Alphaa AI Assignment

In [1]:

```
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
import numpy as np
```

In [2]:

```
df=pd.read_csv("banknifty-data (1).csv")
```

In [3]:

```
df.head()
```

Out[3]:

	datetime	open	high	low	close	volume
0	2006-01-02	4566.95	4601.35	4542.00	4556.25	0.0
1	2006-01-03	4531.45	4605.45	4531.45	4600.25	0.0
2	2006-01-04	4619.55	4707.60	4616.05	4694.14	0.0
3	2006-01-05	4714.20	4782.64	4670.55	4760.45	0.0
4	2006-01-06	4767.25	4802.80	4703.10	4755.60	0.0

In [4]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3448 entries, 0 to 3447
Data columns (total 6 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   datetime  3448 non-null   object 
 1   open      3448 non-null   float64
 2   high      3448 non-null   float64
 3   low       3448 non-null   float64
 4   close     3448 non-null   float64
 5   volume    3448 non-null   float64
dtypes: float64(5), object(1)
memory usage: 161.8+ KB
```

In [5]:

```
df.shape
```

Out[5]:

```
(3448, 6)
```

In [6]:

```
df_copy=df.copy()
```

In [7]:

```
new_df=pd.DataFrame(df.datetime.str[:7])
new_df['mon_perc_ret']=(df.close-df.open)/df.open
new_df
```

Out[7]:

	datetime	mon_perc_ret
0	2006-01	-0.002343
1	2006-01	0.015183
2	2006-01	0.016147
3	2006-01	0.009811
4	2006-01	-0.002444
...	...	...
3443	2019-12	-0.001486
3444	2019-12	-0.001245
3445	2019-12	0.003660
3446	2019-12	-0.001283
3447	2019-12	-0.001764

3448 rows × 2 columns

In [8]:

```
grouped_df=pd.DataFrame(new_df.groupby("datetime")["mon_perc_ret"].mean()).reset_index()
grouped_df.head()
```

Out[8]:

	datetime	mon_perc_ret
0	2006-01	0.000162
1	2006-02	-0.000093
2	2006-03	-0.000525
3	2006-04	-0.001505
4	2006-05	-0.005277

In [9]:

```
grouped_df
```

Out[9]:

	datetime	mon_perc_ret
0	2006-01	0.000162
1	2006-02	-0.000093
2	2006-03	-0.000525
3	2006-04	-0.001505
4	2006-05	-0.005277
...	...	...
163	2019-08	-0.002885
164	2019-09	0.002340
165	2019-10	-0.002030
166	2019-11	0.001512
167	2019-12	-0.001108

168 rows × 2 columns

In [10]:

```
grouped_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 168 entries, 0 to 167
Data columns (total 2 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   datetime      168 non-null    object 
 1   mon_perc_ret  168 non-null    float64
dtypes: float64(1), object(1)
memory usage: 2.8+ KB
```

In [11]:

```
grouped_df["Year"]=grouped_df.datetime.str[:4]
grouped_df["Month"]=grouped_df.datetime.str[5:7]
grouped_df.head()
```

Out[11]:

	datetime	mon_perc_ret	Year	Month
0	2006-01	0.000162	2006	01
1	2006-02	-0.000093	2006	02
2	2006-03	-0.000525	2006	03
3	2006-04	-0.001505	2006	04
4	2006-05	-0.005277	2006	05

In [12]:

```
grouped_df['Month_name']=grouped_df.Month.map({'01':'Jan','02':'Feb','03':'Mar','04':'Apr',
grouped_df.head()
```

Out[12]:

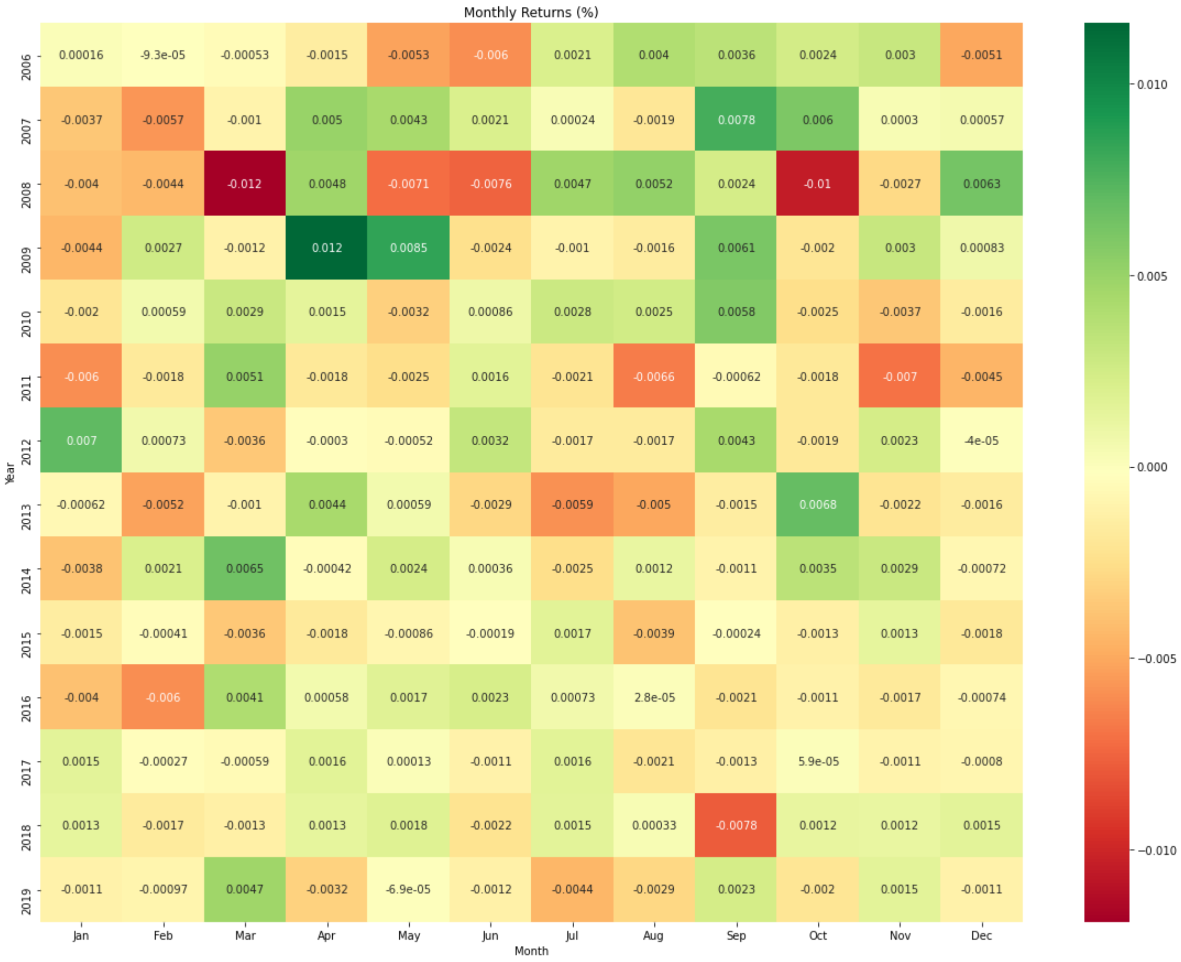
	datetime	mon_perc_ret	Year	Month	Month_name
0	2006-01	0.000162	2006	01	Jan
1	2006-02	-0.000093	2006	02	Feb
2	2006-03	-0.000525	2006	03	Mar
3	2006-04	-0.001505	2006	04	Apr
4	2006-05	-0.005277	2006	05	May

In [13]:

