```
predicted=1.571055, expected=1.700000
predicted=1.625283, expected=2.300000
predicted=1.904219, expected=2.000000
predicted=1.943541, expected=1.800000
predicted=1.883933, expected=2.000000
predicted=1.931580, expected=2.200000
predicted=2.041826, expected=1.900000
predicted=1.982540, expected=1.800000
predicted=1.906772, expected=1.500000
predicted=1.738895, expected=1.900000
predicted=1.805754, expected=1.500000
predicted=1.679970, expected=1.600000
predicted=1.647712, expected=1.700000
predicted=1.670104, expected=1.900000
predicted=1.765543, expected=1.800000
predicted=1.780075, expected=2.000000
predicted=1.870951, expected=1.900000
predicted=1.882807, expected=2.200000
predicted=2.013376, expected=2.100000
predicted=2.048379, expected=1.500000
predicted=1.821616, expected=1.700000
predicted=1.771594, expected=1.700000
predicted=1.742399, expected=1.400000
predicted=1.601663, expected=2.100000
predicted=1.807983, expected=1.500000
predicted=1.681422, expected=1.300000
predicted=1.525114, expected=1.500000
predicted=1.516141, expected=1.600000
predicted=1.552075, expected=1.900000
predicted=1.696489, expected=2.600000
predicted=2.069571, expected=1.900000
predicted=1.998509, expected=2.100000
predicted=2.039659, expected=1.500000
predicted=1.816748, expected=1.500000
predicted=1.686429, expected=1.300000
predicted=1.527696, expected=1.600000
predicted=1.558896, expected=2.900000
predicted=2.111317, expected=1.500000
predicted=1.858933, expected=1.400000
predicted=1.671141, expected=1.300000
predicted=1.519809, expected=1.400000
predicted=1.472054, expected=1.300000
predicted=1.403077, expected=1.300000
predicted=1.362685, expected=1.400000
predicted=1.380060, expected=1.300000
predicted=1.349230, expected=1.300000
predicted=1.331172, expected=1.700000
predicted=1.484559, expected=1.700000
predicted=1.574464, expected=1.400000
predicted=1.504078, expected=1.400000
predicted=1.462882, expected=1.500000
predicted=1.479731, expected=1.600000
predicted=1.530584, expected=1.600000
predicted=1.560379, expected=1.600000
predicted=1.577834, expected=1.400000
```

```
predicted=1.506092, expected=1.700000
predicted=1.586998, expected=1.200000
predicted=1.429563, expected=1.400000
predicted=1.419226, expected=1.200000
predicted=1.331204, expected=1.100000
