1 UNIT

# Introduction and Core Java

## CONTENTS


**Part-1** : Introduction : Introduction and Web Development Strategies, History of Web and Internet ..... **1–2D to 1–4D**

**Part-2** : Protocol governing Web, Writing Web Projects ..... **1–4D to 1–11D**

**Part-3** : Connecting to Internet, Introduction to Internet Services and Tools Introduction to Client-ServerComputing ..... **1–11D to 1–14D**

**Part-4** : Core Java : Introduction, Operator, Data Type, Variable Arrays ..... **1–14D to 1–17D**

**Part-5** : Methods and Classes, Inheritance, Packages and Interfaces ..... **1–17D to 1–25D**

**Part-6** : Exception Handling, Multithread Programming, I/O ..... **1–25D to 1–32D**

**Part-7** : Java Applet ..... **1–32D to 1–37D**

**Part-8** : String Handling, Event Handling ..... **1–37D to 1–40D**

**Part-9** : Introduction to AWT, AWT Controls, Layout Managers ..... **1–40D to 1–44D**

# PART-1

*Introduction : Introduction and Web Development Strategies, History of Web and Internet.*

## Questions-Answers

### Long Answer Type and Medium Answer Type Questions

**Que 1.1. Discuss web development strategy in brief.**

**Answer**

Web development strategy includes following :

1. **Identify target user :** Identify the user of the website by doing market research.
2. **Make our design portable :** To be successful, website design should be portable and accessible across different browsers, operating systems, and computer platforms.
3. **Design for low bandwidth :** Web pages in website should be accessible at any connection speeds. If page downloaded slowly then users will leave the website before they see the content.
4. **Plan for clear presentation and easy access to information :** Presentation of the information on the website must be clear and easily accessible to the user.
5. **Create smooth transitions :** Plan to create a unified look among the sections and pages of site. Reinforce the identifying elements of the site and create smooth transitions from one page to another.

**Que 1.2. Give the history of World Wide Web.**

**Answer**

1. In the history of the World Wide Web, there are two lines to be traced : the development of hypertext, and the development of the internet protocols.
2. In 1972, DARPA starts research leading to the internet.
3. Its main characteristic is the automatic routing of information packets and circumventing the problem of network vulnerability.
4. In 1979, Charles Goldfarb invents SGML which separates content structure from presentation.
5. In 1975, Alan Kay produces the first personal computer.

6. In 1987, CERN and the US laboratories connect to the internet as the main means of exchanging data between the laboratories.
7. In 1991 SLAC, the Stanford Linear Accelerator Center in California becomes the first web server in USA.
8. In 1992, the portable browser is released by CERN as freeware. Many HEP laboratories are now join with servers.
9. In 1995, Sun Microsystems produces HotJava, a browser which incorporates interactive objects.
10. In 2000, a massive denial of service attack is launched against major websites, including Yahoo, Amazon and e-bay.
11. In 2004, Abiline, the Internet2 backbone, upgraded from 2.5 Gbps to 10 Gbps. Network solutions begins offering 100 year domain registration.

**Que 1.3. Why it is important to identify the object in web development strategies ? Also explain, with the help of block diagram, web development process.**

**Answer**

It is essential to identify objects in web development strategies because it will help the developer to understand the elements that play a vital role in business applications.

**Web development process :**

The process of website development can be divided into following different life cycle steps :

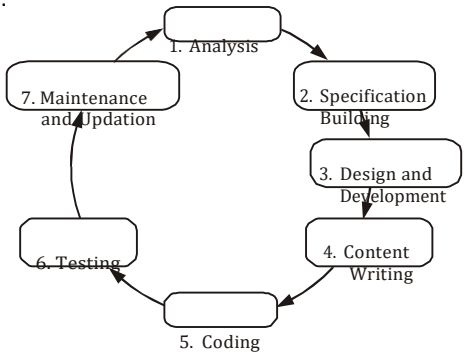



**Fig. 1.3.1.** Block diagram.

**1. Analysis :**

a. In this phase, all the information required for the web project is gathered.
b. Analysis of the requirement given by the customer is done by the

group of programmers and designers.

2. **Specification building :**
   a. In this phase, Software Requirement Specifications (SRS) document is prepared.
   b. In this document each and every element of the requirement is presented in detailed form.
3. **Design and development :**
   a. In design phase, the layouts and navigation will be designed as a prototype.
   b. Test plans and procedures are developed for quality assurance.
   c. In development phase, team will develop the database with all the data structures and sample data according to the requirements.
4. **Content writing :** There are professional content developers who write industry specific and relevant content for the site. The grammatical and spelling check should be done in this phase.
5. **Coding :**
   a. In coding stage programmers add the code without disturbing the design.
   b. Coding team generate necessary testing plans as well as technical documentation.
6. **Testing :**
   a. Both automated testing and manual testing should be done without fail.
   b. After doing all the testing, a live testing is necessary for websites and web based applications. After uploading the site there should be a complete testing.
7. **Maintenance and updation :** Once the website is operational, ongoing promotion, technical maintenance, content management and staff training is needed on a regular basis.

## PART-2

*Protocol Governing Web, Writing Web Projects.*

### Questions-Answers

**Long Answer Type and Medium Answer Type Questions**

**Que 1.4.** **Describe in brief, the growth of the web technology. Explain the protocols governing the web.**

**Answer**

**Growth of web technology :** Refer Q. 1.1, Page 1–2D, Unit-1.

**Protocols governing web :**

1. **HTTP (Hypertext Transfer Protocol) :**
   a. Hypertext Transfer Protocol (HTTP) is a method used to transfer or convey information on the World Wide Web.
   b. HTTP is a request/response protocol between clients and servers.
   c. The originating client, such as a web browser is referred as the user agent.
   d. The destination server, which stores or creates resources such as HTML files and images, is called server.
2. **ICMP (Internet Control Message Protocol) :**
   a. ICMP is primarily used by networked computers operating systems to send error messages.
   b. The purpose of these control messages is to provide feedback about problems in the communication environment.
3. **RIP (Routing Information Protocol) :**
   a. RIP is a dynamic routing protocol based on the Bellman-Ford algorithm.
   b. Routing is the method by which the host or gateway decides where to send the datagram.
   c. The goal of RIP is to supply the information that is needed to do routing.
4. **OSPF (Open Shortest Path First) :**
   a. OSPF is classified as an Interior Gateway Protocol (IGP).
   b. It distributes routing information between routers belonging to a single Autonomous System (AS).
   c. OSPF also provides the authentication of routing updates and utilizes IP multicast.
5. **TCP/IP :**
   a. TCP/IP stands for Transmission Control Protocol / Internet Protocol.
   b. It is the communication protocol for communication between computers on the internet.
   c. TCP is connection oriented protocol.
   d. TCP allows the transmission of arbitrary amount of data by breaking it into stream of separate IP packets.

**6. UDP :**

a. User Datagram Protocol (UDP) is a connectionless protocol without any error detection facility.

b. It is also used for transmission of data.

c. This protocol provides a procedure for application programs to send messages to other programs with a minimum of protocol mechanism.

**Que 1.5. Explain the HTTP protocol. Mention three basic featuresof HTTP that make HTTP a simple but powerful protocol. Give its architecture.** **AKTU 2018-19, Marks 07**

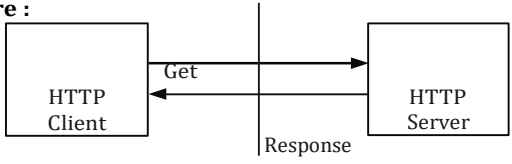
**Answer**

1. The Hypertext Transfer Protocol (HTTP) is an application-level protocol for distributed, hypermedia information systems. This is the foundation for data communication for the World Wide Web (*i.e.* internet).
2. HTTP is a generic and stateless protocol which can be used for other purposes as well using extensions of its request methods, error codes, and headers.
3. HTTP is a TCP/IP based communication protocol, that is used to deliver data (HTML files, image files, query results, etc.) on the WWW.
4. The default port is TCP 80, but other ports can be used as well.