```
plt.figure(figsize=(20,15))
plt.title("Monthly Returns (%)")
sns.heatmap((np.asarray(grouped_df['mon_perc_ret'])).reshape(14,12),xticklabels=grouped_df.
plt.xlabel("Month")
plt.ylabel("Year")
```

Out[13]:

```
Text(159.0, 0.5, 'Year')
```



In [14]:

```
grouped_df['datetime']=pd.to_datetime(grouped_df['datetime'])
grouped_df.head()
```

Out[14]:

	datetime	mon_perc_ret	Year	Month	Month_name
0	2006-01-01	0.000162	2006	01	Jan
1	2006-02-01	-0.000093	2006	02	Feb
2	2006-03-01	-0.000525	2006	03	Mar
3	2006-04-01	-0.001505	2006	04	Apr
4	2006-05-01	-0.005277	2006	05	May

In [15]:

```
grouped_df.info()
```

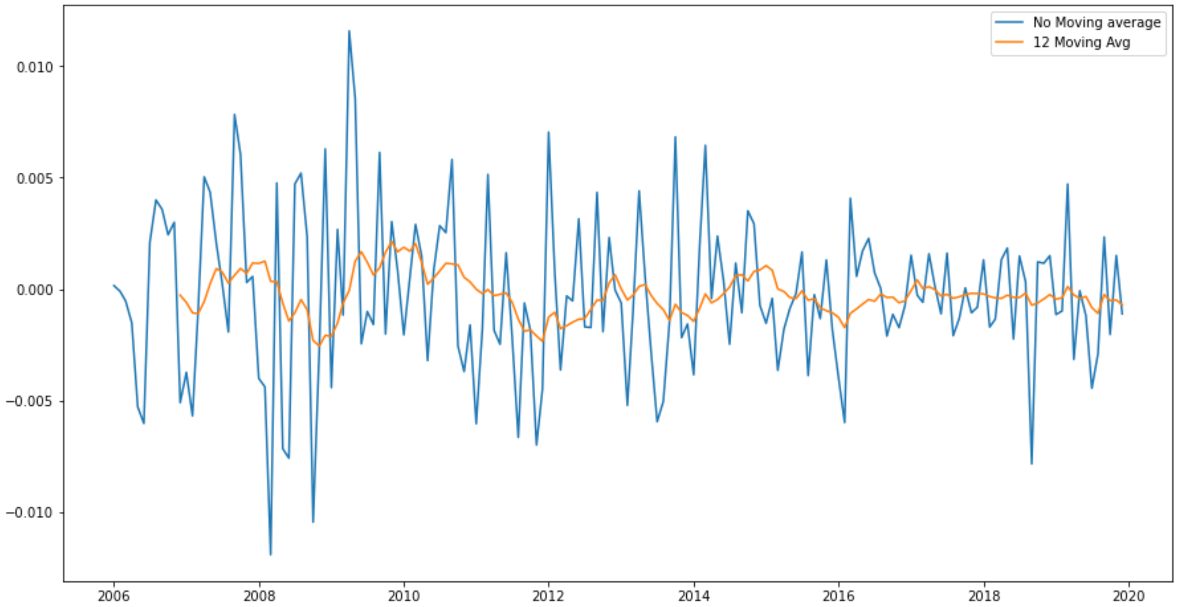
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 168 entries, 0 to 167
Data columns (total 5 columns):
 #   Column        Non-Null Count  Dtype         
---  ------        --------------  -----         
 0   datetime      168 non-null    datetime64[ns]
 1   mon_perc_ret  168 non-null    float64       
 2   Year          168 non-null    object        
 3   Month         168 non-null    object        
 4   Month_name    168 non-null    object        
dtypes: datetime64[ns](1), float64(1), object(3)
memory usage: 6.7+ KB
```

In [16]:

```
plt.figure(figsize=(15,8))
plt.plot(grouped_df['datetime'],grouped_df['mon_perc_ret'],label='No Moving average')
plt.plot(grouped_df['datetime'],grouped_df['mon_perc_ret'].rolling(12).mean(),label='12 Mov
plt.legend()
```

