marks)

Question D1. [2+3=5 marks] [M2 Topic1.1, various other references]

D1.1
List two key features that were part of the historical design of the internet that have impacted the design of modern internet applications.

[2 marks]

- Stateless HTTP protocol
- Layout less HTML

Or similar. Background topics 1.3 and 1.4 may also assist

D1.2
Describe how these two features have impacted the design of modern internet applications, and the importance of these impacts.

[3 marks]

- Application frameworks have built structures to overcome lack of state in the protocol, e.g. Viewstate mechanism of ASP.Net form based applications. State management is important for interactive data centric applications
- Layout features that augment HTML, e.g. CSS oriented approaches to control layout at low levels of detail. Controlling layout is important for graphics designers to ensure the page is layed out as designed.

Or similar etc.

Question D2 [2+3+2=7 marks] [M2-L1-S32, Topic3.2-Part 2]

D2.1
Name and briefly define two standard types of colour schemes that can be used in web applications.

[2 marks]

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D2.2 [M2-L1-S17, Topic2.2 Part 3]
Describe how mock-ups are used in the internet application development process, in particular identify the role of low-fidelity, medium-fidelity and high-fidelity mock-ups.

[3 marks]

- Use for rapid protoyping
- low-fidelity, low graphics resolution sometimes just sketches and described functionality
- medium-fidelity medium graphics resolution and some of the functionality built in.
- high-fidelity high graphics resolution almost like a final application, often with mock functionalty built in etc…

Or similar etc.

D2.3
Draw an example of a mock-up for a simple single ASP page application, identify which level of fidelity you have targeted for this mock-up.

[2 marks]

- 0.5 mark for identifying fidelity correctly
- 1.5 marks for mock-up

Or similar etc.

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Question D3. [2+3+3=8 marks]

D3.1 [M2-L5-S7]
When would a required field validator be used in an application? In your example, what error message would you give if the validation failed?

[2 marks]

D3.2 [M2-L5-S26-30]
Briefly describe how Navigation is implemented in an ASP.NET web application.

[3 marks]

D3.3 [M2-L7-S14, M2-L8-S31,41,45]
List three ASP.Net controls that use datasources and briefly describe how each of these controls use the datasource (what do the controls do?)

[3 marks]

- Data should be stored in a database for persistence (server rather than embedded database)
- Application will interact using a ASP.Net DataSource control e.g. SQLDataSource
- Insert/update,delete implemented using Insert/update,delete commands on the datasource (defined using e.g. SQL).
- Data Displayed using controls such as GridView, Listview, can be augmented with jquery/datatables etc

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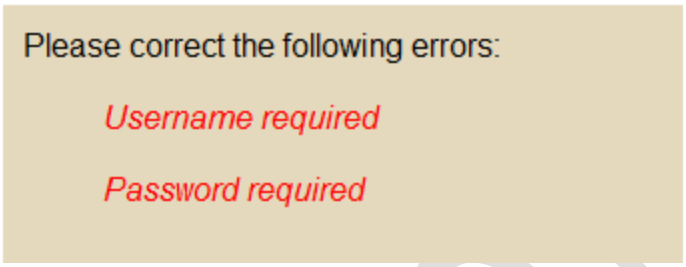
Question D4. [3 marks] [M2-L5-S37-40]



Shown here is a Login control. Complete the following script by writing a `LoginCheck` function, which is executed when the user clicks the button. The function will check that the user has entered "**admin**" as the username and "**fit5192**" as the password and if so, the user will be redirected to whatever page they first attempted to access.

Please complete the missing lines in the **LoginCheck**, **ASPX form** and **Web.Config** file on the following page.

```
<%@ Page Language="C#"%>
<script language="C#" runat="server">
void LoginCheck(object sender, AuthenticateEventArgs e)
{
  if(Login.UserName == "admin" && Login.Password == "fit5192")
  {
      FormsAuthentication.RedirectFromLoginPage(Login.UserName, false);
  }
}
</script>

<html>
  <head>
    <title>Forms Authentication</title>
  </head>
    <body>
    <form runat="server">
      <asp:Login ID="Login" runat="server"
```

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```
        OnAuthenticate="LoginCheck"
```

```
          CssClass="login"
          TitleText="<br />Please enter your details <br />
          below to login for this site.<br /><br />"
          UserNameLabelText="Username:"
          UserNameRequiredErrorMessage="Username required<p />"
          PasswordLabelText="Password:"
          PasswordRequiredErrorMessage="Password required"
        Height = "250" Width = "330"
          LoginButtonText="Click to login"
DisplayRememberMe="false">
        <LabelStyle CssClass="loginText" />
        <TitleTextStyle CssClass="loginText" />
        <ValidatorTextStyle CssClass="loginValidator" />
    </asp:Login>
      <p />

<asp:ValidationSummary id="vlSummary1" Font-Names="Arial"
        Visible="true" CssClass="vldSummary"
        runat="server" ValidationGroup="Login"
        HeaderText="Please correct the following errors:" />
    </form>
  </body>
</html>
```

Web.Config file