**Features of HTTP protocol :**

1. **HTTP is connectionless :** The HTTP client, *i.e.*, a browser initiates an HTTP request and after a request is made, the client disconnects from the server and waits for a response.
2. **HTTP is media independent :** It means, any type of data can be sent by HTTP by specifying appropriate MIME type.
3. **HTTP is stateless :** As HTTP is connectionless and it is a direct result of HTTP being a stateless protocol. The server and client are aware of each other only during a current request.

**Architecture :**




HTTP Protocol

**Fig. 1.5.1.**

**Que 1.6. Explain web project.**

**OR**

**What are the stages and strategies required to develop a web project ?**

**Answer**

1. A web project is the process of developing and creating a website, activities in a network which are aimed at a pre-defined goal.
2. The network can be both accessible for everyone, as in the internet, or only for certain people, as an internet.

**Following are the various stages and strategies required in order to develop a web project :**

**Phase-I :** Strategy :

1. Goals and objectives
2. Team building
3. Research and review
4. Project proposal

**Phase-II :** Design and specification :

1. Developing concepts
2. Content planning
3. Rough design
4. Final design
5. Build prototype
6. Prototype testing

**Phase-III :** Production or development :

1. Coding

**Phase-IV :** Testing and maintenance :

1. Automation testing
2. Manual testing

**Phase-V :** Register with ISP :

1. Buy domain name
2. Hoisting

**Phase-VI :** Launch

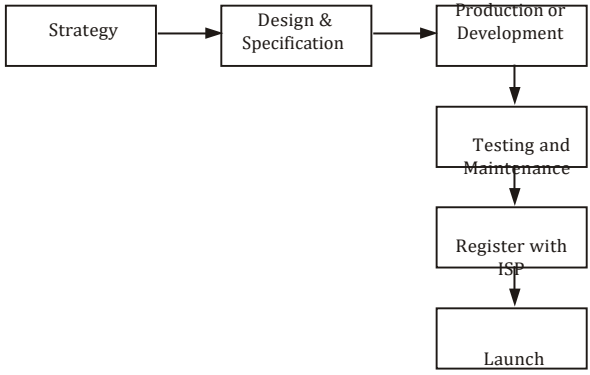



**Fig. 1.6.1.**

**Que 1.7. What do you understand by web technologies ? Write down the steps to develop multi-department and large scale website.**

**OR**

**What are the technologies used in web design ? What is the role of scripting languages in web design ?**

**Answer**

Web technologies are the technologies which are used to develop website for the World Wide Web or an internet.

**Following are various web technologies used in web design :**

1. **Client-side technologies :**
   - **a. XHTML :**
     - i. XHTML is a markup language designed to structure information for presentation as web pages.
     - ii. All XHTML programs are written to ensure that it is clean, valid and of the highest standard.
   - **b. Cascading style sheets :** Cascading style sheets control how web pages are displayed in the browser, and allow the separation of presentation from structure and content.
   - **c. JavaScript :** JavaScript is a lightweight scripting technology which is used alongside XHTML documents to make websites more interactive.
2. **Server-side technologies :**
   - **a. PHP :** PHP is a fast, server-side scripting language that is used to create interactive, dynamic websites.
   - **b. CGI/Perl :** Perl is a programming language that can handle input and output from a web server, usually through the Common

Gateway Interface.

**c. XML/XSL :**

i. XML is a software and hardware independent markup language designed for describing and transmitting information.

ii. XSL is a language for defining, transforming and formatting XML documents.

**d. MySQL :**

i. MySQL is a fast, open-source relational database management system that uses the popular Structured Query Language (SQL).

ii. MySQL is perfect for most websites that need database functionality.

**e. Linux/Apache :** Linux is a popular open-source operating system, and Apache is the most widely used web server on the internet.

**Steps to develop a multi-department and large scale website :**

1. **Gathering information :** It includes purpose, main goals, and target audience.
2. **Planning :** It includes sitemap and wireframe creation.
3. **Design :** It includes page layouts and review,
4. Content writing and assembly
5. Coding
6. Testing, review, and launch
7. **Maintenance :** It includes monitoring and regular updating.

**Role of scripting language in web design :**

1. Scripting language reflects the object orientation of web pages.
2. Scripting language was designed to add interactivity to HTML pages.

**Que 1.8. Explain various protocols governing web. Also, explain web team.** **AKTU 2017-18, Marks 05**

**Answer**

**Protocols governing web :** Refer Q. 1.4, Page 1–4D, Unit-1.

**Web team :**

1. Web team is a group of various technical experts in a developing site from coding the page to maintain the web server.
2. The ideal web team consists of two sub-teams :
   a. The client-side specialists, who create an attractive, clear front-end.
   b. The server-side specialists, who create a smoothly operating

back-end.

**Que 1.9. Describe the objective of any website. Which type of essential skills required being a member of web project team ?**

**AKTU 2018-19, Marks 07**

**Answer**

**Objectives of any websites :**

1. Providing quality content on our website regularly, adding new information, establishing trust, marketing our site on other websites and social media to become an authoritative resource.
2. E-mail marketing lists, online support (live chat), webinars is provided to improve interaction with existing and potential customers.
3. Provide active social media program, promotions, reputation management to our regular customers to build our brand.

**Essentials skills required being member of web project team are :**

1. **HTML/CSS :** As a web developer, one should need to understand the basics of coding and markup language such as HTML and CSS.
2. **JavaScript :** After learning HTML and CSS, one should have the knowledge of JavaScript as it makes websites more interactive and functional.
3. **Photoshop :** For editing, designing, and stylizing websites one should have the knowledge of Photoshop to design a handful of banners and logos for clients.
4. **PHP language :** Other than HTML/CSS, one should have the skill of writing code in PHP language which is the core part of WordPress.

**Que 1.10. Discuss the basic elements of a good website design, including navigation considerations.**

**Answer**

Basic elements of a good website design are as follows :

1. **Original content :** The most important element is the content shown on the first page of website. The first page should clearly focus on the information about the business.
2. **Well-organized and easy to read :** The most important information on any page should be property organized and easy to read.
3. **More click, less scroll :** Website should be designed in such a way that it has more clickable element and less scrollable.
4. **Share your knowledge :** Every business has knowledge that their viewers might find useful. Use our website to showcase that valuable asset.

5. **Intelligent use of graphics :** The website design should be easy to navigate and the menu items should easily accessible from any page. The viewer should always know exactly where they are on the website and have easy access to where they would like to be.
6. **Be interactive :** Create a site that encourages viewer participation.

**Que 1.11. Why planning is must before developing a website ? What are the advantages of early planning ?**

**Answer**

1. A successful website is a result of successful planning.
2. Hence, before creating and uploading website, it is important to take the time to plan exactly what is needed in the website.
3. Thoroughly considering the audience or target market, as well as defining the purpose and deciding what content will be developed, are extremely important.
4. This will save time, energy and expense in long run. Early planning also helps to maintain our focus. Therefore, planning is must before developing a website.