Out[16]:

```
<matplotlib.legend.Legend at 0x1e330a58c10>
```



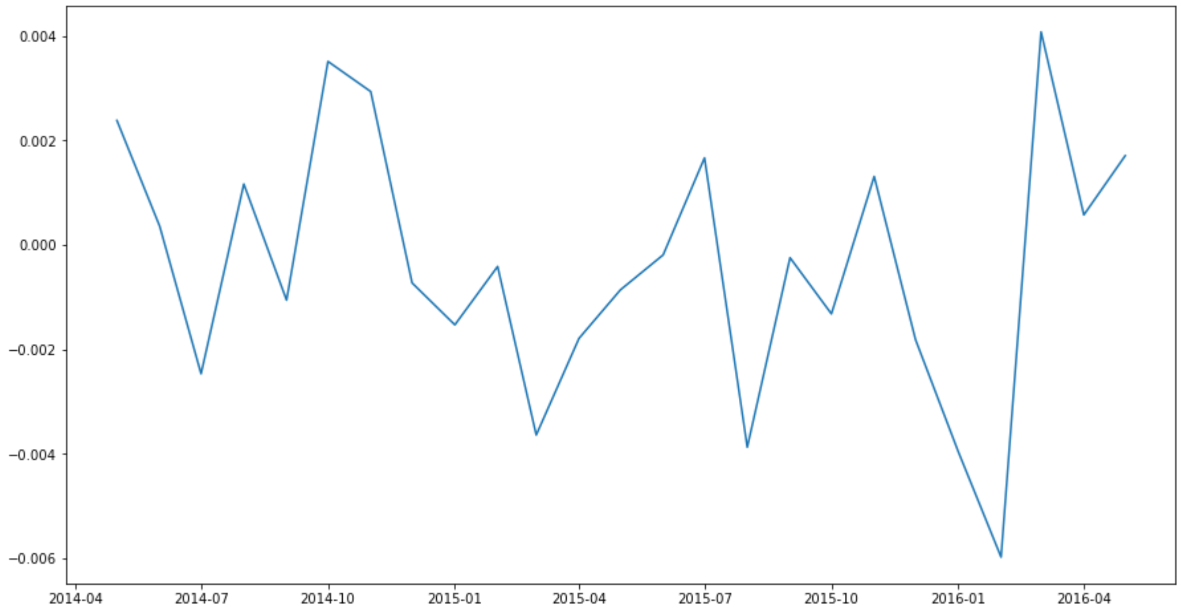
From the above time series data we can see that there is a continuous fluctuations in the trend of monthly percentage returns.

In [17]:

```
plt.figure(figsize=(15,8))
plt.plot(grouped_df['datetime'].iloc[100:125],grouped_df['mon_perc_ret'].iloc[100:125],labe
```

Out[17]:

```
[<matplotlib.lines.Line2D at 0x1e330ad4a90>]
```



In [18]:

```
df.head()
```

Out[18]:

	datetime	open	high	low	close	volume
0	2006-01-02	4566.95	4601.35	4542.00	4556.25	0.0
1	2006-01-03	4531.45	4605.45	4531.45	4600.25	0.0
2	2006-01-04	4619.55	4707.60	4616.05	4694.14	0.0
3	2006-01-05	4714.20	4782.64	4670.55	4760.45	0.0
4	2006-01-06	4767.25	4802.80	4703.10	4755.60	0.0

In [19]:

```
date_ind_df=df.set_index('datetime')
```

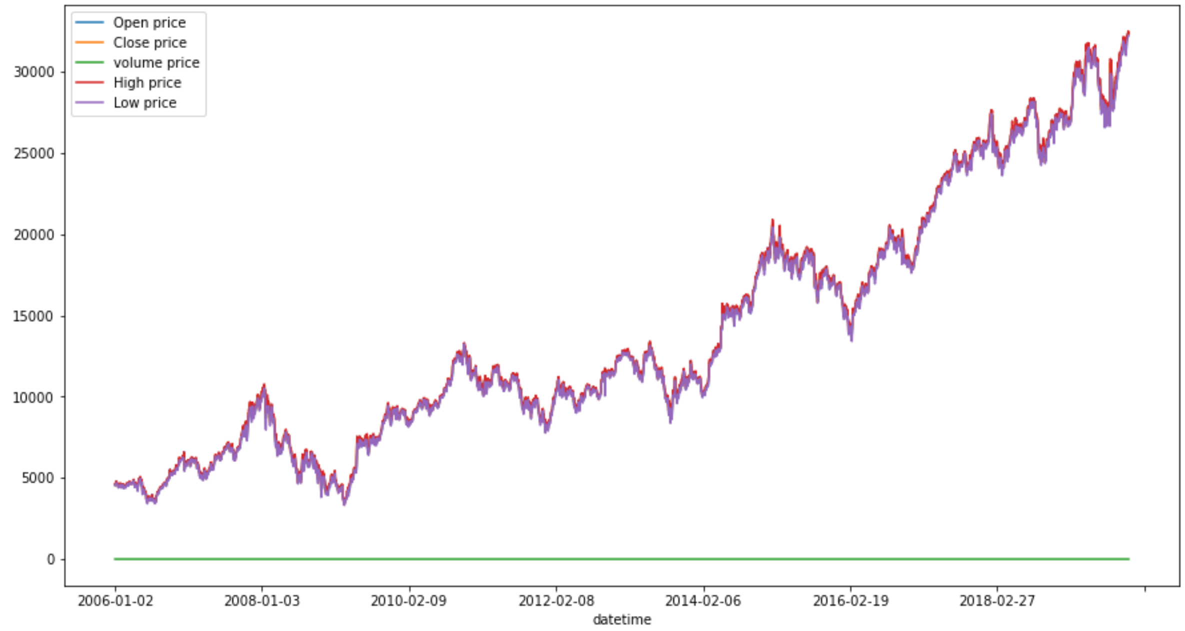
In [20]:

```
date_ind_df['open'].plot(figsize=(15,8),label='Open price')
date_ind_df['close'].plot(figsize=(15,8),label='Close price')
date_ind_df['volume'].plot(figsize=(15,8),label='volume price')
date_ind_df['high'].plot(figsize=(15,8),label='High price')
date_ind_df['low'].plot(figsize=(15,8),label='Low price',)

plt.legend()
```