C:\Users\admin\Anaconda3\lib\site-packages\statsmodels\base\model.py:508:
ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  "Check mle_retvals", ConvergenceWarning)
predicted=1.238585, expected=1.100000
predicted=1.184318, expected=1.100000
predicted=1.152552, expected=1.100000
predicted=1.133960, expected=1.400000
predicted=1.246132, expected=2.000000
predicted=1.558105, expected=1.200000
predicted=1.412262, expected=1.200000
predicted=1.327176, expected=1.200000
predicted=1.277301, expected=1.200000
predicted=1.248064, expected=1.200000
predicted=1.230929, expected=1.400000
predicted=1.302812, expected=1.300000
predicted=1.303980, expected=1.200000
predicted=1.263706, expected=1.300000
predicted=1.281057, expected=1.400000
predicted=1.332183, expected=1.300000
predicted=1.321192, expected=1.100000
predicted=1.232845, expected=1.400000
predicted=1.303911, expected=1.300000
predicted=1.304620, expected=1.200000
predicted=1.264090, expected=1.700000
predicted=1.445017, expected=1.400000
predicted=1.428281, expected=1.400000
predicted=1.418476, expected=1.400000
predicted=1.412727, expected=2.100000
predicted=1.695903, expected=1.700000
predicted=1.698197, expected=1.400000
predicted=1.576751, expected=1.500000
predicted=1.546484, expected=1.300000
predicted=1.446897, expected=1.200000
predicted=1.347495, expected=1.400000
predicted=1.371117, expected=1.400000
predicted=1.384957, expected=1.400000
predicted=1.393070, expected=1.400000
predicted=1.397828, expected=1.400000
predicted=1.400618, expected=1.300000
predicted=1.361329, expected=1.500000
predicted=1.420134, expected=1.500000
predicted=1.454622, expected=1.400000
predicted=1.433922, expected=1.600000
predicted=1.503628, expected=1.600000
predicted=1.544515, expected=1.500000
predicted=1.527559, expected=1.500000
predicted=1.517618, expected=1.400000
predicted=1.470865, expected=2.000000
predicted=1.688920, expected=2.000000
predicted=1.817026, expected=1.800000
```

```
predicted=1.810128, expected=2.000000
predicted=1.888032, expected=1.800000
predicted=1.851739, expected=1.600000
predicted=1.748594, expected=1.700000
predicted=1.729071, expected=1.600000
predicted=1.676672, expected=1.800000
predicted=1.727864, expected=1.700000
predicted=1.716922, expected=1.700000
predicted=1.710507, expected=1.600000
