

Python Interview Questions

① What are differences between list and tuples in Python?

LISTS

- (i) List are mutable i.e. they can be edited.
- (ii) List are slower than tuples.
- (iii) Syntax
`list_1 = [10, 'shyam', 20],`
- (iv) List has a variable size.

TUPLES

- (i) Tuples are immutable (tuple), list which cannot be edited)
- (ii) Tuples are faster than list.
- (iii) Syntax
`tup_1 = (10, 'shyam', 20),`
- (iv). Tuple has a fixed size.

② What are key features of Python?

- (i) Python is a interpreted language. that means python does not need to be compiled before it's run.
- (ii) Python is dynamically-typed, this means that you don't need to specify the types of variables when you declare them or anything like that.
Example. `x = 11` and then `x = "I am string"` without error.
- (iii) Python is well suited to object oriented programming, in that it allows definition of classes along with composition and inheritance.
- (iv) Python, functions are first like objects, that means that they can be assigned to variables, returned from other functions and passed as arguments.
- (v) Writing python code is fast but executing it is often slower than compiled language.
- (vi) Python finds in many spheres.
Web application, automation, scientific modelling, Big Data applic.

③ What type of language is Python? programming or scripting?

- Python is capable of scripting but in general sense, it is considered a general purpose programming language.

④ Python is an Interpreted language. Explain?

- An interpreted language is any programming language which is not compiled into machine code, before runtime. therefore Python is an interpreted language.

⑤ What is PEP8?

- PEP stands for Python Enhancement Proposal
- It is a set of rules that specify how to format Python code for maximum readability.

⑥ How is Memory manage in Python?

- memory management in Python is managed by Python Private heap space. all python objects and data structures are located in a private heap.
- programmer does not have access to this private heap.
- Allocation of heap space for python objects is done by Python memory manager. the C API gives access to some tools for the programmers to code.
- Python also has an inbuilt garbage collector, which recycles all the unused memory and so that it can be made available to heap space.

⑦ What is namespace in Python?

- Namespace is a naming system used to make sure that names are unique to avoid naming conflicts.

⑧ What are Python PATH?

- It is an environment variable which is used when module is imported.
- whenever module is imported, PYTHONPATH also looked up to check for the presence of imported modules in various directories.
- Interpreter uses to determine which module to load.

⑨ What are Python modules? Name some commonly used built-in modules in Python?

- Python modules are files containing Python code.
- This code can either be functions classes or variables.
- Python modules - .py file containing executable code.
- Some of commonly used built-in modules are:

OS, sys, math, random, datetime, JSON.

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(10) What are local variables and global variables in Python?

(i) Global variable :

- Variable declared outside a function or in global space are called global variables.
- These variables can be accessed by any function in the program.

(ii) Local variables :

- Any variable declared inside a function is known as local variable.
- This variable is in the local space and does not in global space.

Example

a = 2 ← global variable.

def add():

 b = 3 ← local variable.

 c = a + b,

 print(c)

add().

Note :

When you try to access the local variable outside the function add(), it will throw an error.

(11) Is Python case sensitive?

- Yes, Python is a case sensitive language.

(12) What is type conversion in Python?

- Type conversion refers to the conversion of one data type to another.

int()

list()

float()

dict()

ord() - char to integer.

str()

hex()

complex(real, image) - function

oct()

converts real numbers to complex.

tuple()

set().

(3) What is difference between Python Arrays and lists?

- Arrays and list, in Python have same way of storing data.

(P) List

- list can hold any data type elements.
- list in Python is a collection of item which can contain elements of multiple data types, which may be numeric, character etc.
- It is an ordered collection supporting negative indexing.
- list are mutable, which means you can add or remove items after a list creation.
- list item do not need to be unique.

(ii) Array

- An array is also a data structure that stores a collection of items.
- Arrays are mutable, ordered, enclosed in square brackets, or able to store non-unique items.
- Array vector containing homogeneous element.
- Elements are allocated with contiguous memory location, allow easy modification, that is addition, deletion, accessing of elements.
- Array can hold only a single data type elements.