Out[20]:

```
<matplotlib.legend.Legend at 0x1e330e05eb0>
```



From above trend it can be seen that all open, close, high, low prices are increasing

In [21]:

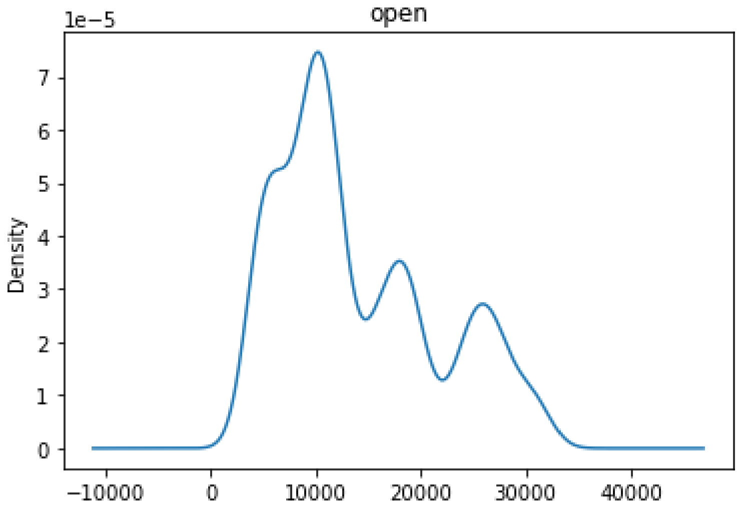
```
df.head()
```

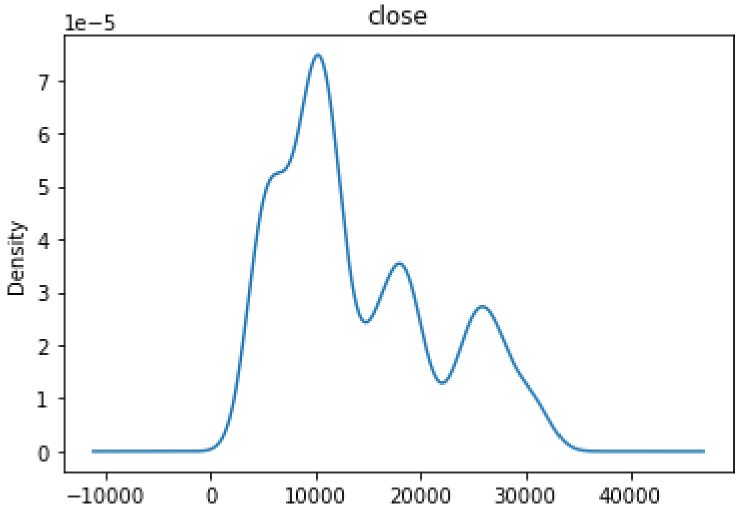
Out[21]:

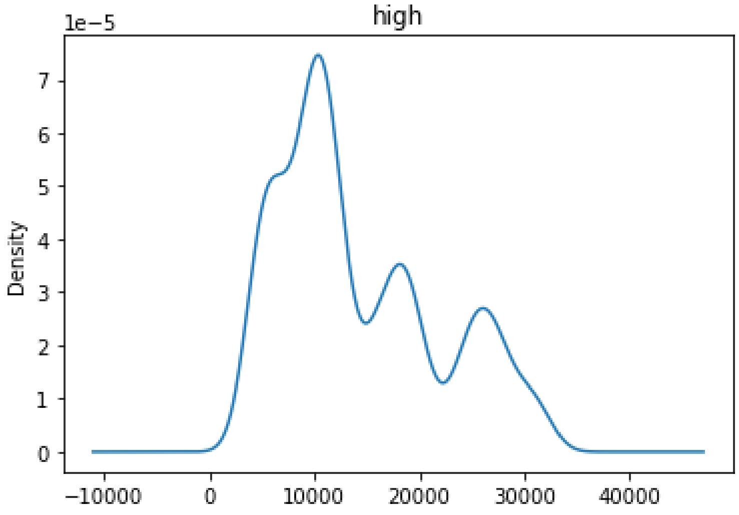
	datetime	open	high	low	close	volume
0	2006-01-02	4566.95	4601.35	4542.00	4556.25	0.0
1	2006-01-03	4531.45	4605.45	4531.45	4600.25	0.0
2	2006-01-04	4619.55	4707.60	4616.05	4694.14	0.0
3	2006-01-05	4714.20	4782.64	4670.55	4760.45	0.0
4	2006-01-06	4767.25	4802.80	4703.10	4755.60	0.0

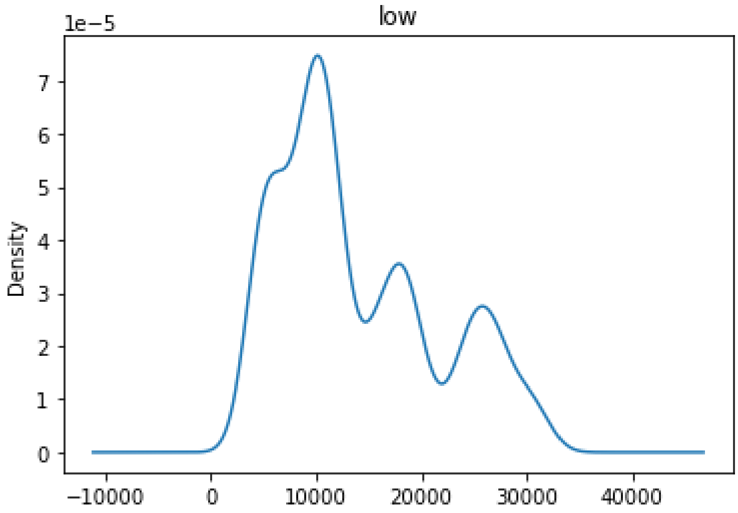
In [22]:

```
for i in ['open','close','high','low']:
    df[i].plot(kind='kde')
    plt.title(i)
    plt.show()
```









```
In [23]:
```

```
df.description()
```