predicted=1.665802, expected=1.900000
predicted=1.762416, expected=1.600000
predicted=1.696250, expected=1.600000
predicted=1.657455, expected=1.600000
predicted=1.634706, expected=1.500000
predicted=1.580425, expected=1.400000
predicted=1.507636, expected=1.500000
predicted=1.505930, expected=1.800000
predicted=1.627753, expected=1.400000
predicted=1.535433, expected=1.400000
predicted=1.481298, expected=1.400000
predicted=1.449551, expected=1.400000
predicted=1.430937, expected=1.300000
predicted=1.379079, expected=1.500000
predicted=1.430564, expected=1.300000
predicted=1.378872, expected=1.800000
predicted=1.553192, expected=1.400000
predicted=1.491717, expected=1.500000
predicted=1.496593, expected=1.500000
predicted=1.499452, expected=1.400000
predicted=1.460222, expected=1.300000
predicted=1.396295, expected=1.200000
predicted=1.317859, expected=1.400000
predicted=1.353718, expected=1.400000
predicted=1.374738, expected=1.500000
predicted=1.427979, expected=1.400000
predicted=1.418292, expected=1.200000
predicted=1.330791, expected=1.400000
predicted=1.361287, expected=1.400000
predicted=1.379172, expected=1.400000
predicted=1.389662, expected=1.500000
predicted=1.436724, expected=1.900000
predicted=1.628045, expected=1.500000
predicted=1.576502, expected=1.500000
predicted=1.546320, expected=1.700000
predicted=1.610424, expected=1.300000
predicted=1.484444, expected=2.300000
predicted=1.819149, expected=1.200000
predicted=1.566525, expected=1.200000
predicted=1.418247, expected=1.100000
predicted=1.290081, expected=1.100000
predicted=1.214724, expected=1.000000
predicted=1.129583, expected=1.100000
predicted=1.120531, expected=1.200000
predicted=1.156097, expected=1.200000
predicted=1.176966, expected=1.100000
```

```
predicted=1.148361, expected=1.300000
predicted=1.213276, expected=1.100000
predicted=1.169681, expected=1.200000
predicted=1.184936, expected=1.100000
predicted=1.153042, expected=1.100000
predicted=1.134313, expected=1.200000
predicted=1.164166, expected=1.100000
predicted=1.140844, expected=1.200000
predicted=1.167998, expected=1.400000
predicted=1.265649, expected=1.300000
predicted=1.282138, expected=1.300000
predicted=1.291816, expected=1.400000
predicted=1.338358, expected=2.100000
predicted=1.652006, expected=1.300000