**Advantages of early planning :** The main advantage of early planning is that planning helps in deciding the following questions :

1. Why are we building the website ?
2. What do we envision as the goal of the site ?
3. What do we hope to gain from creating and maintaining a website ?
4. How will we judge the success of the site ?
5. Who is the target audience ?
6. What are the limiting technical factors affecting our site ?

# PART-3

*Connecting to Internet, Introduction to Internet Services and Tools, Introduction to Client-Server Computing.*

**Questions-Answers**

**Long Answer Type and Medium Answer Type Questions**

**Que 1.12. Briefly explain the internet concepts.**

**AKTU 2016-17, Marks 10**

**OR**

**What is internet ?**

**Answer**

1. Internet is a global system of interconnected computer networks that use the standard Internet Protocols suite (TCP/IP) to serve billions of users worldwide.
2. Internet is a network of networks that consists of millions of private and public, academic, business, and government networks of local to global scope that are linked by a broad array of electronic, wireless and optical networking technologies.
3. The internet carries a vast array of information resources and services, to support electronic mail.
4. Most traditional communications media, such as telephone and television services, are reshaped or redefined using the technologies of the internet, giving rise to services such as Voice over Internet Protocol (VoIP).
5. Newspaper, book and other print publishing has been reshaped into web sites, blogging, and web feeds.
6. The internet has enabled or accelerated the creation of new forms of human interactions through instant messaging, internet forums, and social networking sites.

**Que 1.13. What is internet service ? Explain various types of internet service.**

**Answer**

1. Internet service provides a way for data to be transferred from internet servers to our computer.
2. Internet service allows us to access huge amount of information such as text, graphics, sound and software over the internet.

**Four different categories of internet services are as follows :**

1. **Communication services :** There are various communication services available that offer exchange of information with individuals or groups which are as follows :
   a. Electronic mail
   b. Telnet
   c. Mailing lists
   d. Internet telephony (VoIP)
2. **Information retrieval services :** There exist several information retrieval services offering easy access to information present on the internet which are as follows :
   a. File Transfer Protocol (FTP)

b. Gopher

3. **Web services :**

a. Web services allow exchange of information between applications on the web.

b. Using web services, applications can easily interact with each other.

4. **World Wide Web (WWW) :**

a. WWW offers a way to access documents spread over the several servers over the internet.

b. These documents may contain texts, graphics, audio, video, hyperlinks.

c. The hyperlinks allow the users to navigate between the documents.

**Que 1.14. Explain client-server computing.**

**Answer**

1. A client-server system is a networked computing model that distributes processes between client and servers.
2. A client-server process usually manages the user-interface portion of the application; validate data entered by the user, dispatch requests to server programs.
3. Client process also manages the local resources that the user interacts with such as the monitor, keyboard, workstation, CPU and other peripherals.

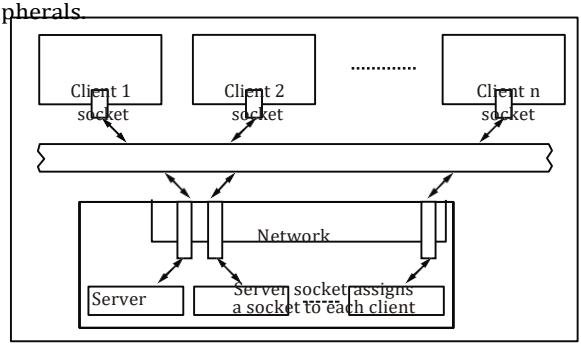



**Fig. 1.14.1.**

4. Server process fulfills the client request by performing the service

requested.

5. The main aim of the server process is to perform the back-end tasks that are common to similar applications.

6. After the server receives requests from clients, it executes database retrieval, updates and manages data integrity and dispatches responses to client requests.

# PART-4

*Core Java : Introduction, Operator, Data Type, Variable Arrays.*

## Questions-Answers

### Long Answer Type and Medium Answer Type Questions

**Que 1.15. Explain some features of Java.**

**OR**

**Elucidate the features of java.** **AKTU 2016-17, Marks 15**

**Answer**

The basic features of Java are as follows :

1. **Simple :** Java is easy to learn.
2. **Object-oriented :** All the functions are defined inside the classes.
3. **Platform independent :** It is platform independent programming language because it compiles to byte-code. This byte code is interpreted by the Virtual Machine (JVM) on any platform.
4. **Robust :** Java is graceful in the presence of software or hardware errors. Java has very good exception handlers.
5. **Secure :** Java has no pointers. All pointer-related security problems are gone. So it is more secure.
6. **Portable :** Java is portable because it facilitates us to carry the Java bytecode to any platform. It does not require any implementation.
7. **Multithreaded :** Java programs are capable for easy to set up multiple threads of execution and coordinate parallel processes.
8. **Dynamic :** Java is a dynamic language. It supports dynamic loading of classes. It means classes are loaded on demand. It also supports functions from its native languages, i.e., C and C++.
9. **Garbage collection :** Java has an automatic garbage collector which releases the objects which are not in use from long time.

**Que 1.16. Discuss data type in Java.**

**Answer**

Data type is a classification of data which tells the compiler or interpreter how the programmer intends to use the data.

**Types of data type are :**

**a. Primitive data types :**

1. Primitive data types are built-in data types.
2. Java initializes all primitive data types to default values.
3. Primitive data types are byte, short, int, long, float, double, boolean and char.

**b. Reference data types :**

1. Reference data types are made by the logical grouping of primitive data types.
2. These are called reference data types because they contain the address of a value rather than the value itself.
3. Reference data types are arrays, objects, interfaces, enum etc.

**Que 1.17. Discuss operators in Java.**

**Answer**

An operator is a symbol that usually represents an action or process. These symbols were adapted from mathematics and logic.

**Following are the operators used in Java :**

**1. Unary operator :**

a. The Java unary operators require only one operand.

b. Unary operators are used to perform various operations such as :

i. Incrementing/decrementing a value by one (++,--)

ii. Negating an expression (~)

iii. Inverting the value of a Boolean (!)

**2. Arithmetic operator :** Java arithmetic operators are used to perform addition, subtraction, multiplication, and division. They act as basic mathematical operations.

**3. Shift operator :**

**a. Left shift operator :** The left shift operator << is used to shift all of the bits in a value to the left side of a specified number of times.

**b. Right shift operator :** The right shift operator >> is used to move left operands value to right by the number of bits specified by the right operand.

4. **Relational operator :** Relational operators enables us to test for any relationship between two operands. ==(equal to), != (not equal to), > (greater than), < (less than), >= (greater than or equal to), <= (less than or equal to) are the example of relational operator.
5. **Ternary operator :** Java ternary operator is used as one liner replacement for if-then-else statement and it is the only conditional operator which takes three operands.
6. **Assignment operator :** Java assignment operator is one of the most common operators. It is used to assign the value on its right to the operand on its left. =,+=,-=,*=, /=,%=, |= are the example of assignment operator.
7. **Bitwise operator :** Bitwise operator works on bits and performs bit-by-bit operation. It can be applied to the integer types, long, int, short, char, and byte. Binary AND operator, binary OR operator, binary XOR operator are the example of bitwise operator.

**Que 1.18. What is variable ? Describe different types of variable.**

**Answer**

1. A variable is a container which holds the value while the Java program is executed.
2. A variable is assigned with a data type.
3. Variable is a name of memory location.

**There are three types of variables in java :**

1. **Local variable :**
   a. A variable declared inside the body of the method is called local variable. We can use this variable only within that method and but not in the other methods.
   b. A local variable cannot be defined with “static” keyword.
2. **Instance variable :**
   a. A variable declared inside the class but outside the body of the method, is called instance variable.
   b. It is called instance variable because its value is instance specific and is not shared among instances.
3. **Static variable :**
   a. A variable which is declared as static is called static variable. It cannot be local.
   b. We can create a single copy of static variable and share among all the instances of the class.
   c. Memory allocation for static variable happens only once when the

class is loaded in the memory.