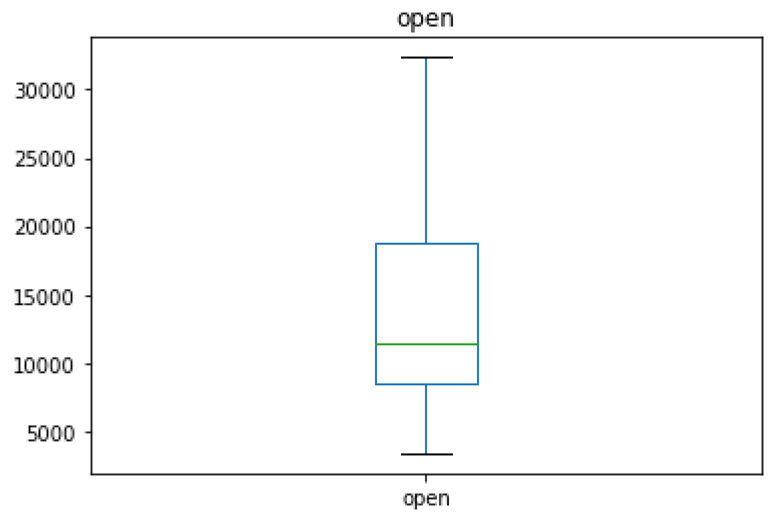
```
Out[23]:
```

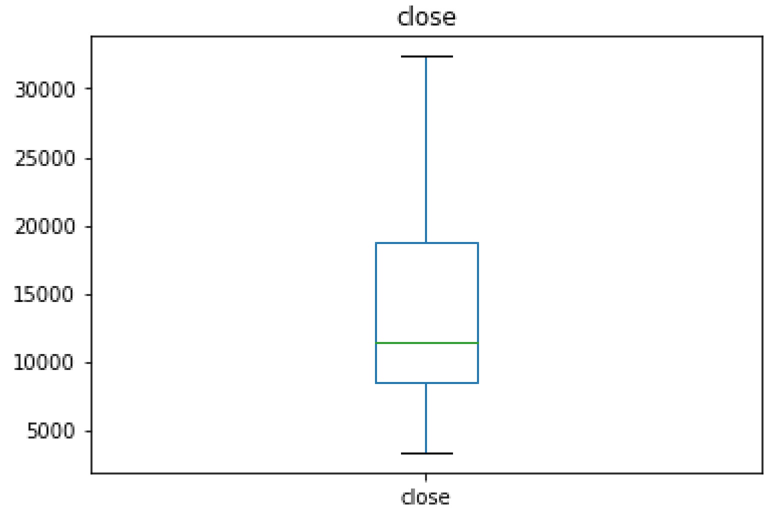
```
               open          high           low         close  volume
count   3448.000000   3448.000000   3448.000000   3448.000000  3448.0
 mean  14013.821769  14129.682880  13883.132796  14007.342648     0.0
  std   7601.245514   7626.954675   7565.885745   7596.458906     0.0
  min   3385.400000   3446.750000   3314.550000   3339.700000     0.0
  25%   8477.925000   8566.342500   8369.900000   8485.662500     0.0
  50%  11379.725000  11460.000000  11262.100000  11362.025000     0.0
  75%  18828.805000  18945.425000  18662.655000  18803.425000     0.0
  max  32381.000000  32502.800000  32246.050000  32384.950000     0.0
```

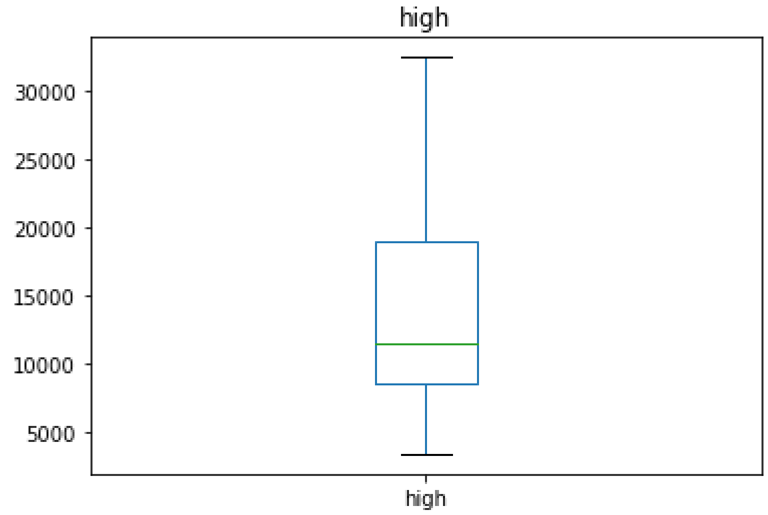
There is no much deviation in prices

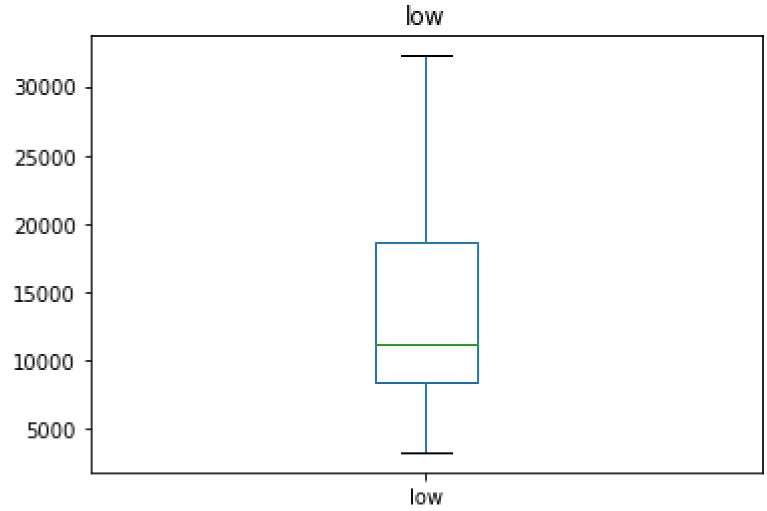
In [24]:

```
for i in ['open','close','high','low']:
    df[i].plot(kind='box')
    plt.title(i)
    plt.show()
```