predicted=1.508706, expected=1.200000
predicted=1.384121, expected=1.300000
predicted=1.351722, expected=1.300000
predicted=1.332686, expected=1.500000
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predicted=1.314011, expected=1.200000
predicted=1.269733, expected=1.500000
predicted=1.366093, expected=1.400000
predicted=1.381935, expected=1.600000
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predicted=1.608003, expected=1.800000
predicted=1.687459, expected=1.600000
predicted=1.652324, expected=1.600000
predicted=1.631719, expected=1.700000
predicted=1.660457, expected=1.400000
predicted=1.554838, expected=1.300000
predicted=1.451931, expected=1.500000
predicted=1.473208, expected=1.400000
predicted=1.444851, expected=1.500000
predicted=1.469044, expected=1.400000
predicted=1.442409, expected=1.700000
predicted=1.549274, expected=1.500000
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predicted=1.560092, expected=1.500000
predicted=1.536719, expected=1.800000
predicted=1.645484, expected=1.600000
predicted=1.627700, expected=1.400000
predicted=1.535613, expected=1.500000
predicted=1.522343, expected=1.400000
predicted=1.473718, expected=1.500000
predicted=1.485988, expected=1.400000
predicted=1.452366, expected=1.400000
predicted=1.432615, expected=1.200000
predicted=1.339335, expected=1.600000
predicted=1.447891, expected=1.200000
predicted=1.348367, expected=1.200000
predicted=1.289879, expected=1.200000
predicted=1.255515, expected=1.300000
predicted=1.276165, expected=1.300000
```

```
predicted=1.288291, expected=1.300000
predicted=1.295414, expected=1.300000
predicted=1.299597, expected=1.400000
predicted=1.342878, expected=1.200000
predicted=1.286657, expected=1.300000
predicted=1.294451, expected=1.100000
predicted=1.217389, expected=1.600000
predicted=1.376169, expected=1.200000
predicted=1.306246, expected=1.100000
predicted=1.224375, expected=1.200000
predicted=1.217043, expected=1.100000
predicted=1.171935, expected=1.500000
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predicted=1.225770, expected=1.100000
predicted=1.177093, expected=1.300000
predicted=1.230015, expected=1.200000
predicted=1.220361, expected=1.300000
predicted=1.255451, expected=1.200000
predicted=1.235317, expected=1.200000
predicted=1.223477, expected=1.200000