**Que 1.19. Explain arrays in Java.**

**Answer**

1. Java array is an object which contains elements of a similar data type.
2. The elements of an array are stored in a contiguous memory location. It is a data structure where we store similar elements.
3. We can store only a fixed set of elements in a Java array.
4. The length of an array is established when the array is created.

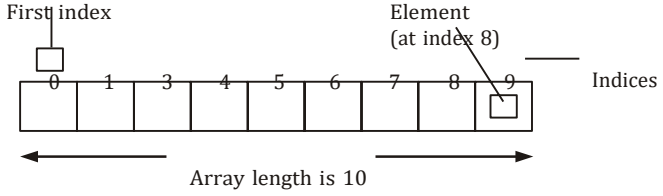



**Fig. 1.19.1.**

5. Each item in an array is called an element, and each element is accessed by its numerical index.

**Creating, initializing, instantiation and accessing an array :**

1. **Syntax to declare an array in Java :**

   dataType arrName[size];

2. **Syntax to initialize array in Java :**

   int a[ ] = {33, 3, 4, 5};

3. **Instantiation of an array in Java :**

   arrayRefVar = new datatype[size];

4. **Accessing an array element :** Each array element is accessed by its numerical index.

   System.out.println("Element 1 at index 0 :" + anArray[0]);

   System.out.println("Element 2 at index 1 :" + anArray[1]);

   System.out.println("Element 3 at index 2 :" + anArray[2]);

# PART-5

*Methods and Classes, Inheritance, Packages and Interfaces.*

**Questions-Answers**

**Long Answer Type and Medium Answer Type Questions**

**Que 1.20. Write a short note on class.**

**Answer**

1. A class is a blueprint from which objects are created.
2. A class is a group of objects which have common properties.
3. A class can be declared private or protected.
4. The general syntax of the class construct is :

```
class user_defined_name {
    private :
                data type members ;
                implementation operations ;
                list of friend functions ;
    public :
                data type members ;
                implementation operations ;
    protected :
                data type members ;
                implementation operations ;
};
```

**Example :**

```
class Box {
    public:
    double length; // Length of a box
    double breadth; // Breadth of a box
    double height;  // Height of a box
};
```

**Que 1.21. Explain object and method in Java language.**

**Answer**

**Objects :**

1. An object is an instance of a class template.
2. Objects are the basic runtime entities in an object-oriented system.
3. An object has three characteristics :
   - **i. State :** It represents data (value) of an object.
   - **ii. Behaviour :** It represents the behaviour (functionality) of an object.
   - **iii. Identity :** It is a unique ID which is used internally by JVM to identify each object.
4. General syntax to declare object is :

```
className     ObjectName;
```

**Methods :**

1. Methods are the set of executable statements.
2. Methods (also called as function) are also the interface to the data variables of the class.
3. Methods provide a structured approach to programming. A program can be divided into several methods.

**For example :**

```
public class Test
{
int x = 5;
    public static void welcome ()
    {
        system.out.println  (" ---------- ");
    }
    public static void main(string args [ ])
    {
    welcome ();
    system.out.println("Hi !!! This is my first program");
    Test my obj = new Test ();
    System.out.println ("myobj. x");
    }
}
```

**Que 1.22. Explain the concept of inheritance with its types.**

**Answer**

1. Inheritance is the mechanism that allows us to extend the definition of a class without making any physical changes to the existing class.
2. Inheritance creates new classes from existing class. Any new class that we create from an existing class is called derived class; existing class is called base class.

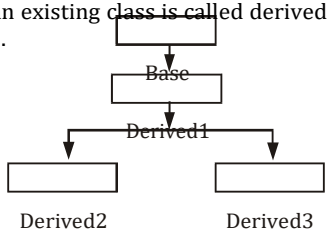



**Fig. 1.22.1.**

3. The inheritance relationship enables a derived class to inherit features

from its base class. Derived class can add new features of its own.

4. Therefore, rather than creating completely new classes from scratch, we can take advantage of inheritance and reduce software complexity.

**Types of inheritance :**

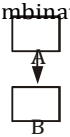
**a.** **Single inheritance :** It is the inheritance hierarchy wherein one derived class inherits from one base class.

**b.** **Multiple inheritance :** It is the inheritance hierarchy wherein one derived class inherits from multiple base classes.

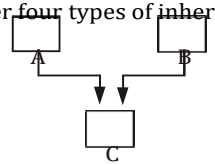
**c.** **Hierarchical inheritance :** It is the inheritance hierarchy wherein multiple subclasses inherit from one base class.

**d.** **Multilevel inheritance :** It is the inheritance hierarchy wherein subclass acts as a base class for other classes.

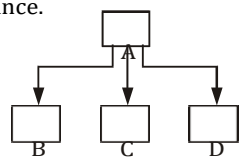
**e.** **Hybrid inheritance :** The inheritance hierarchy that reflects any legal combination of other four types of inheritance.



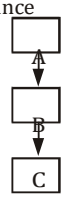

(a) Single inheritance



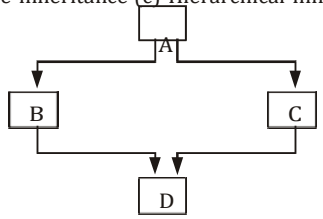

(b) Multiple inheritance




(c) Hierarchical inheritance




(d) Multilevel inheritance




(e) Hybrid inheritance

**Fig.1.22.2.**

**Que 1.23. Discuss the key features supported by object-oriented programming languages.**

**Answer**

Following are the features supported by object-oriented programming languages :

1. **Objects :** Refer Q. 1.21, Page 1–18D, Unit-1.
2. **Class :** Refer Q. 1.20, Page 1–18D, Unit-1.
3. **Inheritance :** Refer Q. 1.22, Page 1–19D, Unit-1.
4. **Polymorphism :**
   a. Polymorphism is the ability to use an operator or function in different ways.

b. An operation may exhibit different behaviour and different instances. The behaviour depends upon the types of data used in the operation.

c. Polymorphism plays an important role in allowing objects having different internal structures to share the same external interface.

d. This means that a general class of operations may be accessed in the same manner even though specific actions associated with each operation may differ.

e. Polymorphism is extensively used in implementing inheritance.

**5. Encapsulation :**

a. Encapsulation is the wrapping up of data and methods into single unit called class.

b. Using the method of encapsulation, the programmer cannot access the data directly. Data is only accessible through the function present inside for the class.

c. Data encapsulation is an important concept of data hiding.

d. Data hiding is the implementation details of a class that are hidden from the user.

e. The concept of encapsulation shows that a non-member function cannot access an object's private or protected data.

**Que 1.24. What are packages in java ? How a user-defined packageis created in Java, explain with example ?**

**AKTU 2017-18, Marks 10**

**Answer**

1. Package is a mechanism to encapsulate a group of classes, interfaces and subpackages.
2. Packages are the way to organize files into different directories according to their functionality, usability as well as category.
3. Packages provide a way to hide classes thus preventing other programs or packages from accessing classes that are meant for inter use only.
4. Packages also provide a way for separating "design" from "coding".
5. There are two types of packages in Java :
   - **i. User-defined package :** The package we create is called user defined package.
   - **ii. Built-in package :** The already defined package like java.io.*, java.lang.* etc are known as built-in packages.

**To create user-defined package :**

User-defined package is created with the help of "package" keyword, and to use a package we use the import keyword.