There is no outlier prices also

In [25]:

```
df.head()
```

Out[25]:

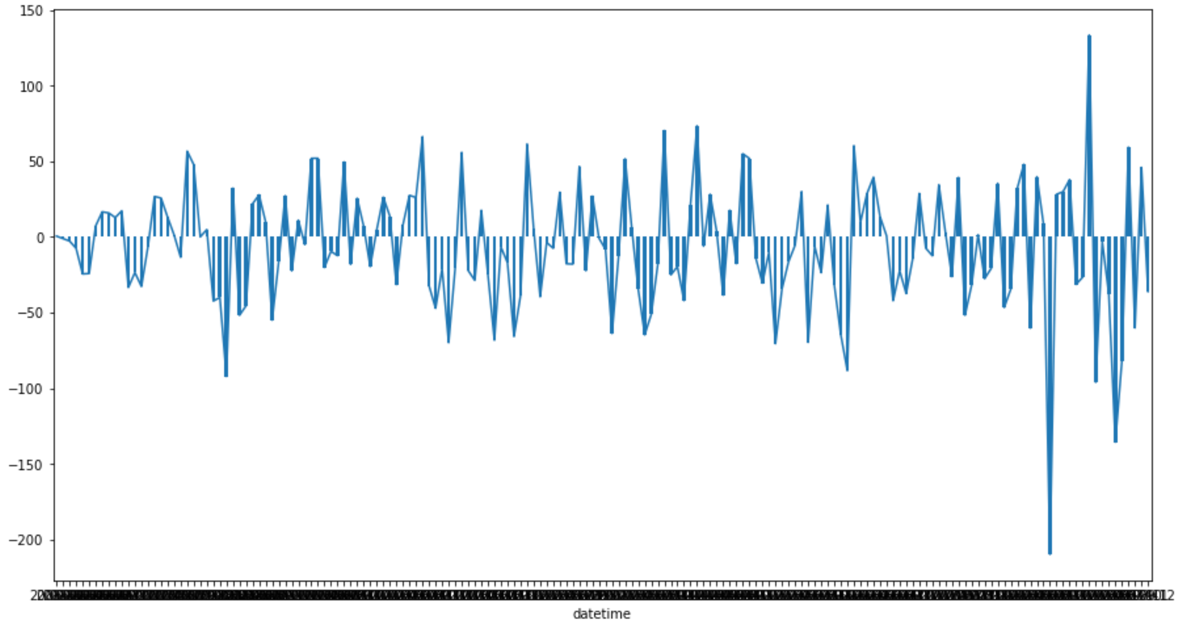
	datetime	open	high	low	close	volume
0	2006-01-02	4566.95	4601.35	4542.00	4556.25	0.0
1	2006-01-03	4531.45	4605.45	4531.45	4600.25	0.0
2	2006-01-04	4619.55	4707.60	4616.05	4694.14	0.0
3	2006-01-05	4714.20	4782.64	4670.55	4760.45	0.0
4	2006-01-06	4767.25	4802.80	4703.10	4755.60	0.0

In [39]:

```
plt.figure(figsize=(15,8))
(df.groupby(df.datetime.str[:7])['close'].mean()-df.groupby(df.datetime.str[:7])['open'].me
(df.groupby(df.datetime.str[:7])['close'].mean()-df.groupby(df.datetime.str[:7])['open'].me
# plt.show()
```

Out[39]:

```
<AxesSubplot:xlabel='datetime'>
```



-- In the beginning of 2006 there is less difference between monthly open and close price, but later during 2017

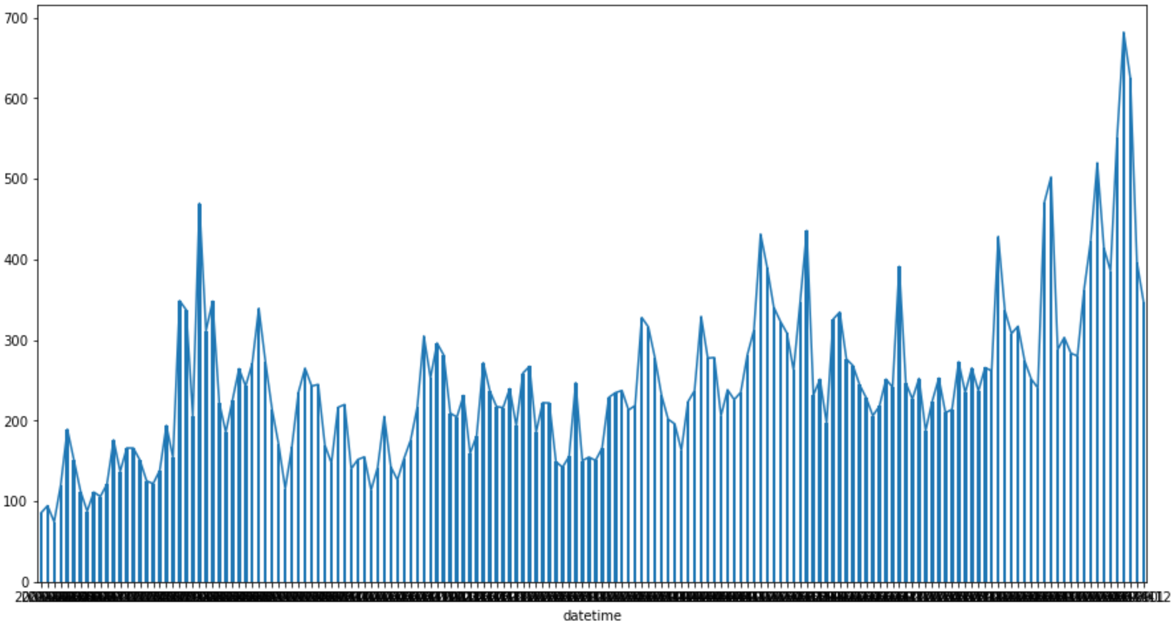
and above, we have huge difference between close and open balance