predicted=1.216514, expected=1.300000
predicted=1.253186, expected=1.400000
predicted=1.315520, expected=1.400000
predicted=1.352178, expected=1.700000
predicted=1.496124, expected=1.500000
predicted=1.499132, expected=1.600000
predicted=1.541705, expected=1.700000
predicted=1.607540, expected=1.800000
predicted=1.687068, expected=1.800000
predicted=1.733791, expected=1.800000
predicted=1.761223, expected=1.500000
predicted=1.654835, expected=1.800000
predicted=1.714819, expected=1.700000
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predicted=1.705962, expected=1.700000
predicted=1.704036, expected=2.000000
predicted=1.825349, expected=1.700000
predicted=1.774172, expected=2.000000
predicted=1.866539, expected=1.700000
predicted=1.798389, expected=1.700000
predicted=1.758351, expected=1.500000
predicted=1.653198, expected=1.500000
predicted=1.591376, expected=1.600000
predicted=1.595905, expected=1.700000
predicted=1.639383, expected=1.900000
predicted=1.746544, expected=1.800000
predicted=1.768696, expected=2.000000
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predicted=2.000768, expected=2.100000
predicted=2.040574, expected=1.900000
predicted=1.982154, expected=2.300000
predicted=2.111331, expected=2.000000
predicted=2.064567, expected=2.500000
predicted=2.241437, expected=2.700000
predicted=2.427365, expected=2.300000
```

```
predicted=2.372566, expected=2.500000
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predicted=2.247035, expected=1.800000
predicted=2.062229, expected=2.000000
predicted=2.035663, expected=2.100000
predicted=2.061052, expected=1.800000
predicted=1.953144, expected=2.100000
predicted=2.012663, expected=2.100000
predicted=2.047541, expected=1.900000
predicted=1.986190, expected=2.200000
predicted=2.072906, expected=1.800000
predicted=1.960205, expected=2.200000
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predicted=2.148343, expected=2.100000
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predicted=2.176894, expected=1.800000
predicted=2.021357, expected=1.700000
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predicted=1.852372, expected=1.800000
predicted=1.830812, expected=2.100000
predicted=1.940782, expected=1.700000
predicted=1.841887, expected=1.700000
predicted=1.783813, expected=1.400000