(4) What are functions in Python.

- function is a block of code which is executed only when it is called.
- To define a Python function, def keyword is used.
- function can return data as a result.
- you can pass data, known as parameters, into a function.

```
def Newfunc():  
    print("Welcome to Python")  
Newfunc();
```

(5) What is __init__?

- __init__ is a method or constructor in Python.
- this method automatically called to allocate memory when a new object instance of a class is created.

class Employee:

def __init__(self, name, post):

self.name = name

self.post = post

e1 = Employee('Shyam', 'Data Scientist')

print(e1.name)

print(e1.post)

⑯ What is Lambda function?

- An anonymous function is known as a lambda function.
- This function can have any number of parameters but, can have a single statement.
- Anonymous function is a function that is defined without name.

Syntax

lambda arguments : expression.

Example:

a = lambda x,y : x+y

print(a(5,6))

⑰ What is self in Python?

- self is an instance or an object of a class.
- self variable in the init method refers to the newly created object while in other methods, it refers to the object whose method was called.

⑱ How does break, continue, and pass work?

(i) break

- Allow loop termination when some condition is met and the control transfers to the next statement.

(ii) continue

- Allow skipping some part of loop when some specific condition is met and the control is transferred to the beginning of the loop.

(iii) Pass

- used when you need to some block of code syntactically, but you want to skip its execution.
- basically it's null operation, Nothing happens when pass is executed.

(iv) What does [::-1] do?

- [::-1] it is used to reverse the order of an array or a sequence.
- [::-1] represent a reversed copy of ordered data structure such as array or a list.
- original array or list remains unchanged.
`my_arr = arr.copy.array([1, 2, 3, 4, 5])
my_arr[::-1].`

(v) What are Python Iterators?

- Iterators are objects which can be traversed through an iterated upon.
- that means you can traverse all the values,
- Iterator is an object which implements the iterator protocol, which consists of methods `__iter__()` and `__next__()`.

(vi) How can you generate random numbers in Python?

- Random module is the standard module that is used to generate a random number.
- `import random`.
- `random.random()` method return the floating point number that is range of (0,1)
- The function generates random float numbers.
- That method are used with the random class are the bound methods of hidden instances:
 - (i) `randrange(a,b)`
 - (ii) `uniform(a,b)`
 - (iii) `normalvariate(mean, stdex)`,
 - (iv). Random class.

Q2) What is difference between range and xrange?

- range() and xrange() are two functions that could be used to iterate a certain number of times in for loops.
- In Python3, there is no xrange, but range function behaves like xrange in Python2.

(i) range():

This return a return object (a type of iterable).

(ii) xrange():

- This function returns generator object that can be used to display numbers only by looping.
- Because range is displayed on demand and hence called "Lazy evaluation".
- Both are implemented in different ways and different characteristics associated with them.

(i) Return type.

(ii) memory.

(iii) operation usage.

(iv) speed.

(i) Return type

- range() returns range object.
- xrange returns xrange object.

(ii) Memory

- Variable storing the range created by range() takes more memory as compared to variable storing the range using xrange().

(iii) operation usage:

- As range() returns the list, all operation they can be applied on the list can be used on it.

- `xrange()` returns `xrange` objects, operations associated w/ list cannot be applied on them. (Disadvantages).

(ii) Speed :

- `xrange()` evaluates only the generators object containing only the value that are required by lazy evaluation, therefore faster in implementation than `range()`,
- `range()` is faster if iterating over same sequence multiple times
- `xrange()` has to reconstruct the integer object every time, but `range` will have real integer object.

(23) What is pickling and unpickling?

- pickle module accepts any python objects and converts it into a string representation and dumps onto a file by using `dump` function, this process is called pickling.
- While the process of retrieving original Python objects from the stored string representation is called unpickling.