```
<configuration>
  <system.web>
```

```
<authentication mode="Forms"/>
```

```
  </system.web>
</configuration>
```

Question D5. [4 marks] [M2-L6-S7-19]

Given the Master Page on the following page, identify 4 key features that will be displayed on the content page that uses this master page.

[4 marks]

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```
<%@ Master Language="C#"%>
<script runat="server">
 protected void Page_Load(object sender, EventArgs e)
 { litBannerTitle.Text = Page.Title;
   lblDate.Text = DateTime.Now.ToLongDateString();
 }
</script>
<html>
<head id="Head1" runat="server">
  <title></title>
  <link href="StyleSheet.css" rel="stylesheet" type="text/css" />
</head>
<body>
<div style:width="400">
  <form id="form1" runat="server">
    <table cellpadding="0" cellspacing="0">
    <tr><td class="bordertxt" colspan="3" height="20"></td></tr>
    <tr>
      <td class="bannertxt"><img src="pix/BillnBenLeft.gif" /></td>
      <td class="bannertxt"> Bill n' Ben's Nursery <br />
        <asp:Literal ID="litBannerTitle" runat="server" />
      </td>
      <td class="bannertxt"><img src="pix/BillnBenRight.gif" /></td>
    </tr>
    <tr><td class="bordertxt" colspan="3" height="20"></td></tr>
    <tr>
      <td valign="top" class="bordertxt" style="height: 340px">
        <asp:HyperLink ID="hl1" runat="server"
          NavigateUrl="products.aspx" Text="Products" /><p />
        <asp:HyperLink ID="hl2" runat="server"
          NavigateUrl="customers.aspx" Text="Customers" /><p />
        <asp:HyperLink ID="hl3" runat="server"
          NavigateUrl="orders.aspx" Text="Orders" />
      </td>
      <td colspan="2" style="height: 327px" valign="top">
       <asp:ContentPlaceHolder ID="ContentPlaceHolder1"
                               runat="server">
        </asp:ContentPlaceHolder>
      </td>
    </tr>
    <tr>
      <td class="footertxt">   Copyright Bill n' Ben</td>
      <td class="footertxt" align="right">
        <asp:Label id="lblDate" runat="server" />
      </td>
      <td class="footertxt"></td>
    </tr>
    </table>
  </form>
</div>
</body>
</html>
```

- Banner with 2 images surrounding text (which is the page title, from content page) [this might be two features]
- Navigation links on the left
- Content in the right of the table
- Date/time displayed at bottom of page

Based on correct description, sequence should namely be major functionality [probably not in a master page though], followed by navigation followed by decoration items

Question D6. [5+3+5=13 marks] [M2-All]

You have been asked to design an Internet application for a sports club. You are required to use a Form based application that stores the club membership and event details in a database.

D6.1
Sketch your application structure, in particular identifying the main ASPX pages you will use in your application.

[5 marks]

Marks for identifying feature and for describing the way to implement in ASP.Net

UI Features, e.g:

- For user interface Flyout menu, using sitemap file and menu control
- Bread Crumbs sitemap file and SiteMapPath control
- SiteMap implemented using sitemap file and sitemap control
- Events Calendar using Calandar control and events database
- Tooltips for user help, using tooltip attribute in control

Data models and persistence, e.g:

- Data should be stored in a database for persistence (server rather than embedded database)
- Application will interact using a ASP.Net DataSource control e.g. SQLDataSource
- Insert/update,delete implemented using Insert/update,delete commands on the datasource (defined using e.g. SQL).
- Data Displayed using controls such as GridView, Listview, can be augmented with jquery/datatables etc

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D6.2 [M2-L5]
Identify at least three data validation components that you will use in your application. Briefly explain what they do and why they are needed.

[3 marks]

- Description of input validation framework, client side validation plus server side validation (for security)
- [Alternatively Client side validation used for quick response (no server side round trip)]
- Usability features in validation
- Give clear instructions on filling fields (to match validation)
- Good Feedback when validations are violated
- Only use validations that are required for business reasons (or security)

Or similar etc.

D6.3 [M2-L10]
Could the same application be implemented as an MVC application? If so briefly explain how, if not, explain why it can't be implemented.

[5 marks]

- URL mapped to file in Form based, while mapped to control and actions in MVC
- Form based is code centric, MVC tends to be data centric (generating models and code from data)
-

Or similar etc.

Two differences:

URL mapped: MVC applications split into **data model** code files, View code files and controller files that are invoked in a single call, form base app, functionality is developed page based executed when matching URL called

Code centric versus Data Centric: Code centric approach, tend to write the code **to interface with the relevant data sources**, however data centric approach, design data sources (data bases) and derive data models and code. This provides a significant productivity boost for standard functionality, so the developer focuses on application specific functions.

Models: Generally a model is a class or set of classes that describes all the business logic and additionally handles data access for an application. The model also contains code that defines its relationship with other models and defines the data validation rules to be used when adding or updating data.

Views: Views are the outputs or responses that are sent back to the user once a request is processed. They basically consist of markup (like HTML) code with embedded .NET code, but they can also be other forms of output like XML, PDF documents etc depending on the situation. Views can be thought of as the presentation layer of an application and ideally should be as "dumb" as possible.

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Controllers: Controllers control the application flow or logic of the application. Each web request is directed to a particular controller where the user input is accepted. The controller logic then decides what response is to be generated. The controller logic normally contains calls to models to access data, and also other functionalities like access control checks etc. Lastly, the controller passes the response (output) to the view. Controllers can be thought of as the control logic layer of the application. As mentioned above, the model should have all the business logic of an application. The controllers are used just to delegate the actions to the models and they should be "light". This design philosophy is sometimes referred to as "fat models and thin controllers".

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END of SAMPLE EXAM QUESTIONS