**Example :**

**Demo.java :**

```
package abhi;
public class Demo
{
public void sum(int num1,int num2)
{
int result;
result=num1+num2;

System.out.println("the sum of two numbers is:"+result);
}
}
```

**Tester.java :**

```
import abhi.Demo;
class Tester extends Demo
{
public static void main(String args[ ])
{
Tester obj=new Tester();
obj.sum(10,20);
}
}
```

**Que 1.25. Write a short note on interface with example.**

**Answer**

1. An interface defines a set of methods but does not implement them.
2. A class that implements the interface agrees to implement all of the methods defined in the interface.
3. An interface is a collection of method declarations (without definitions). An interface can also include constant declarations.

**Defining an interface :**

1. An interface definition has two components :
   a. **Interface declaration :** The interface declaration declares various attributes about the interface such as its name and whether it extends another interface.
   b. **Interface body :** The interface body contains the constant and method declarations within interface body as shown in Fig 1.25.1.

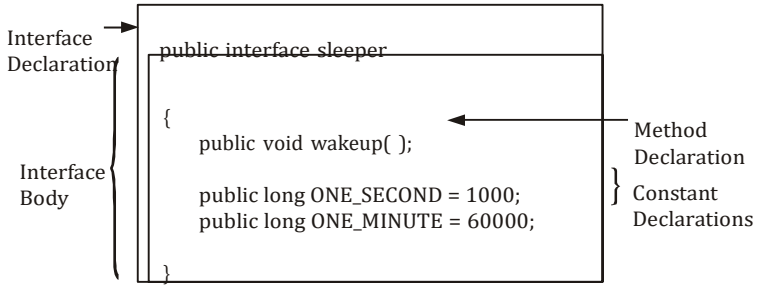



**Fig. 1.25.1.**

**For example :**

```
// simple interface
interface Calc
{

      void sum(int a, int b);
      void sub(int a, int b);
}
// class implements with Interface
class MyCalc implements Calc
{
      public void sum(int a, int b)   // method of Calc
      {
            System.out.println("Sum is = "+ (a + b));
      }
      public void sub(int a, int b)    // method of Calc
      {
            System.out.println("Sub is = "+ (a – b));
      }
      public static void main(String args[ ])
      {
            MyCalc cal = new MyCalc( );
            cal.sum(100, 20);
            cal.sub(100, 20);
      }
}
```

**Output :**

```
Sum is = 120
Sub is = 80
```

**Que 1.26. Compare object-oriented programming and object-based programming with example. List the features of object-**

**oriented programming. Write a program in Java to demonstrate use of this keyword in constructor.** **AKTU 2019-20, Marks 07**

**Answer**

**Comparison :**

| S. No. | Object-Oriented Programming | Object-Based Programming |
|---|---|---|
| 1. | It supports all the features of OOPS. | It supports the usage of object and encapsulation. |
| 2. | It also supports inheritance and polymorphism. | It does not support inheritance or, polymorphism or, both. |
| 3. | It supports built-in objects. | It does not supports built-in objects. |
| 4. | C#, Java, VB.Net are the examples of object-oriented languages. | JavaScript, VB are the examples of object-based languages. |

**Features of Object-Oriented programming are :**

1. Inheritance
2. Polymorphism
3. Data hiding
4. Encapsulation
5. Overloading
6. Reusability

**"this" keyword with constructor :**

1. "this" keyword can be used inside the constructor to call another overloaded constructor in the same class. It is called the explicit constructor invocation.
2. This occurs if a class has two overloaded constructors, one without argument and another with the argument. Then "this" keyword can be used to call the constructor with an argument from the constructor without argument. This is required as the constructor cannot be called explicitly.

**Program :**

```
class JBT {
JBT() {
this("JBT");
System.out.println("Inside Constructor without parameter");
}
JBT(String str) {
System.out.println("Inside Constructor with String parameter as " +
str);
```

```
}
```

```
public static void main(String[ ] args) {
JBT obj = new JBT();
}
}
```

**Output :**

Inside Constructor with String parameter as JBT
Inside Constructor without parameter

# PART-6

*Exception Handling, Multithread Programming, I/O.*

## Questions-Answers

### Long Answer Type and Medium Answer Type Questions

**Que 1.27. What are exceptions and how they are handled in java ? Explain the keywords try, catch, throw, and finally with example.**

**AKTU 2017-18, Marks 10**

**OR**

**Explain exception handling in Java.**

**OR**

**What are exceptions and how they are handled ? Explain with an example. How we define a try and catch block ? Is it essential to catch all types of exceptions ?** **AKTU 2018-19, Marks 07**

**Answer**

An exception is an unwanted or unexpected event, which occurs during the execution of a program *i.e.*, at runtime, that disrupts the normal flow of the program's instruction.

**Exception handling :**

1. Exception handling provides a type-safe, integrated approach for handling unusual problems that arise while executing a program.
2. To handle the exceptions, exception handling mechanism is designed.
3. The mechanism suggests a separate error handling code that performs the following tasks :
   a. Find the problem (Hit the exception)
   b. Inform that an error has occurred (Throw the exception)
   c. Receive the error information (Catch the exception)

d. Take corrective actions (Handle the exception)

**Java exception handling is managed by the following keywords :**

**1. Try :**

a. Java uses keyword "try" to preface a block of code that is likely to cause an error condition and "throw" an exception.

b. The try block can have one or more statements that could generate an exception.

```
try
{
        statement ; // generates an exception
}
catch (Exception_type e)
        statement ; // processes the exception
}
```

c. If any one statement generates an exception, the remaining statements in the block are skipped and execution jumps to the catch block that is placed next to the try block.

d. Every try statement should be followed by at least one catch statement; otherwise compilation error will occur.

**2. Catch :**

a. A catch block defined by the keyword "catch" catches the exception thrown by the try block and handles it appropriately. The catch block is added immediately after the try block.

b. The catch block can have one or more statements that are necessary to process the exception.

c. The catch statement is passed as a single parameter, which is reference to the type of exception object thrown by the try block.

d. If the catch parameter matches with the type of exception object, then the exception is caught and statements in the catch block will be executed.

**3. Finally :**

a. Java supports another statement known as finally statement that can be used to handle an exception that is not caught by any of the previous catch statements.

b. Finally block can be used to handle any exception generated within a try block.

c. It may be added immediately after the try block or after the last catch block as follows :

```
try                         try
{                           {
    ..............              ..............
```

```
}                          }
finally                    catch (..... )
{                          {
      .....                        .....
}                          }
                           catch (..... )
                           {
                                 .....
                           }
                           .
                           finally
                           {
                                 .....
                                 .....
                           }
```

**4. Throw :**

a. Java supports "throw keyword" which is used if we want to throw our own exceptions.

b. We can do this by using the keyword throw as follows :

throw new Throwable_subclass;

No, it is not essential to catch all type of exceptions.

**For example :**

```
throw  new ArithmeticException  ( )  ;
throw new NumberFormatException ( ) ;
class TestFinallyBlock
{
public static void main(String args[ ])
{
try
{
int data=25/0;
System.out.println(data);
}
catch(ArithmeticException e)
{
System.out.println("Caught: "+e);
}
finally
{
System.out.println("finally block is always executed");
}
System.out.println("rest of the code...");
}
```

```
}
```

**Output :**

Caught: java.lang.ArithmeticException: / by zero
finally block is always executed
rest of the code...

**Que 1.28. Define thread. How to create a thread in java ? Write a program that executes two threads. One thread will print the even numbers and another thread will print odd numbers from 1 to 5.**

**AKTU 2019-20, Marks 07**

**Answer**

**Thread :** A thread is a light weighted process which runs concurrently with other threads. All threads of program define a separate path of execution.