(24) What are generators in Python?

- function that return an iterable object set of items are called generators.
- generator are used to create iterators, but with different approach.
- generator are simple functions which return an iterable set of items.

(25) What is purpose of `is`, `not` and `in` operators?

- operator are special function, they can take one or more values and produce corresponding result.
- `is`: return true when 2 operands are true
- `not`: return the inverse of boolean value.
- `in`: checks if some element is present in some sequence.

(26) What is the usage of `help()` and `dir()` function in Python?

(i) Help() :

`Help()` function is used to display documentation string and also

facilitate you to see help related to module, keyword, attribute, etc.

(ii) dir():

- `dir()` function is used to display the defined symbol.

Q27 Whenever Python exists, why isn't all memory deallocated?

(i) Whenever Python exists, especially those Python modules which are having circular references to other objects or the objects that are referenced from the global namespaces are not always deallocated or freed.

(ii) It is impossible to de-allocate those portions of memory that are reserved by C library.

(iii) On exit, because of having own efficient clean up mechanism, Python would try to deallocate/destroy every other objects.

Q28 What are dictionaries in Python?

- Built-in datatype in Python is called dictionary.
- It defines one-to-one relationship between keys and values.
- Dictionaries contain pair of keys and their corresponding values.
- Dictionaries are indexed by keys.

Q29 How can the ternary operators be used in Python?

- Ternary operator is the operator that is used to show the conditional statements. This consists of True or False value.

Syntax

[on-True] if [expression] else [on-false] x,y = 25, so big = x if x > y

Q30 What does this mean: *args, **kwargs? Why would we use it?

- We use `*args` when we are unsure how many arguments are going to be passed to a function.

- `**kwargs` is used when we don't know how many keywords argument will pass to a function.

(31) Explain `split()`, `sub()`, `subn()` methods of "re" module in Python.

- To modify strings, Python 're' module is providing 3 methods.

(i) `split()`

Uses a regex pattern to "split" a given string into a list.

(ii) `sub()`:

find all substring where the regex pattern matches and then replace them with a different string.

(iii) `subn()`

- It is similar to `sub()` and also return the new string along with no of replacements.

(32) What are Negative Indexed and why do they used?

- Sequences in Python are indexed and it consists of positive as well as negative numbers.

positive - positive number starts from 0,

Negative - Negative number starts from -1,

- Negative index is used to remove any new-line spaces from the string and allow string to except last character that is given as [:-1]

- Negative index is also used to show the index to represent string in correct order.

(33) How can he file deleted in Python?

- To delete a file in Python, need to import os module

- need to use `os.remove()` function.

`import os`

`os.remove("abc.txt")`

(34) What are built in types of Python?

i) Integers.

ix) String

ii) floating points

x) Boolean

iii) complex Numbers.

xi) Built in functions.

- (35) What advantages do NumPy Arrays offer over Python lists?
- Python lists are efficient general purpose containers.
 - Python support insertion, deletion, appending, and concatenation.
 - Python comprehensions make them easy to construct and manipulate.

(i) They have certain limitations

- they don't support "vectorized" operations like element-wise addition and multiplication. They can contain objects of different types.

(ii) NumPy is efficient and more convenient.

- lot of vector and matrix operations for free, which sometimes allow one to avoid unnecessary work.

(iv) NumPy Array is fast and built-in with NumPy. FFTs convolution, fast searching, basic statistics, linear algebra, histograms etc.

(36) How to add values to a Python Array?

- Elements can be added to an array using append(), extend(), and insert(i, x) functions.

(37) How to remove values to a Python Array?

- Array element can be removed using pop() or remove() methods.

(i) remove()

- Remove method takes a single element as an argument and removes it from the list.
- If element doesn't exist, it throws value Error: list.remove.
- Remove method only removes first occurrence of the specified value.
- Removes only one that searches object (not index).

(ii) pop:

- Use pop() method to remove an element in array.
- Pop is only way that returns the object.
- pop sets the deleted value from left.