In [40]:

```
plt.figure(figsize=(15,8))
(df.groupby(df.datetime.str[:7])['high'].mean()-df.groupby(df.datetime.str[:7])['low'].mean
(df.groupby(df.datetime.str[:7])['high'].mean()-df.groupby(df.datetime.str[:7])['low'].mean
# plt.show()
```

Out[40]:

```
<AxesSubplot:xlabel='datetime'>
```



As we can observe that there is gradual increase in diffrence between monthly high and low prices

from above graph it can be concluded that

1) there is constant trend during 2006 to 2009

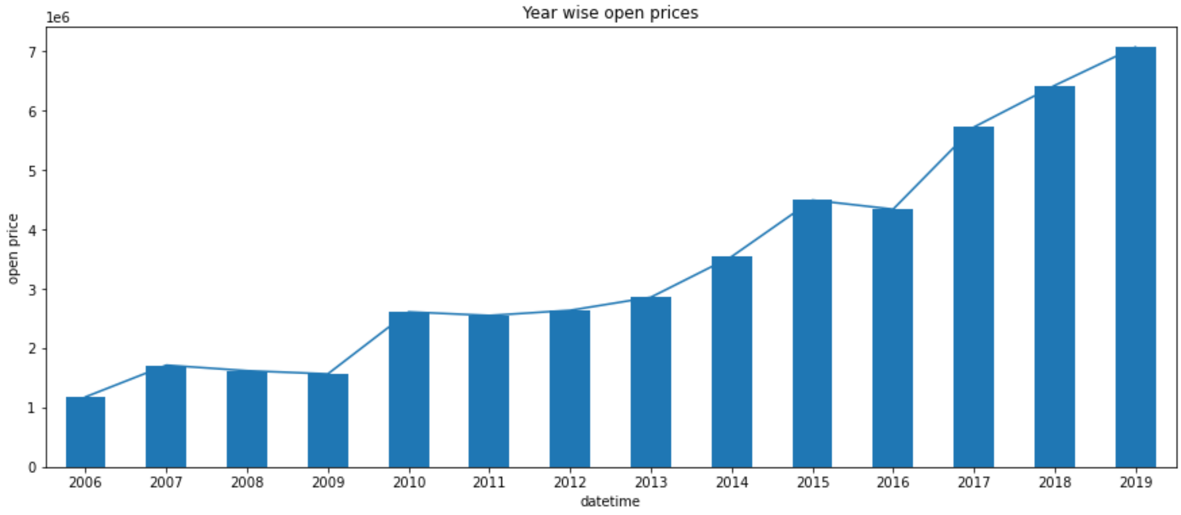
2) There was sudden increase in 2010 and continued till 2013

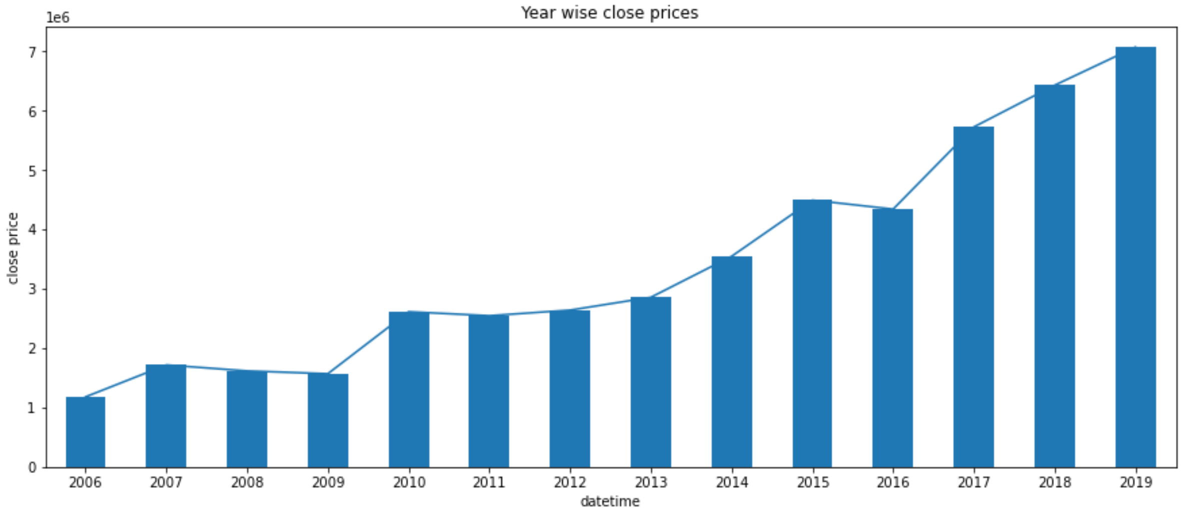
3) with gradual increase 2010 to 2015 but prices fallen during 2016.