**Create a thread in Java :**

```
public class Thread Test
{
public static void main (string [ ] args)
{
System.out.println ("Constructing the thread.....");
BytePrinter bp = new BytePrinter ( );
System.out.println ("Starting the thread.....");
bp start ( );
System.out.println ("The thread has been started");
System.out.println ("The main ( ) method is finishing");
return;
}
}
```

**Program :**

1. In the first step, we will implement the Runnable interface to define the logic of both threads. In the run method, we check if the number is even or odd.
2. If the number is even, we call the printEven method of the Printer class, else we call the printOdd method :

```
class TaskEvenOdd implements Runnable {
private int max;
private Printer print;
private boolean isEvenNumber;
// standard constructors
@Override
```

```
public void run() {


int number = isEvenNumber ? 2 : 1;
while (number <= max) {
if (isEvenNumber) {
print.printEven(number);
} else {
print.printOdd(number);
}
number += 2;
}
}
}
```

3. We define the Printer class as :

```
class Printer {
private volatile boolean isOdd;
synchronized void printEven(int number) {
while (!isOdd) {
try {
wait();
} catch (InterruptedException e) {
Thread.currentThread().interrupt();
}
}
System.out.println(Thread.currentThread().getName() + ":" +
number);
isOdd = false;
notify();
}
synchronized void printOdd(int number) {
while (isOdd) {
try {
wait();
} catch (InterruptedException e) {
Thread.currentThread().interrupt();
}
```

```
}
```

```
System.out.println(Thread.currentThread().getName() + ":" + number);
isOdd = true;
notify();
}
}
```

4. In the main method, we use the defined class to create two threads. We create an object of the Printer class and pass it as the parameter to the TaskEvenOdd constructor:

```
public static void main(String... args) {
Printer print = new Printer();
Thread t1 = new Thread(new TaskEvenOdd(print, 5, false),"Odd");
Thread t2 = new Thread(new TaskEvenOdd(print, 5, true),"Even");
t1.start();
t2.start();
}
```

**Que 1.29. Explain multithreading in Java.**

**Answer**

1. A multithreaded program contains two or more parts that can run concurrently.
2. Each part of such a program is called a thread, and each thread defines a separate path of execution.
3. Each thread runs parallel to each other.
4. A multithreading is a specialized form of multitasking.
5. In multithread program, each thread has its own life cycle. The life cycle of thread is shown in Fig. 1.29.1.

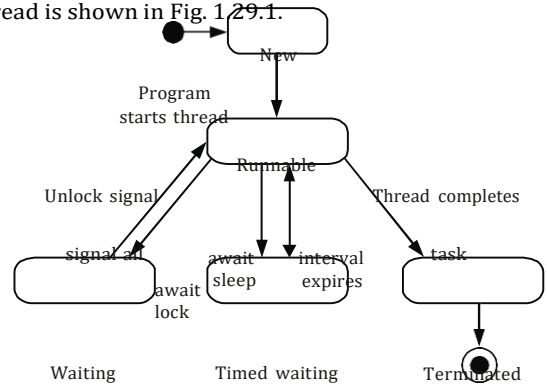


**Fig. 1.29.1.**

**Life cycle of a thread :**

A thread goes through various stages in its life cycle which are as follows :

**a. New :**

i. A new thread begins its life cycle in the new state. It remains in this state until the program starts the thread.

ii. It is also referred to as a new born thread.

**b. Runnable :**

i. After a newly born thread is started, the thread becomes runnable.

ii. A thread in this state is considered to be executing its task.

**c. Waiting :**

i. Sometimes a thread gets transitions to the waiting state while the thread waits for another thread to perform a task.

ii. A thread transitions get back to the runnable state only when another thread signals the waiting thread to continue executing.

**d. Timed waiting :**

i. A runnable thread can enter the timed waiting state for a specified interval of time.

ii. A thread in this state transition back to the runnable state when that time interval expires or when the event it is waiting for, occurs.

**e. Terminated :** A runnable thread enters the terminated state when it completes its task, otherwise it terminates.

**Que 1.30. Write a short note on Java I/O.**

**Answer**

1. Java programs perform I/O through streams.
2. A stream is linked to a physical device by the Java I/O system to make input and output operation in Java.
3. Streams are clean way to deal with I/O without understanding every part of our code and the difference between a keyboard and a network.
4. Java defines two types of streams :

**a. Byte streams :**

i. It provides a convenient means for handling input and output of bytes.

ii. Byte streams are used for reading or writing binary data.

iii. FileInputStream and FileOutputStream are the most frequently used classes in byte stream.

**b. Character streams :**

i. It provides a convenient means for handling input and output of characters.

ii. They use unicode and therefore, can be internationalized.

iii. FileReader and FileWriter are most frequently used classes of character stream.

5. An input stream can abstract many different kinds of input from a disk file, a keyboard, or a network socket.
6. An output stream may refer to the console, a disk file, or a network connection.

# PART-7

*Java Applet.*

## Questions-Answers

### Long Answer Type and Medium Answer Type Questions

**Que 1.31. What is applet ? Explain life cycle of applet.**

**Answer**

1. Applet is a Java program that can be embedded into a web page.
2. It runs inside the web browser and works at client side.
3. Applets are used to make the website more dynamic and entertaining.
4. All applets are sub- classes (either directly or indirectly) of java.applet.Applet class.
5. Applets can run within a web browser or an applet viewer (standard applet viewer tool).

**Life cycle of an Applet :**

Life cycle of an applet use five methods which are as follows :

**a.** **init( ) :** This method is intended for whatever initialization is needed for our applet.

**b.** **start( ) :** This method is automatically called after the browser calls the init method.

**c.** **stop( ) :** This method is automatically called when the user moves off the page on which the applet sits.

**d.** **destroy( ) :** This method is only called when the browser shuts down normally.

**e.** **paint( ) :** Invoked immediately after the start( ) method, and also any time the applet needs to repaint itself in the browser.

**Que 1.32. Explain Applet with its life cycle. Write a program to demonstrate simple java applet to display any image. Compare Applets over HTML.** **AKTU 2019-20, Marks 07**

**Answer**

**Applet with its life cycle :** Refer Q. 1.31, Page 1–32D, Unit-1.

**Program :**

```
import java.awt.*;
import java.applet.*;
public class DisplayImage extends Applet {
Image picture;
public void init() {
picture = getImage(getDocumentBase(),"sonoo.jpg");
}
public void paint(Graphics g) {
g.drawImage(picture, 30,30, this);
}
}
```

**Comparison :**

| S. No. | Applet | HTML |
|---|---|---|
| 1 | Applet is a JAVA program. | HTML is Hyper Text Markup Language. |
| 2 | It is embedded in the HTML code to provide functionality to the webpage. | It is used to provide position of the text in the webpage. |
| 3. | It need Java package to run on JVM. | HTML do not need any package to run on browsers. |

**Que 1.33. What is the difference between applet and application ? How is Java strongly associated with internet ? Draw a flowchart to show various Java tools are used in application development.**

**AKTU 2018-19, Marks 07**

**Answer**

**Difference :**

| S. No. | Applets | Application |
|---|---|---|
| 1. | An applet is a java program which is embedded in web page to generate dynamic content. | An application is a java program that runs independently on client/server without web browser. |
| 2. | The execution of the program does not start from main( ) method. | The execution of the program starts from the main( ) method. |
| 3. | Applet cannot run program from local machine. | Application can run the program from local machine. |
| 4. | It is used to perform small tasks. | It is used to perform large tasks. |
| 5. | It can only access browser specific services. | It can access all kind of services available on the system. |

1. Java is strongly associated with the internet because the first application program written in Java was HotJava, a browser to run the applet on internet.
2. So, the internet users use the java to create the applet programs and run them locally using a java-enabled browser's like HotJava.
3. The users can use the java-enabled browsers to download the applet located on the computer system anywhere in the internet and run it on their computer.