Ques 36 Does python have OOPS concepts?

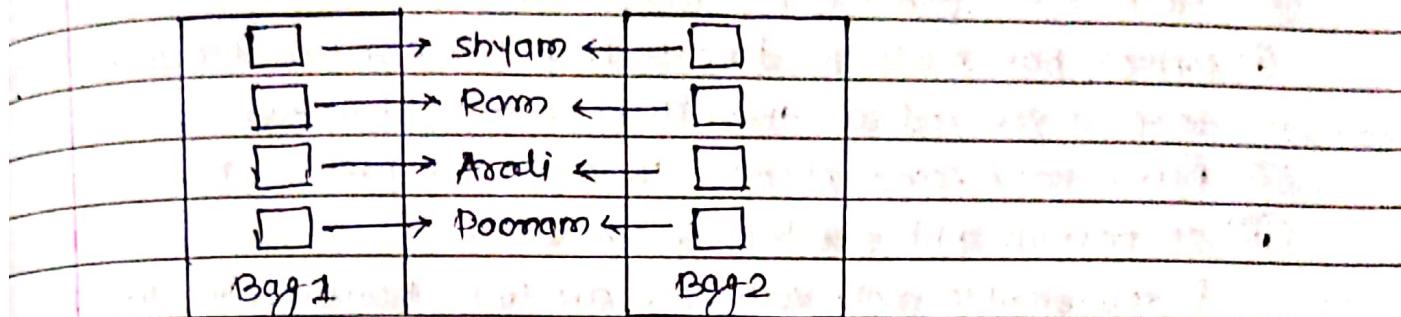
- Python is an object oriented programming language.

- Python can be treated as procedural as well as structural language.

Ques 37 What is difference between deep and shallow copy (Ex)?

- Shallow copy is used when a new instance type gets created, and it keeps the values that are copied in the new instance.

- Shallow copy is used to copy the reference pointers just like it copies value.



- Shallow copy means constructing a new collection object and then populating it with references to the child objects found in the original.

- Reference of object is copied in other objects.

- It means that any changes made to a copy of object do effect in the original object.

- This is implemented as using "copy" function.

- The copying process does not recurse and therefore won't create copies of the child objects themselves.

Ques 38 Deep copy

- Deep copy is a process occurs recursively.

- first constructing a new collection object and then recursively populating it with copies of the child objects found in the original.

- In case of, a copy of objects is copied in other object.

- Any changes made to a copy of objects do not effect in the original object.

- Implemented using deepcopy() function.

	→ shyam		→ shyam
	→ Poonam		→ Poonam
	→ Anali		→ Anali
	→ Renu.		→ Renu
Bag 1	Bag 2.		

Deep copy

(28) How is Multithreading achieved in Python?

- (i) Python has multithreading package but if you want to multithread to speed your code up, then it's not a good idea to use it.
- (ii) Python has a construct called the Global Interpreter Lock (GIL).
- (iii) GIL passing adds overhead to execution
if you want to make your code run faster - then using the threading package option isn't good idea.

(29) What is the process of compilation and linking in Python?

- compiling and linking allows new extensions to be compiled properly without any errors.
- linking can be done only when it passes the compiled procedure.
- If dynamic loading is used then it depends on the style that is being provided with the system.
- Python interpreters can be used to provide dynamic loading of the code - generation setup files and rebuild the interpreter.

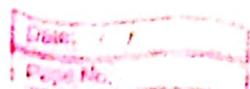
(30) What are Python libraries? Name a few of them.

- Python libraries are a collection of Python packages. some of the most used python libraries are,
- NumPy, Pandas, Matplotlib, scikit-learn.

(31) What is split used for.

- split method is used to separate a given string in Python.
`print(a.split())`

OOPS PYTHON INTERVIEW QUESTIONS.



Q42 Explain Inheritance in Python with an example?

