UNIT-4

PYTHON UTILITY FUNCTION

DATE AND TIME

- Time and date modules
- **Datetime module**

BASIC DATE AND TIME CLASSES

- Datetime classes are categorize into **6 main** classes:

1. **date:** year, month, day
2. **time:** hour, minutes, seconds, microseconds and tzinfo
3. **datetime:** year, month, day, hour, minutes, seconds, microseconds and tzinfo
4. **timedate:** Difference between the two dates, time or datetime instances to microseconds resolution.
5. **tzinfo:** time zone information
6. **timezone:** implements the tzinfo

What is Tick?

- Time intervals are **floating point numbers in seconds**.
- **Time module**
- **Time.time()** returns the current system time in ticks since 00:00:00 hrs January 1, 1970.

Example:

```
import time
ticks=time.time()
print("Number of ticks since 12:00 am, January 1, 1970:",ticks)
```

What is Time Tuple?

- Many of Python’s time functions handle time as a tuple of 9 numbers:

Index	**Field**	**Values**
0	4-year digit	2021
1	Month	1 to 12
2	Day	1 to 31
3	Hour	0 to 23
4	Minute	0 to 59

5	Second	0 to 61
6	Day of Week	0 to 6 (0 is Monday)
7	Day of Year	1 to 366 (Julian Day)
8	Daylight Saving	-1,0,1,-1 means library determines DST

- The above tuple is equivalent to **struct time structure**. This structure has following attributes:

Index	**Attributes**	**Values**
0	tm_year	2021
1	tm_mon	1 to 12
2	tm_mday	1 to 31
3	tm_hour	0 to 23
4	tm_min	0 to 59
5	tm_sec	0 to 61 (60 or 61 are leap-seconds)
6	tm_wday	0 to 6 (0 is Monday)
7	Tm_yday	1 to 366 (Julian Day)
8	tm_isdst	-1,0,1,-1 means library determines DST

DIFFERENT TIME FORMATS

- Datetime module

1. Get Current Date and Time

Example:

```
import datetime
datetime_object=datetime.datetime.now()
print(datetime_object)
```

2. Get Current Date

Example:

```
import datetime
date_object=datetime.date.today()
print(date_object)
```

Commonly used classes in the datetime module are:

- **Date class**
- **Time class**
- **Datetime class**
- **Timedelta class**

1. Datetime.date Class

- Format YYYY-MM-DD

Syntax: class datetime.date(year, month, day)

Example:

```
#date object to represent a date
import datetime
d=datetime.date(2021,6,13)
print(d)

#import date class from datetime module
from datetime import date
d=date(2021,6,23)
print(d)

#get current date
from datetime import date
today=date.today()
print("Current date = ",today)
```

Example: Get date from a timestamp

```
from datetime import date
timestamp=date.fromtimestamp(1326244364)
print("Date = ",timestamp)

#print today's year, month and today
from datetime import date
today=date.today() #for today's date
print("Current Year : ",today.year)
print("Current Month : ",today.month)
print("Current Day : ",today.day)
```

2. Datetime.time Class

- Time class represents the local time independent of any day.

Syntax:

class datetime.time(hour, minute, seconds, microseconds, tzinfo=None,*,fold=0)

Example:

```
#time object to represent time
from datetime import time
#time(hour=0, minute=0,second=0)
a=time()
print("a = ",a)

#time(hour, minute,second)
b=time(11,25,50)
print("b = ",b)

#time(hour, minute,second)
c=time(hour=11,minute=25,second=50)
print("c = ",c)

#time(hour, minute,second, microsecond)
d=time(11,25,50,234566)
print("d = ",d)

#print hour, minute, second and microsecond
from datetime import time
a=time(11,34,56)
print("Hour = ",a.hour)
print("Minute = ",a.minute)
print("Second = ",a.second)
print("microsecond = ",a.microsecond)
```

3. Datetime.datetime Class

- The **datetime module** has a class named **dateclass** contain information from both date and time objects.
- The year, month and day arguments are mandatory.

Syntax:

class datetime.datetime(hour, month, day, hour=0, minute=0, seconds=0, microseconds=0, tzinfo=None,*,fold=0)

Example 1:

```
#python datetime object
from datetime import datetime
#datetime(year, month, day)
a=datetime(2021,7,1)
print(a)
#datetime(year, month, day, hour, minute, second, microsecond)
b=datetime(2021,7,1,10,55,45,342385)
print(b)
```

Example 2:

```
#print year, month, hour, minute and timestamp
from datetime import datetime
a=datetime(2021,7,1,5,28,45,342589)
print("Year = ",a.year)
print("Month = ",a.month)
print("Hour = ",a.hour)
print("Minute = ",a.minute)
print("Timestamp = ",a.timestamp())
```

4. Datetime.timedelta

- A **timedelta** object represents difference between two dates or times.
- Data Manupulations
- Get the total number of seconds in a timedelta object using **total_seconds() method.**

Syntax:

class datetime.timedelta (days=0, seconds=0, microseconds=0, milliseconds=0, minutes=0, hours=0, weeks=0)

Example:

```
#Difference between two timedelta objects
from datetime import timedelta
t1=timedelta(weeks=2,days=5,hours=1,seconds=33)
t2=timedelta(days=4,hours=11, minutes=4,seconds=54)
t3=t1-t2
print("t3 = ",t3)
```

```
#time duration in seconds
from datetime import timedelta
t=timedelta(days=5,hours=1,seconds=33, microseconds=233423)
print("Total seconds = ",t.total_seconds())
```

Note: you can also find sum of two dates and time using **+ operator**. Also, you can multiply and divide a timedelta object by integers and floats.