**Flowchart to show various Java tools used in application development :**

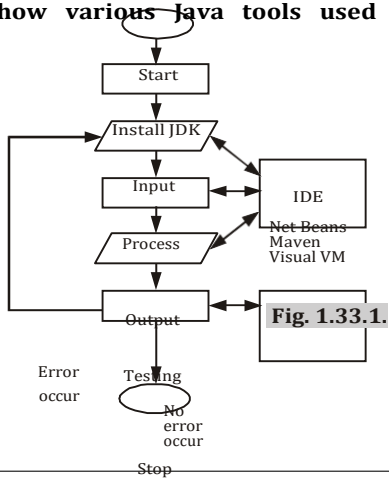



**Fig. 1.33.1.**

Testing tools

JUnit

Clover

Gradle

**Que 1.34. What are the advantages and drawback of applet ? Write a Java program to create an applet for calculator and also perform event handling on each button.** **AKTU 2018-19, Marks 07**

**Answer**

**Advantages of applets :**

1. Applets are platform independent.
2. Applets are quite secure and safe to use.
3. Applets cache quickly.
4. Applet increase interactivity for users.
5. Database integration is another important advantage of applets.

**Drawbacks of applets :**

1. Applets do not access client-side resources, like such as file, operating system.
2. Applet cannot work with native methods.
3. Applet can only extract information about client-machine *i.e.*, its name, Java version, OS, version etc.
4. Mobile browsers which are running on IOS or Android do not support applets.

**Program :**

```
import java.applet.*;
import java.awt.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.awt.event.TextEvent;
import java.awt.event.TextListener;;
public class calculator extends Applet implements ActionListener, TextListener {
String s,s1,s2,s3,s4;
Button b1,b2,b3,b4,b5,b6,b7,b8,b9,b0;
Button add,sub,eq,cl,mul,div;
TextField t1;
int a,b,c;
public void init() {
```

```
b1=new Button("1"); b2=new Button("2"); b3=new Button("3");
b4=new Button("4"); b5=new Button("5"); b6=new Button("6");
b7=new Button("7"); b8=new Button("8"); b9=new Button("9");
b0=new Button("0");
add=new Button("+"); sub=new Button("–");
mul=new Button("*"); div=new Button("/");
eq=new Button("="); cl=new Button("Clear");
GridLayout gb=new GridLayout(4,5);
setLayout(gb);
add(t1);add(b1);add(b2); add(b3);add(b4);add(b5);
add(b6); add(b7);add(b8); add(b9);add(b0);add(add);
add(sub);add(mul);add(div); add(eq);add(cl);
b1.addActionListener(this); b2.addActionListener(this);
b3.addActionListener(this); b4.addActionListener(this);
b5.addActionListener(this); b6.addActionListener(this);
b7.addActionListener(this); b8.addActionListener(this);
b9.addActionListener(this); b0.addActionListener(this);
add.addActionListener(this); sub.addActionListener(this);
mul.addActionListener(this); div.addActionListener(this);
eq.addActionListener(this); cl.addActionListener(this);
paint();
//t1.addTextListener(this); }
public void paint() {
setBackground(Color.green); }
public void actionPerformed(ActionEvent e) {
s=e.getActionCommand();
if(s.equals("0") || s.equals("1") || s.equals("2") ||
s.equals("3") || s.equals("4") || s.equals("5") || s.equals("6") ||
s.equals("7") || s.equals("8") ||
s.equals("9") || s.equals("0")) {
s1=t1.getText()+s;
t1.setText(s1); }
```

```
if(s.equals("+")) {
s2=t1.getText();
t1.setText("");
s3="+"; }
if(s.equals("–")) {
s2=t1.getText();
t1.setText("");
s3="–"; }
if(s.equals("*")) {
s2=t1.getText();
t1.setText("");
s3="*"; }
if(s.equals("–")) {
s2=t1.getText();
t1.setText("");
s3="–"; }
if(s.equals("=")) {
s4=t1.getText();

a=Integer.parseInt(s2);
b=Integer.parseInt(s4);
if(s3.equals("+"))
c=a+b; if(s3.equals("–
")) c=a–b;
t1.setText(String.valueOf(c)); }
if(s.equals("Clear")) {
t1.setText(""); } }
public void textValueChanged(TextEvent e) { }}
```

## PART-8

*String Handling, Event Handling.*

**Questions-Answers**

**Long Answer Type and Medium Answer Type Questions**

**Que 1.35. Explain string handling in Java with example.**

**Answer**

1. String handling is a process of performing different operation such as concatenation, comparison on the string.
2. Following are the method used in string handling :
   - **a. Java string length() :** The Java string length() method returns the length of the string. It returns count of total number of characters present in the string.
   - **b. Java string compareTo() :** The Java string compareTo() method compares the given string with current string. It returns positive number, negative number or zero.
   - **c. Java string concat() :** The Java string concat() method combines a specific string at the end of another string and returns a combined string.
   - **d. Java string replace() :** The Java string replace() method returns a string, replacing all the old characters to new characters.
   - **e. Java string equals() :** The Java string equals() method compares the two given strings on the basis of content of the string. If all the characters are matched, it returns true else it will return false.
   - **f. Java string contains() :** The Java string contains() method searches the sequence of characters in the string. If the sequences of characters are found, then it returns true otherwise returns false.

     **For example :**

```
public class Example{
public static void main(String args[]{
String s1="Hello";
String s2="Aditya";
s3=s1.concat("how are you?");
System.out.println("Length of string s1 is: "+s1.length());
System.out.println(s1.compareTo(s2));
```

```
System.out.println(s3);
System.out.println(s3.contains("you"));
System.out.println(s1.replace('H', "T"));
}}
```

**Output :**

```
Length of string s1 is: 5
False
Hello how are you?
True
Tello
```

**Que 1.36. Explain event handling in brief.**

**Answer**

**Event :**

1. An event happens when something changes within a graphical user interface.
2. We can say that events are objects in Java. It comes under some classes stored in java.util.EvenObject.
3. The Abstract Window Toolkit (AWT) uses event driven programming to do processing of user actions, one that underlies all modern window systems programming.
4. An event describes as a particular user action.
5. The Java run time notifies the program when an interesting event occurs.
6. For example, events occur when a user clicks on a button, clicks on a combobox, or types characters into a text field, such as in the following:
   a. For a button, the event that is fired is the ActionListener.
   b. For a text field, it is the KeyEvent.

**The following is required to perform event handling :**

1. Implement the Listener interface and override its methods
2. Register the component with the listener

**Following are the public methods used for various components :**

1. **Button :** void addActionListener( ActionListener a)
2. **List :**

void addActionListener(ActionListener a)

addItemListener(ItemListener a)

3. **Choice :**

   void addItemListener(ItemListener x)

4. **MenuItem :**

   void addActionListener(ActionListener x)

5. **TextField :**

   void addActiontListener(ActionListener x)

   void addTextListener(TextListener x)

6. **TextArea :**

   void addTextListener(TextListener x)

# PART-9

*Introduction to AWT, AWT Controls, Layout Managers.*

**Questions-Answers**

**Long Answer Type and Medium Answer Type Questions**

**Que 1.37. Write short note on AWT.**

**AKTU 2016-17, Marks 05**

**Answer**

1. The AWT stands for Abstract Window Toolkit.
2. AWT is a library of class which provides GUI tools to develop GUI application and applet.
3. It provides many classes for programmers to use. It is the connection between our application and the native GUI.
4. It is a Java package and can be used in any Java program by importing java.awt.* via the import keyword.
5. It contains three kinds of classes :
   a. **Containers class :** Frame, Dialog, Panel, Applet etc.
   b. **Components class :** TextField, Button, Checkbox, Scrollbar, Label, List etc.
   c. **Custom graphics class :** Colour, Font, Dimensions etc.