Inheritance is the capability of one class to derive or inherit the properties from another class, benefits of inheritance are,

(i) It represents the real world relationship

(ii) It provides reusability of a code.

(iii) It allows us to add more features to a class without modifying it.

(iv) It is transitive in nature, which means If class B inherits from another class A, then all the subclasses of B would automatically inherit from class A.

- There are different types of Inheritance supported by Python.

(i) Single Inheritance. - derived class acquires number of single super-class.

(ii) Multi-level Inheritance. - derived class d1 inherit from base, d2 inherit base

(iii) Hierarchical Inheritance. - one base class can inherit any number of child classes.

(iv) Multiple Inheritance. - derived class is inherited from more than one base class.

- the class from which we are inheriting is called superclass and class that is inherited called derived / child class.

Q43 Does Python support multiple Inheritance?

- multiple inheritance means that a class can be derived from more than one parent class. Python does support multiple inheritance.

Q44 What is Polymorphism in Python?

- polymorphism means ability to take multiple forms.

- if parent class has a method name ABC then the child class also can have a method with same Name ABC having its own Parameters and variables.

- Python allows polymorphism.

Q45 Define encapsulation in Python?

- Encapsulation means binding the code and data together.

- Python class is an example of encapsulation.

(46) How do you do data abstraction in Python?

- Data abstraction is providing only the required details and hiding the implementation from the user.
- It can be achieved in Python by using interfaces and abstract classes.

(47) Python make use of Access specifiers?

- Python does not deprive access to an instance variable or function.
- Python lays down the concept of prefixing the name of the variable, function or method with a single or double underscore to imitate the behaviour of protected and private Access specifiers.

(48) What does type() do?

- It returns a featureless object that is base for all classes.
- It does not take any parameters.

PYTHON LIBRARY - FLASK

Q) Explain what is flask and its benefits?

- flask is a web microframework for python based on "werkzeug", "jinja2" and good intentions, BSD license.
- werkzeug and jinja2 are two of its dependencies.
- this means that it will have little to no dependencies on external libraries.
- it makes the framework light while there is a little dependency to update and fewer security bugs.
- session allows us to remember information from one request to another request.
- user can modify session if only has secret key flask.secret_key.

Q) Is the flask framework open source?

- yes, flask framework is open source.
- source code of flask Framework.

Q) How to add the mailing feature in the flask Application?

- to send emails, need to install flask-mail extension.
PIP install flask-mail.
- once installed, then we need to use flask config API to configure MAIL-SERVER, MAIL-PORT, MAIL-USERNAME, MAIL-PASSWORD, etc.
- need to import message class, instantiate it and form a message object before sending the emails by using mail.send() method.

Q) What is WSGI?

- WSGI stands for Web servers Gateway Interface.
- It is Python standard defined in PEP 3333.
- WSGI is pronounced as "Whiskey".
- Its specification that describes how a web server communicate with web application.

Q) Why do we use flask?

- Flask is used to create web applications using python programming language. flask is a microframework that's also used for quick

Prototyping web and networking based applications.

(56) What is the default host port and port of flask?

- flask default host is localhost(127.0.0.1) and default port is 5000.

(57) How to change default host and default port in flask?
app.run(host='0.0.0.0', port=8080).

(58) Which flask extension can be used to create an Ajax application?

- We can use flask-sijax to create an Ajax application. flask-sijax is an extension that uses Python/jQuery.
- It is available on PyPI and can be installed using pip.
- sijax stands for simple Ajax, once installed and configured.
- It enables the use of @flask-sijax decorator.

(59) How to get query string in flask?

- using request object.

```
@app.route('/')
def index():
    val = request.args.get("var")
    return 'Hello World! {}'.format(val)
```

(60) How to use URL for flask Application?

- Flask url_for function helps in creating dynamic routes.
- We can use url_for in the flask templates.
- We can call the view function with parameters and values to gen URLs.

pass function and arguments

```
<a href="{{ url_for('get_post_id', post_id=post.id) }}>
{{ post.title }}</a>
```

Q) How to create an admin interface in flask?