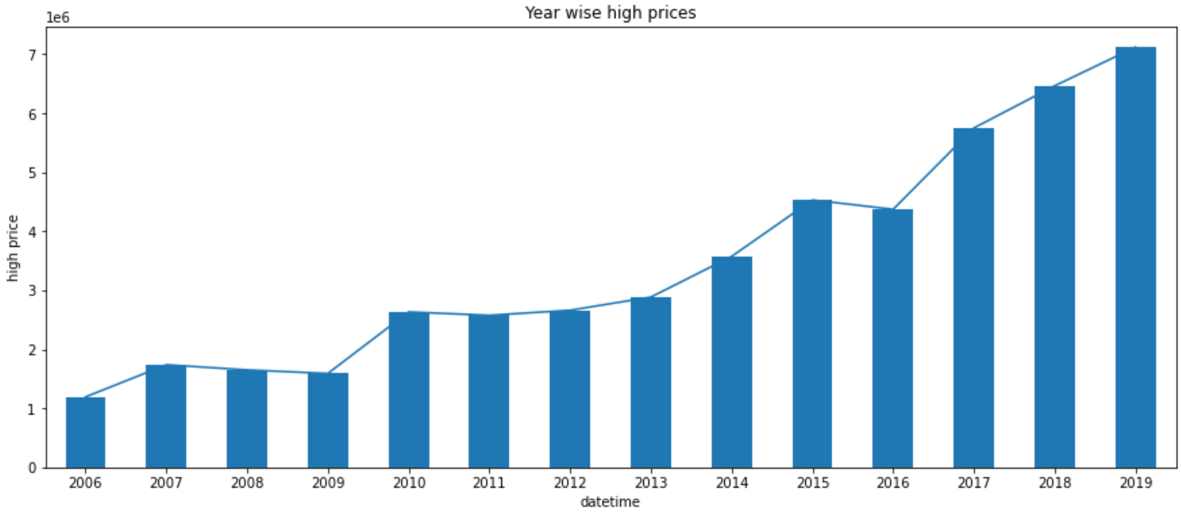
4) However then after it was increasing from 2017 to 2019

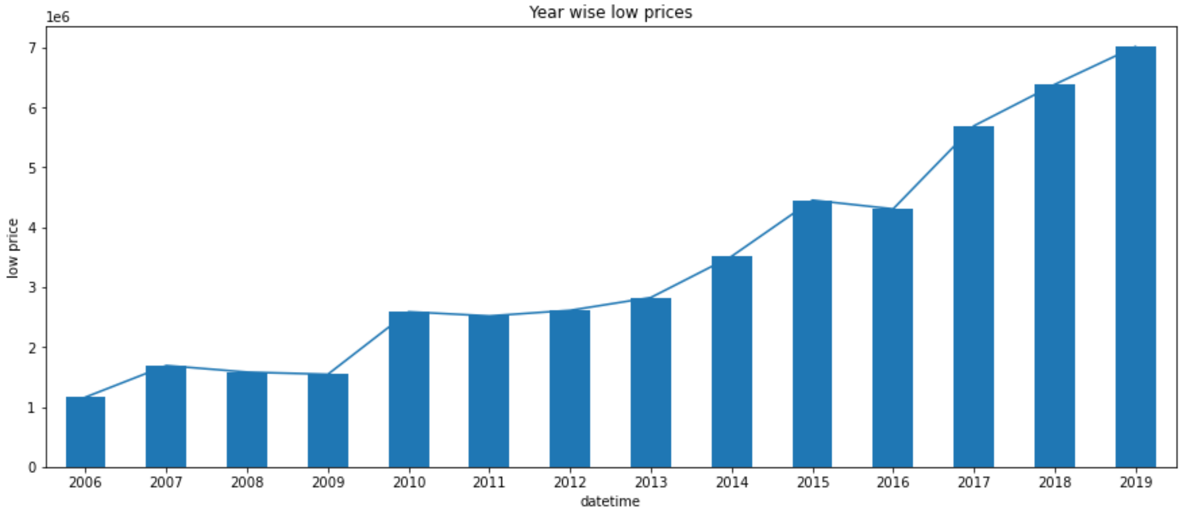
In [61]:

```
for i in ['open','close','high','low']:
    plt.figure(figsize=(15,6))
    (df.groupby(df.datetime.str[:4])[i].sum()).plot(kind='bar')
    (df.groupby(df.datetime.str[:4])[i].sum()).plot()
    plt.ylabel(i+' price')
    plt.title('Year wise '+ i +' prices' )
    plt.show()
```







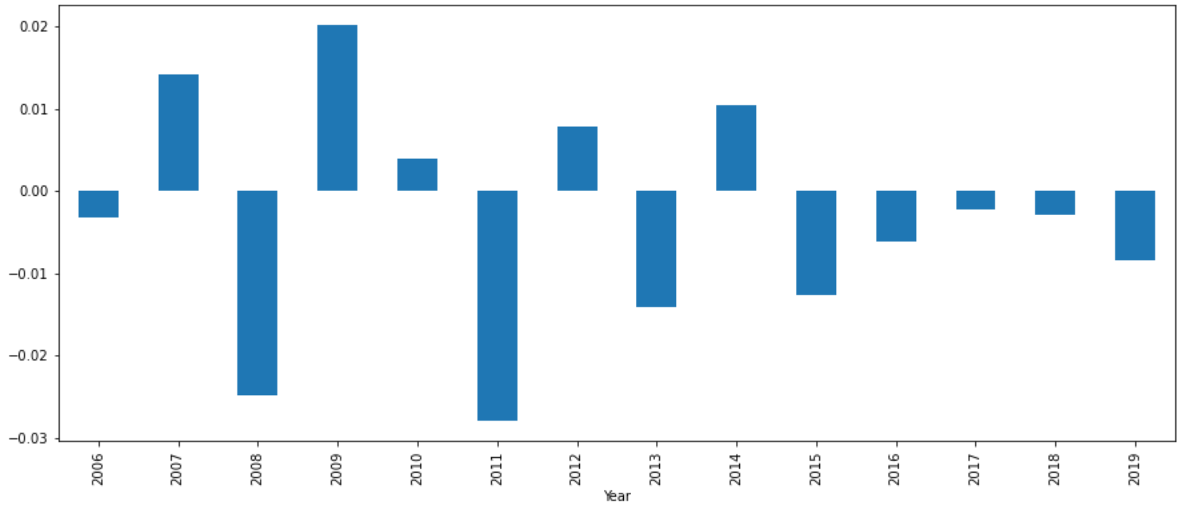


In [62]:

```
plt.figure(figsize=(15,6))
(grouped_df.groupby(grouped_df.Year)['mon_perc_ret'].sum()).plot(kind='bar')
```

Out[62]:

```
<AxesSubplot:xlabel='Year'>
```



We have profits (+ve monthly returns) only during 2007, 2009, 2010, 2012, 2014

and loses(-ve monthly returns) during 2006, 2008, 2011, 2013, 2015, 2016, 2017, 2018, 2019