6. The AWT supports following types of controls :
   i. Buttons
   ii. Checkbox
   iii. CheckboxGroup
   iv. Choice
   v. Label
   vi. List
   vii. Scrollbar
   viii. TextField
   ix. TextArea

**Que 1.38. Mention various AWT controls. Explain any four of them.**

**Answer**

**AWT controls :** AWT controls are components that allow a user to interact with our application.

**Various AWT controls are as follows :** Refer Q. 1.37, Page 1–40D,Unit-1.

1. **Canvas :** A canvas is a graphical component representing a region where we can draw things such as rectangles, circles, and text strings.
2. **Checkbox :**
   a. A Checkbox is a label with a small push button.
   b. The state of Checkbox is either true (button is checked) or false (button not checked).
   c. The default initial state is false.
3. **CheckboxGroup :**
   a. A CheckboxGroup is used to control the behaviour of a group of Checkbox objects (each of which has a true or false state).
   b. Exactly one of the Checkbox objects is allowed to be true at one time.
   c. Checkbox objects controlled with a CheckboxGroup are usually referred to as "radio buttons".
4. **TextArea :**
   a. A TextArea is a multi-row text field that displays a single string of characters, where newline ('\n' or 'n\n\r' or '\r', depending on platform) ends each row.

b. The width and height of the field is set at construction, but the text can be scrolled up/down and left/right.

**Que 1.39. Explain LayoutManager in brief.**

**OR**

**What is LayoutManager ? What are the various types of LayoutManager ?**

**Answer**

**LayoutManager :**

1. LayoutManager is abstract class, we cannot use it directly.
2. LayoutManager class describes how components are "laid out" within a container.
3. We must subclass it and provide our own functionality or use a derived class of LayoutManager already created for us.
4. To use a layout we must call setLayout( ) for the container with an instance of a LayoutManager.

**Types of LayoutManager :**

**a. BorderLayout :** This scheme lays out the component in five ways :

i. North-Northern part of the container

ii. South-Southern part of the container

iii. East-Eastern part of the container

iv. West-Western part of the container

v. Center-centered in the container

**b. CardLayout :** Allows for what Windows programmers have called "tabbed dialogs" or dynamic dialogs.

**c. GridLayout :** Allows for the layout of components in a grid-like fashion rather than "North" or "Center".

**d. FlowLayout :** Allows for component to be laid out in a row (or flow) and aligned (left, right, center).

**e. None :** No layout, the container will not attempt to reposition the components during an update.

**Que 1.40. Explain AWT and its controls. How the layout manager manage the AWT controls ? Write a program to demonstrate graphics (*i.e.* line, circle, rectangle etc.) using Frame, Panel, and layout manager.**

**AKTU 2019-20, Marks 07**

**Answer**

**AWT :** Refer Q. 1.37, Page 1–40D, Unit-1.

**AWT controls :** Refer Q. 1.38, Page 1–41D, Unit-1.

**Layout manager :** Refer Q. 1.39, Page 1–42D, Unit-1.

**Program :**

```
package com.mkyong;
import java.awt.Dimension;
import java.awt.Graphics;
import java.awt.Graphics2D;
import java.awt.Rectangle;
import java.awt.Shape;
import java.awt.geom.Ellipse2D;
import java.awt.geom.Line2D;
import java.awt.geom.RoundRectangle2D;
import javax.swing.JFrame;
import  javax.swing.JPanel;
import javax.swing.SwingUtilities;
public class DrawShapes extends JFrame {
private static final long serialVersionUID = 1L;
public DrawShapes() {
setSize(new Dimension(320, 320));
setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
setVisible(true);
JPanel p = new JPanel() {
@Override
public void paintComponent(Graphics g) {
Graphics2D g2 = (Graphics2D) g;
Shape line = new Line2D.Double(3, 3, 303, 303);
Shape rect = new Rectangle(3, 3, 303, 303);
Shape circle = new Ellipse2D.Double(100, 100, 100, 100);
Shape roundRect = new RoundRectangle2D.Double(20, 20, 250, 250,
5, 25);
g2.draw(line);
g2.draw(rect);
```

```
g2.draw(roundRect);
}
};
setTitle("My Shapes");
this.getContentPane().add(p);
}
public static void main(String arg[ ]) {
SwingUtilities.invokeLater(new Runnable() {
@Override
public void run() {
// TODO Auto-generated method stub
new DrawShapes();
}
});
}
}
```

**Output :**

**Que 1.41. What are the uses of layout managers ? Give the name of classes that represents the layout managers. Explain any five layout managers.** **AKTU 2018-19, Marks 07**

**Answer**

Layout manager is used to place the component such as buttons, text boxes on the application.

**Classes that represent the layout managers are :**

1. BorderLayout
2. FlowLayout
3. GridLayout
4. CardLayout
5. GridBagLayout
6. BoxLayout
7. NoLayout
8. ScrollPaneLayout
9. SpringLayout

**Five layout managers :** Refer Q. 1.39, Page 1–42D, Unit-1.

## VERY IMPORTANT QUESTIONS

***Following questions are very important. These questions may be asked in your SESSIONALS as well as UNIVERSITY EXAMINATION.***

**Q. 1. Why it is important to identify the object in web development strategies ? Also explain, with the help of block diagram, web development process.**

**Ans.** Refer Q. 1.3.

**Q. 2. Explain the HTTP protocol. Mention three basic features of HTTP that make HTTP a simple but powerful protocol. Give its architecture.**

**Ans.** Refer Q. 1.5.

**Q. 3. Describe the objective of any website. Which type of essential skills required being a member of web project team ?**

**Ans.** Refer Q. 1.9.

**Q. 4. Explain some features of Java.**

**Ans.** Refer Q. 1.15.

**Q. 5. Discuss the key features supported by object-oriented programming languages.**

**Ans.** Refer Q. 1.23.

**Q. 6. What are packages in java ? How a user-defined package is created in java, explain with example ?**

**Ans.** Refer Q. 1.24.

**Q. 7. Compare object-oriented programming and object-based programming with example. List the features of object-oriented programming. Write a program in Java to demonstrate use of this keyword in constructor.**

**Ans.** Refer Q. 1.26.

**Q. 8. What are exceptions and how they are handled in java ? Explain the keywords try, catch, throw, and finally with example.**

**Ans.** Refer Q. 1.27.

**Q. 9. Explain Applet with its life cycle. Write a program to demonstrate simple java applet to display any image. Compare Applets over HTML.**

**Ans.** Refer Q. 1.32.

**Q. 10. What are the advantages and drawback of applet ? Write a Java program to create an applet for calculator and also perform event handling on each button.**

**Ans.** Refer Q. 1.34.

**Q. 11. Explain AWT and its controls. How the layout manager manage the AWT controls ? Write a program to demonstrate graphics (*i.e.* line, circle, rectangle etc.) using Frame, Panel, and layout manager.**

**Ans.** Refer Q. 1.40.