- we can create an admin interface for the flask using flask-admin extension.
- helps in grouping individuals virus together in classes.
- we can use the flask-appbuilder extension too.

Q) How to integrate twitter or similar APIs with the flask application?

- To integrate with flask, we can use of a flask extension called flask-social.
- It not only helps in authenticating users from twitter but also other social platforms or accounts facebook and google.

Q) Why is flask called microframework?

- flask is called microframework because flask only provides core features such as request, routing and blueprints.
- for other feature such as caching, ORM, forms etc.
- we need to use of flask extension.

Q) What are the benefits using flask framework?

- It has an inbuilt development server.
- It has vast third-party extensions.
- It has tiny API and can be quickly learned by developers.
- It is WSGI compliant.
- It supports unicode.

Q) Is the sqlalchemy database built-in flask?

- SQLAlchemy is inbuilt in with Python.
- To use the database use in flask, we need not installed any additional flask extension.
- flask developer generally use of flask-SQLAlchemy.

Q) What do you mean by template engine in the flask framework?

- A template is a file that contains two types of data.
(static and dynamic)

- Dynamic data in a template is populated during runtime.
- flask make use of jinja 2 template engine to let developer create HTML templates with placeholders for dynamic data.

(67) What do you mean by Thread local object in flask?

- In flask, thread safety has been provided out of the box.
- we can use objects such as current_app, g, and session without worrying about problems related to locking and concurrency.
- we need not pass objects from methods to methods.

(68) Describe the features of form extension for flask.

- forms flask can be implemented by using extension called flask wtf.
- flask wtf is created by integrating flask with wtf forms.
- wtforms is a python based form generating and validation library.
- It supports data validation, internationalization, CSRF protection.
- flask wtf also supports CAPTCHA.

(69) What is the g object in flask? How does it differ from session?

- flask g object is used as a global namespace for holding data during application context.
- g object is not appropriate for storing the data between requests.

(70) What is the application context in flask?

- application context in flask relates to the idea of complete request/response cycle.
- It keeps a track application-level during a request or CLI command.
- use g and current_app provider to achieve the same.

(71) How to create a RESTful application in flask?

- RESTful application can be created in flask with the help of many extensions.

Some popular Flask extensions are listed below.

1. flask-API
2. flask-RESTful.
3. flask-FFSIX.
4. connexion.

Q) How to debug a Flask Application?

- Flask comes up with development server, and the development server has a debug mode.
- The debug mode can be set to true when we call the run method of flask application object.

```
app.run(host='127.0.0.1', debug=True),
```

- We need to disable the debug mode before deploying the application on production to avoid full stack trace display in browser.

Q) What type of applications can we create with flask?

- We can create almost all type of web applications. We can create a single page Application, RESTful API based applications, SAs applications, small to medium size websites, static websites, Microservices and Serverless app.
- Flask is versatile and flexible

Q) What's difference between Django, Pyramid, and flask?

- Flask is microframework. Pyramid is build larger primarily build for small applications with simple requirements.	Like Pyramid, Django can also used for larger applications.
- In flask, uses external libraries	profeels. Developers choose the data base, ORI structure, templating style.

Q75) What is flask-wtf and what are their features?

- flask-wtf offers simple integration with wtforms.
- Features of wtform are:
 - (i) Integration with wtforms.
 - (ii) secureform with csrf token.
 - (iii) global csrf protection.
 - (iv) Internationalization integration.
 - (v) ReCaptcha supporting.
 - (vi) file upload that works with flask uploads.

Q76) Is flask an MVC model and if yes give an example showing MVC pattern for your application?

- flask is minimalist framework which behaves same as MVC framework.
- MVC is a perfect fit for flask, and the pattern for MVC.

Q77) Explain how you request database connection in flask?

- flask allows to request database in three ways.
 - (i) before_request - They are called before request and pass no args.
 - (ii) after_request - They are called after request and pass the response that will be sent to the client.
 - (iii) teardown_request - They are called in situation when exception is raised, and responses are not guaranteed.
 - They are not allowed to modify request.

Q78) Explain how can you structure a large flask-application?

- stick functions and methods to different files. It will get imported when application starts.
- Use blueprints to assign views to categories, for instance auth, profile.
- Use underlying werkzeug URL map and registers function on their central URL map.

Q) What are HTTP methods in flask?

In flask, HTTP methods are given below.

(i) GET - send data in unencrypted form to the server.

(ii) HEAD - It is same as GET, but without response body.

(iii) POST - send HTML form data to server, Data received by POST method

(iv) PUT - It is used to replace all the current representation uploaded content.

(v) DELETE - It is used to remove all current representation.

Q) What is the default route request in flask?

In flask, GET is the default request.

Q) What are delimiters used in Jinja2 template?

i) {{ }} - It is used for statements.

ii) {{ }} - It is used for expression to print the template output.

iii) {#} - It is used for comments not included in the template output.

iv) # - ## It is used for line statement.

Q) What are the error code in flask?

400 ð for bad request.

401 ð for unauthorized.

403 ð for forbidden.

404 ð for Not Found.

406 ð for Not Acceptable.

415 ð for unsupported Media Type.

429 ð TOO many request.

Q) What is the use of redirect function?

- redirect() function is used to display the login page again when login attempts fails.

(84) What are validators class of wtforms in flask?

Validator class

(i) DataRequired

(ii) Email

(iii) IPAddress

(iv) Length

(v) NumberRange

(vi) URL

Description.

It is used to check whether input field is required or not.

It is used to validate IP Address in input.

It is used to verify if length of string in field is in given range.

It is used to validate a number in input within given range.

It is used to validate URL entered in input field.

(85) What are popular servers that contains wsgi application and serve HTTP?

- There are many popular servers that contain wsgi applications,

(i) GUNICORN.

(ii) Tornado

(iii) Gevent.

(iv) twisted web.

(86) What is ORM?

- ORM stands for object Relational Mapping.

- It is technique of mapping object parameters.

(87) What is URL_for() function in flask?

- URL_for() function is used to build dynamic URL for specific function.

(88) What are the steps to develop my web application in flask?

(i) flask import flask.

(ii) configuration

(iii) views.

(iv) main prg.

- configuration part will be.

```
from flask import Flask
```

```
app = Flask(__name__)
```

- view part will be.

```
app = Flask(__name__)
```

```
@app.route('/')
```

```
def hello():
```

```
    return 'Hello World'
```

- while your model or main part will be.

```
app.run(debug=True).
```

"WEB SCRAPPING"

Date: _____
Page No. _____

Q1) What is web scrapping?

- Web scrapping is a technique to extract and read the data from website.
- Collected data can be saved and used for data analytics.

Q2) Explain web scrapping procedure?

- There are multiple steps involve in web scrapping.
- (i) Reading data (source code of the web page URL) from the website.
 - (ii) Parsing this data based on HTML tags.
 - (iii) Storing or displaying desired scrapped information.

Q3) What are Python libraries you have used for web scrapping?

- There are many Python libraries are available for web scrapping.
- (i) BeautifulSoup and Scrapy are two most useful Python modules for web scrapping information.
 - (ii) The requests module is to read the data from internet web page.
 - (iii) JSON library is used to dump, to read and write JSON formatted objects.

Q4) How to deal if your IP address is blocked by the website?

- If you are accessing any website more than a threshold, IP address can be blocked by website.
 - Proxy IPs/Services can be used to access the web page if IP blocks.
 - To overcome this use a VPN (Virtual Private Network).
- How does VPN work?
- Send a request to the VPN service.
 - It reads data from websites servers and they will never connect to know about your IP address.
 - VPN is a pool of IP address.

Q5)