predicted=1.627024, expected=1.600000
predicted=1.616818, expected=1.400000
predicted=1.528996, expected=1.400000
predicted=1.477474, expected=1.400000
predicted=1.447274, expected=1.400000
predicted=1.429574, expected=1.400000
predicted=1.419200, expected=1.400000
predicted=1.413119, expected=1.400000
predicted=1.409554, expected=1.900000
predicted=1.612066, expected=1.400000
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predicted=1.475886, expected=1.300000
predicted=1.405471, expected=1.200000
predicted=1.323234, expected=1.300000
predicted=1.315927, expected=1.300000
predicted=1.311644, expected=1.300000
predicted=1.309133, expected=1.100000
predicted=1.225822, expected=1.500000
predicted=1.340623, expected=1.300000
predicted=1.326129, expected=1.400000
predicted=1.358530, expected=1.500000
predicted=1.418442, expected=1.400000
predicted=1.412673, expected=1.300000
predicted=1.368387, expected=1.300000
predicted=1.342412, expected=1.400000
predicted=1.368078, expected=1.200000
predicted=1.301332, expected=1.200000
predicted=1.262174, expected=1.200000
```

```
predicted=1.239205, expected=1.300000
predicted=1.266643, expected=1.200000
predicted=1.241829, expected=1.200000
predicted=1.227274, expected=1.200000
predicted=1.218736, expected=1.200000
predicted=1.213729, expected=1.200000
predicted=1.210791, expected=1.200000
predicted=1.209068, expected=1.100000
predicted=1.167148, expected=1.200000
predicted=1.183470, expected=1.200000
predicted=1.193041, expected=1.700000
predicted=1.403202, expected=1.500000
predicted=1.444685, expected=1.800000
predicted=1.591935, expected=1.600000
predicted=1.596233, expected=1.500000
predicted=1.557784, expected=1.400000
predicted=1.494326, expected=1.600000
predicted=1.539018, expected=2.200000
predicted=1.810907, expected=2.000000
predicted=1.888526, expected=1.700000
predicted=1.810888, expected=1.400000
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predicted=1.544001, expected=1.100000
predicted=1.363027, expected=1.300000
predicted=1.339158, expected=1.600000
predicted=1.448275, expected=1.600000
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predicted=1.467502, expected=1.700000
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predicted=1.539076, expected=1.800000
predicted=1.647231, expected=1.400000
predicted=1.546664, expected=1.500000
predicted=1.528739, expected=1.600000
predicted=1.559202, expected=1.600000
predicted=1.577047, expected=1.300000
predicted=1.464624, expected=1.700000
predicted=1.562578, expected=1.500000
predicted=1.538074, expected=1.400000
predicted=1.482769, expected=1.300000
predicted=1.409396, expected=1.200000
predicted=1.325409, expected=1.700000
predicted=1.480987, expected=1.700000
predicted=1.572144, expected=1.300000
predicted=1.461818, expected=2.100000
predicted=1.724453, expected=1.500000
predicted=1.632987, expected=1.500000
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predicted=1.466248, expected=1.500000
predicted=1.481596, expected=1.400000
predicted=1.449719, expected=1.500000
predicted=1.471894, expected=1.400000
predicted=1.444029, expected=1.500000
predicted=1.468554, expected=1.500000
predicted=1.482943, expected=1.600000
predicted=1.532261, expected=1.500000
```
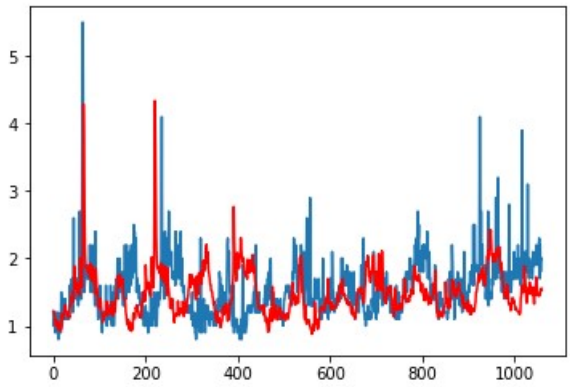
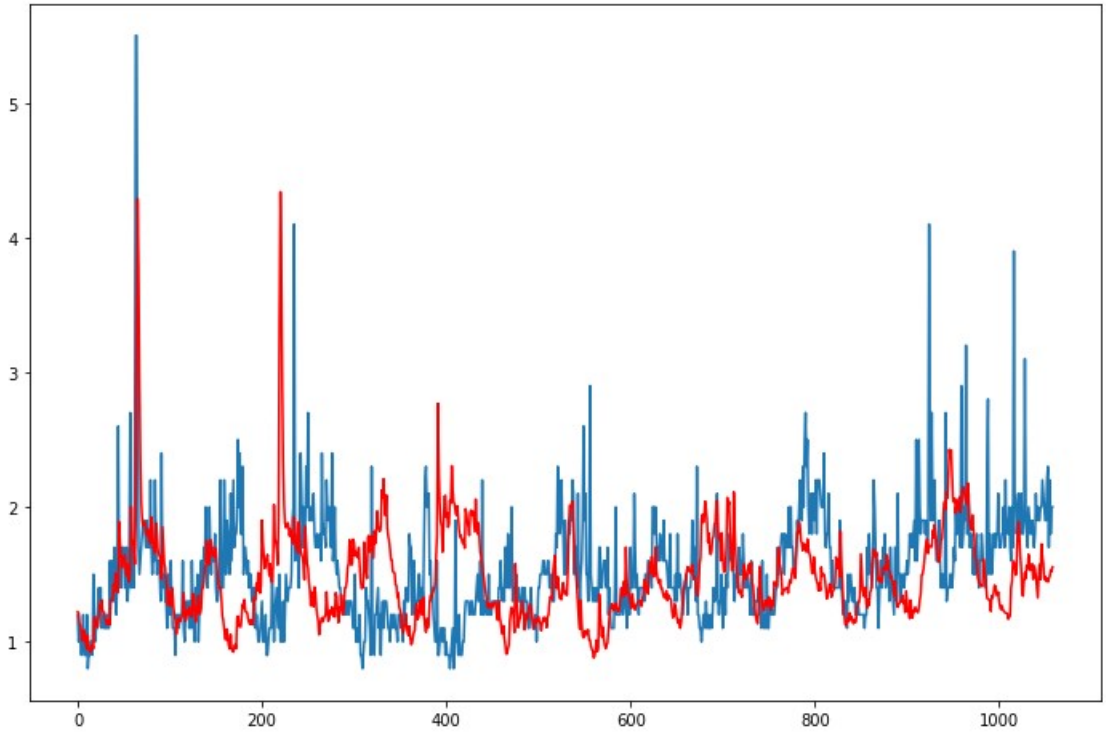

```
predicted=1.520323, expected=1.600000
predicted=1.554194, expected=1.800000
Traceback (most recent call last):

  File "<ipython-input-155-bc51f0cdb4d7>", line 3, in <module>
    model_fit = model.fit(disp=0)

  File "C:\Users\admin\Anaconda3\lib\site-packages\statsmodels\tsa\arima_model.py", line
946, in fit
    start_ar_lags)

  File "C:\Users\admin\Anaconda3\lib\site-packages\statsmodels\tsa\arima_model.py", line
569, in _fit_start_params
    bounds=bounds, iprint=-1)

  File "C:\Users\admin\Anaconda3\lib\site-packages\scipy\optimize\lbfgsb.py", line 199, in
fmin_l_bfgs_b
    **opts)

  File "C:\Users\admin\Anaconda3\lib\site-packages\scipy\optimize\lbfgsb.py", line 335, in
_minimize_lbfgsb
    f, g = func_and_grad(x)

  File "C:\Users\admin\Anaconda3\lib\site-packages\scipy\optimize\lbfgsb.py", line 280, in
func_and_grad
    f = fun(x, *args)

  File "C:\Users\admin\Anaconda3\lib\site-packages\scipy\optimize\optimize.py", line 293,
in function_wrapper
    return function(*(wrapper_args + args))

  File "C:\Users\admin\Anaconda3\lib\site-packages\statsmodels\tsa\arima_model.py", line
560, in <lambda>
    func = lambda params: -self.loglike_css(params)

  File "C:\Users\admin\Anaconda3\lib\site-packages\statsmodels\tsa\arima_model.py", line
815, in loglike_css
    ssr = np.dot(errors, errors)

KeyboardInterrupt


In [156]:

In [155]:

In [156]: predictions.size
Traceback (most recent call last):

  File "<ipython-input-156-1535c9224c50>", line 1, in <module>
    predictions.size

AttributeError: 'list' object has no attribute 'size'
```

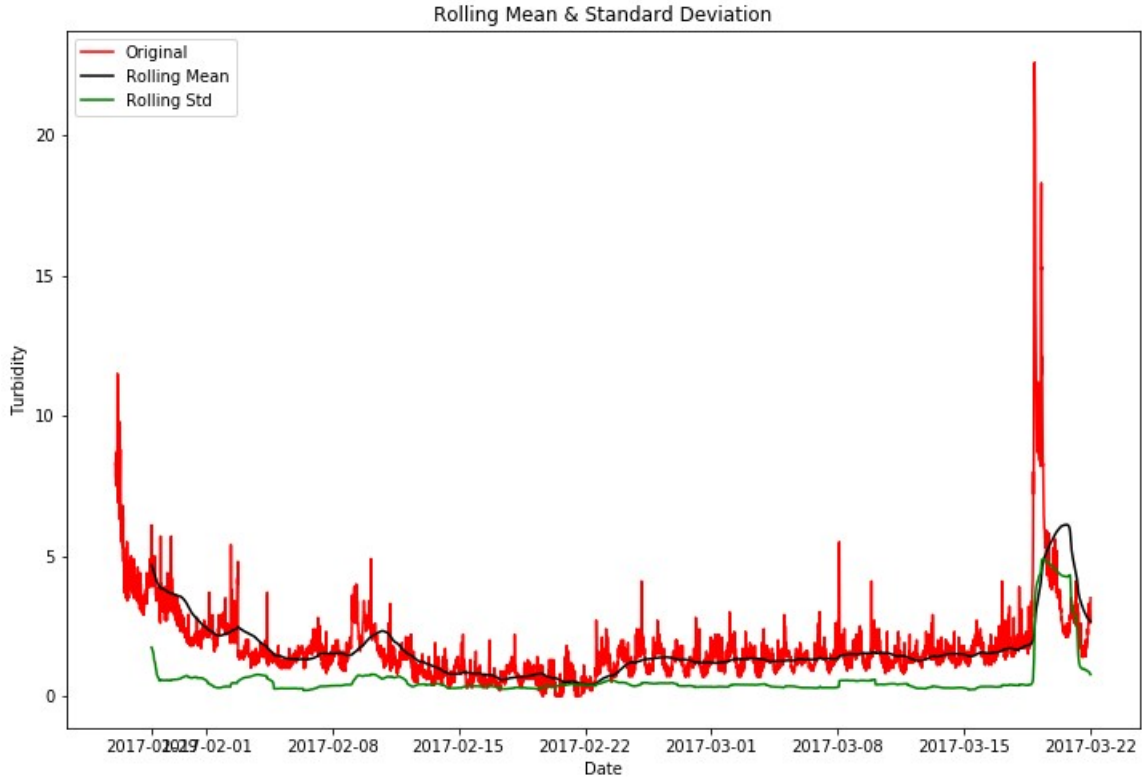
```
In [157]:

In [157]: test.size
Out[157]: 1396

In [158]: test1, test2 = turb_train,turb_test = tts(turb,test_size = 337, random_state=0,
shuffle=False)

In [159]: test1, test2 = tts(test,test_size = 337, random_state=0, shuffle=False)
     ...:

In [160]: error = mean_squared_error(test1, predictions)
     ...: print('Test MSE: %.3f' % error)
Test MSE: 0.275

In [161]: pyplot.plot(test1)
     ...: pyplot.plot(predictions, color='red')
     ...: pyplot.show()
```



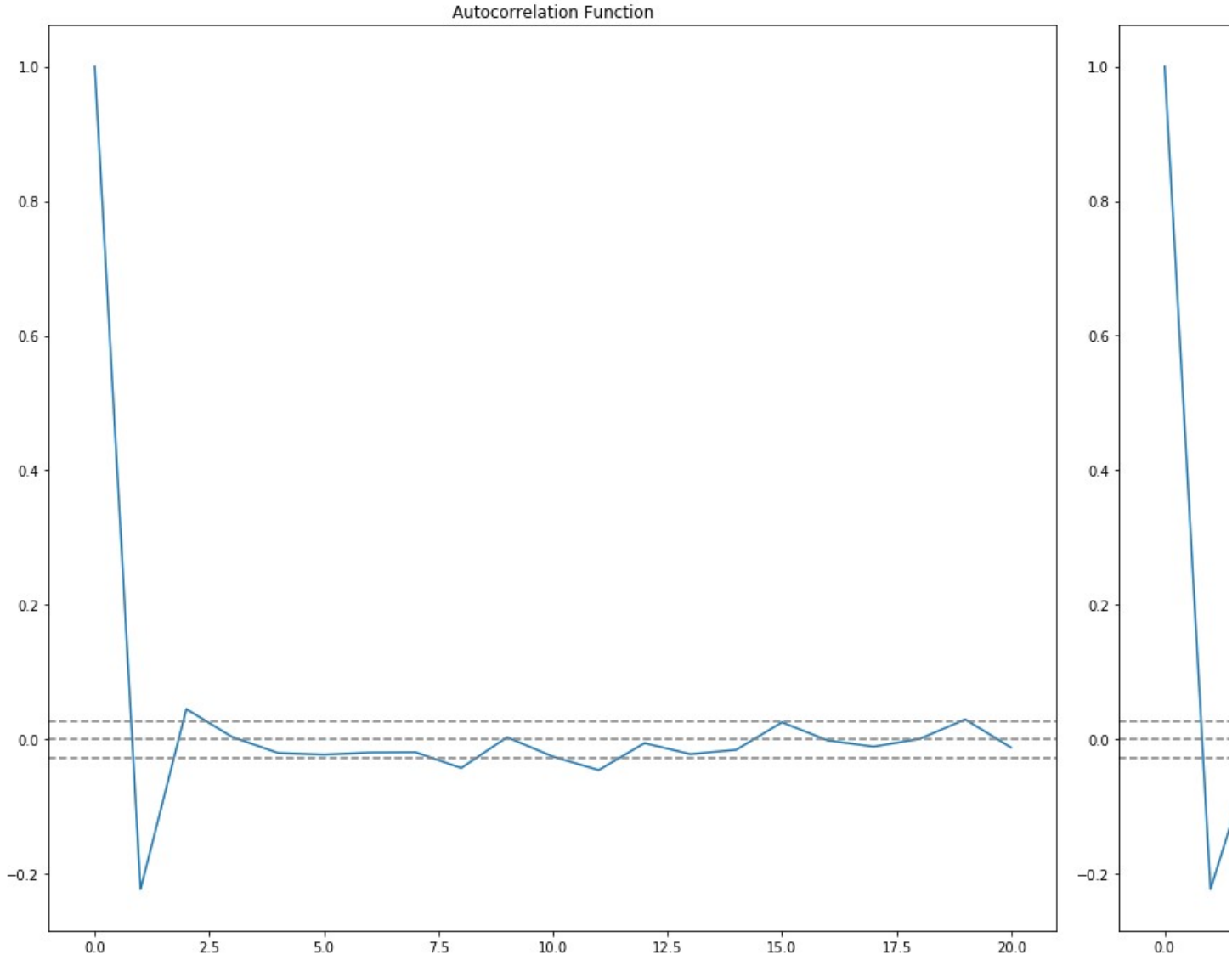

```
In [162]: plt.figure(figsize=(12,8))
     ...: pyplot.plot(test1)
     ...: pyplot.plot(predictions, color='red')
     ...: pyplot.show()
```



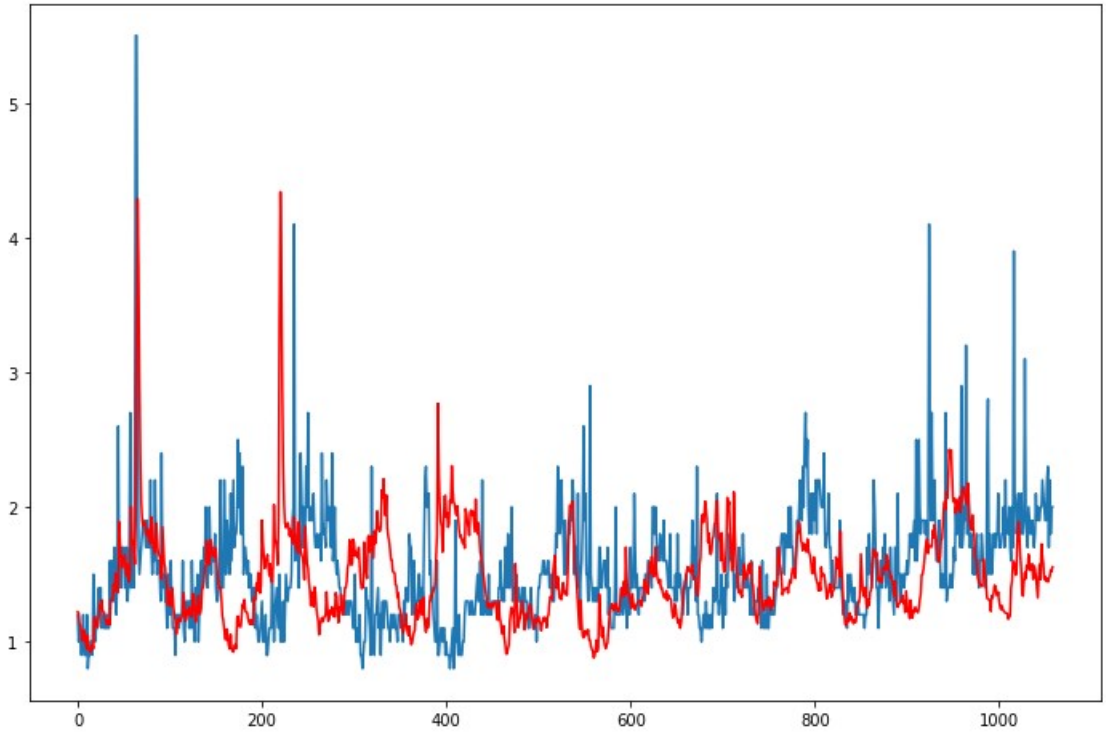

```
In [163]: check_adfuller(dataset['Turb(FNU)'])
Results of Dickey Fuller Test:
--------For a stationary time series Test statistic is less than critical
values-----------
Test Statistic                  -5.039398
p-value                          0.000019
#Lags Used                      31.000000
Number of Observations Used    5139.000000
Critical Value (1%)              -3.431623
Critical Value (5%)              -2.862103
Critical Value (10%)             -2.567069
dtype: float64

In [164]: check_mean_std(dataset['Turb(FNU)'],'\n\nTurbidity')


Turbidity
```



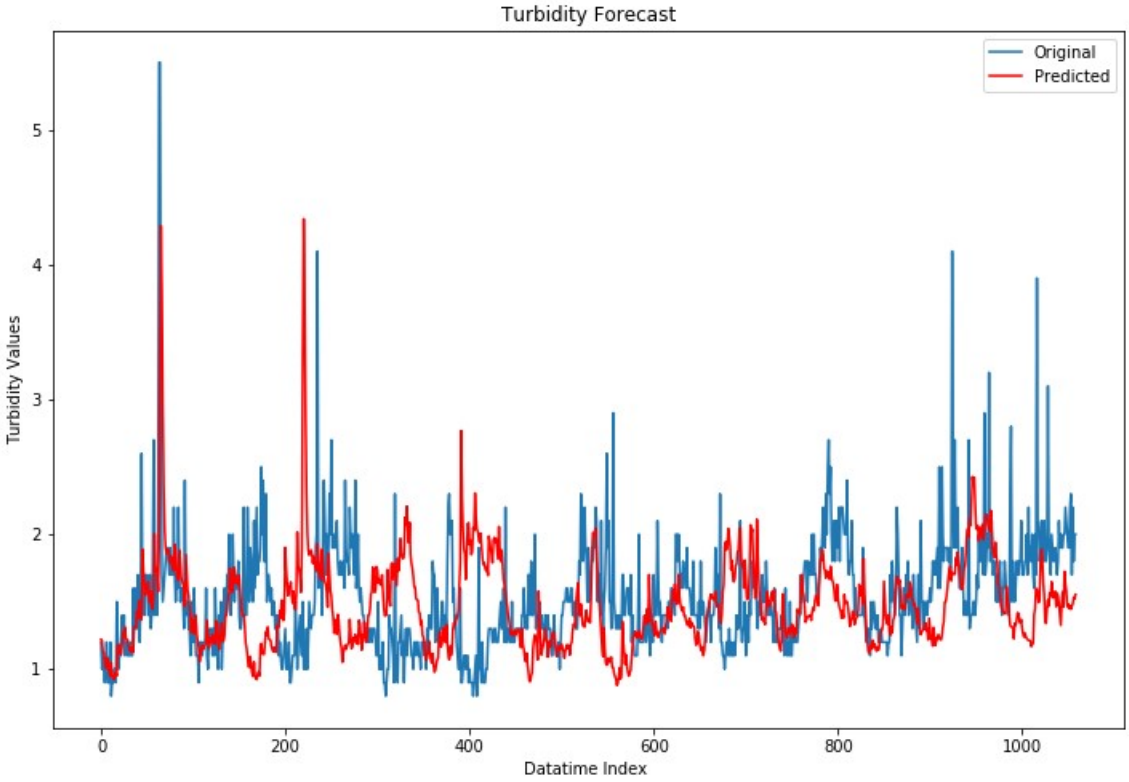
In [165]: acf_pacf_plots(turb)




```
In [166]: plt.figure(figsize=(12,8))
     ...: pyplot.plot(test1)
     ...: pyplot.plot(predictions, color='red')
     ...: pyplot.show()
```




```
In [167]: plt.figure(figsize=(12,8))
     ...: pyplot.plot(test1, label = "Original")
     ...: pyplot.plot(predictions, color='red',label='Predicted')
     ...: plt.xlabel("Datatime Index ")
     ...: plt.ylabel("Turbidity Values")
     ...: plt.title('Turbidity Forecast')
     ...: plt.legend()
     ...: plt.show()
```


Turbidity Forecast
Original
Predicted
Turbidity Values
Datatime Index
1
2
3
4
5
0
200
400
600
800
1000

In [168]: