

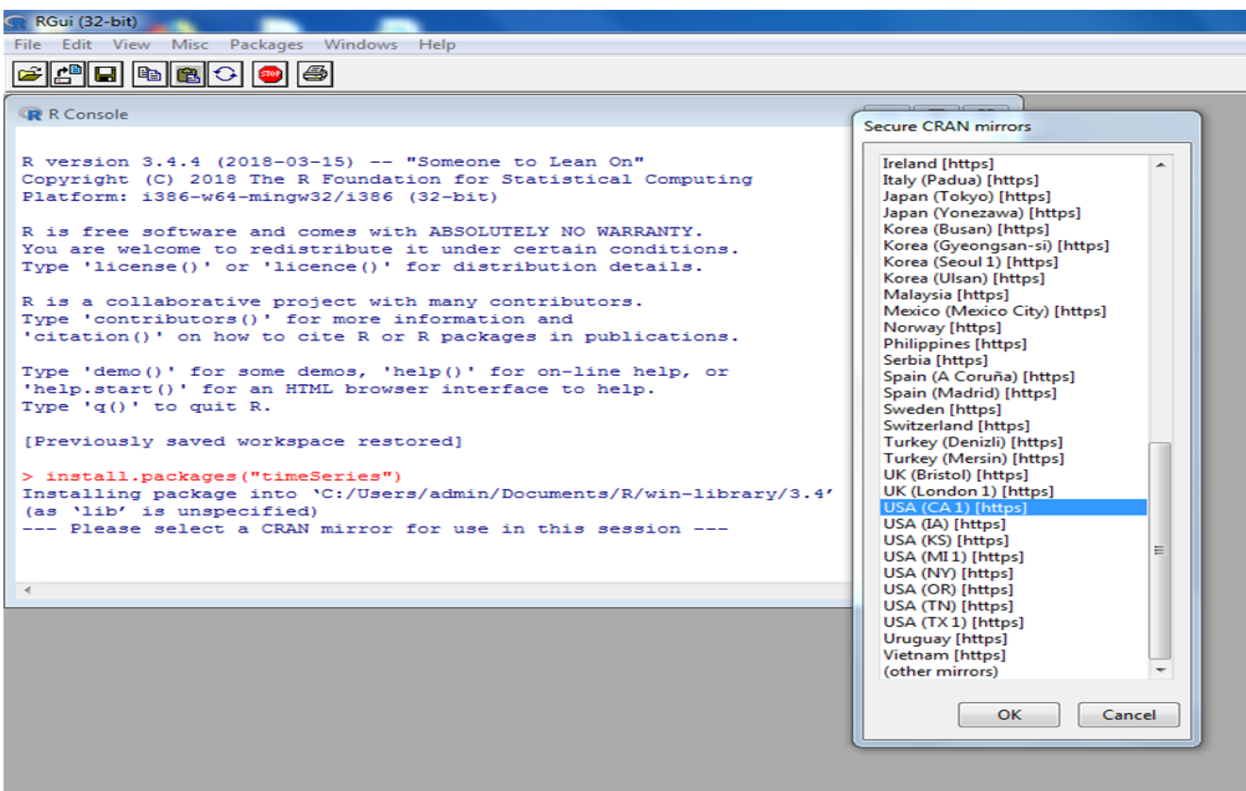
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Roll No:380
Class: TYBSC CS A
Subject: Data Science
Practical No : 9

Practical No 9

Aim: Demonstration of Time-series forecasting.

STEP1: Install time series

install.packages("timeSeries")



Step 2: Install package forecast

install.packages("forecast")

```

RGui (32-bit)
File Edit View Misc Packages Windows Help

> install.packages("timeSeries")
Installing package into 'C:/Users/admin/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
--- Please select a CRAN mirror for use in this session ---
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/timeSeries_30$
Content type 'application/zip' length 1617359 bytes (1.5 MB)
downloaded 1.5 MB

package 'timeSeries' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> install.packages("forecast")
Installing package into 'C:/Users/admin/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/forecast_8.4.$
Content type 'application/zip' length 1996309 bytes (1.9 MB)
downloaded 1.9 MB

package 'forecast' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> |

```

data1=table(AirPassengers)

Data1 view(data1)

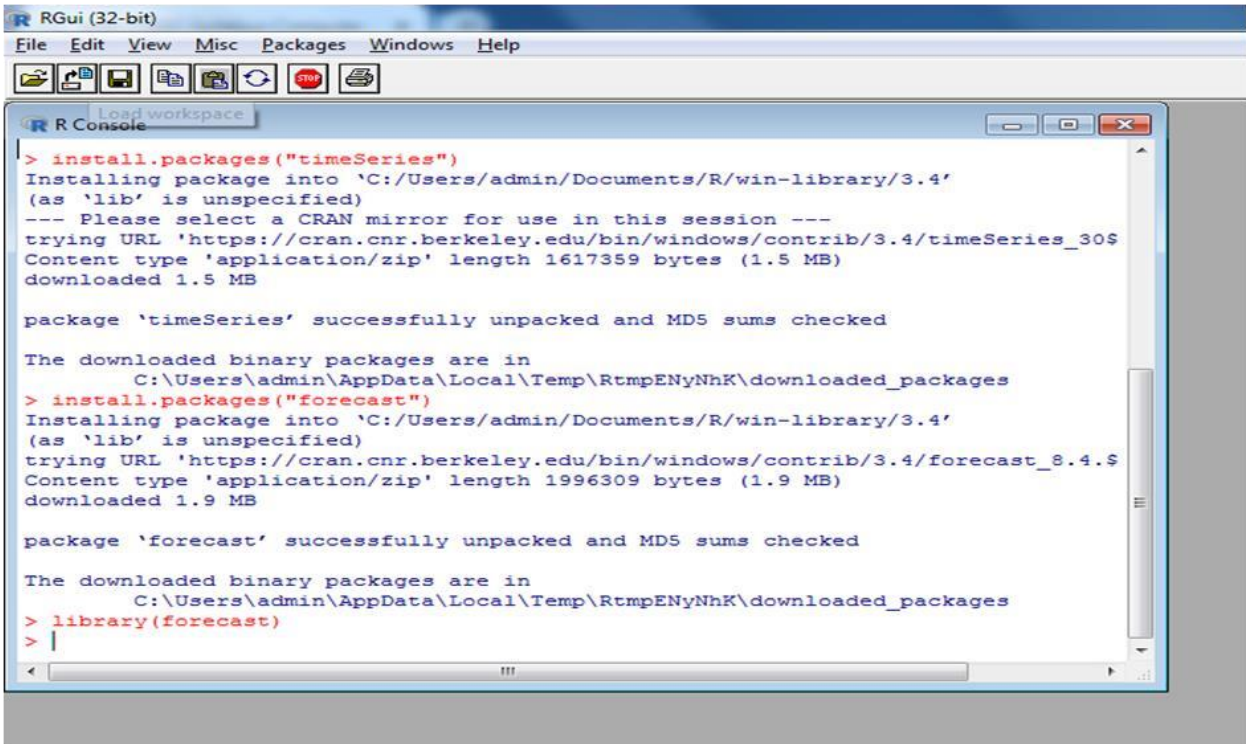
```

> data1
AirPassengers
104 112 114 115 118 119 121 125 126 129 132 133 135 136 140 141 145 146 148 149
 1 1 1 1 2 1 1 1 1 1 1 1 2 1 1 1 1 1 2 1
150 158 162 163 166 170 171 172 178 180 181 183 184 188 191 193 194 196 199 201
 1 1 1 1 1 2 1 2 2 2 1 1 1 1 1 1 1 2 2 1
203 204 209 211 218 227 229 230 233 234 235 236 237 242 243 259 264 267 269 270
 1 1 1 1 1 1 3 1 1 1 2 1 2 2 1 1 2 1 1 1
271 272 274 277 278 284 293 301 302 305 306 310 312 313 315 317 318 336 337 340
 1 1 1 1 1 1 1 1 1 1 2 1 1 1 2 1 2 1 1 1
342 347 348 355 356 359 360 362 363 364 374 390 391 396 404 405 406 407 413 417
 1 2 2 2 1 1 1 2 1 1 1 1 1 1 2 2 1 1 1 1
419 420 422 432 435 461 463 465 467 472 491 505 508 535 548 559 606 622
 1 1 1 1 1 2 1 1 1 2 1 1 1 1 1 1 1 1
> View (data1)
> |

```

Step 3: library (timeSeries)

#library(forecast)



```
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Load workspace
R Console

> install.packages("timeSeries")
Installing package into 'C:/Users/admin/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
--- Please select a CRAN mirror for use in this session ---
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/timeSeries_30$
Content type 'application/zip' length 1617359 bytes (1.5 MB)
downloaded 1.5 MB

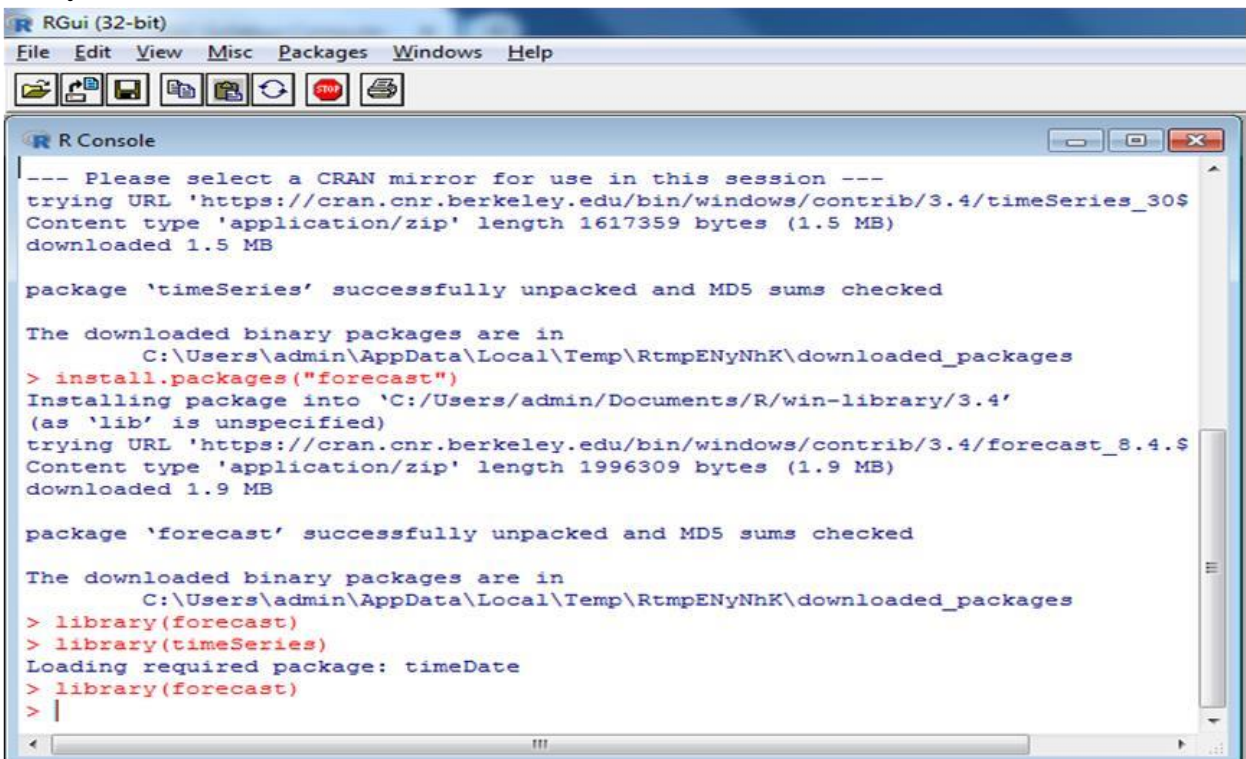
package 'timeSeries' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> install.packages("forecast")
Installing package into 'C:/Users/admin/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/forecast_8.4.$
Content type 'application/zip' length 1996309 bytes (1.9 MB)
downloaded 1.9 MB

package 'forecast' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> library(forecast)
> |
```

library(forecast)



```
RGui (32-bit)
File Edit View Misc Packages Windows Help

R Console

--- Please select a CRAN mirror for use in this session ---
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/timeSeries_30$
Content type 'application/zip' length 1617359 bytes (1.5 MB)
downloaded 1.5 MB

package 'timeSeries' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> install.packages("forecast")
Installing package into 'C:/Users/admin/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/forecast_8.4.$
Content type 'application/zip' length 1996309 bytes (1.9 MB)
downloaded 1.9 MB

package 'forecast' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> library(forecast)
> library(timeSeries)
Loading required package: timeDate
> library(forecast)
> |
```

Step 5: Air Passengers data

```
data1=table(AirPassengers)
```

```
data1
```

The screenshot shows an R Console window with the following output:

```
Loading required package: timeDate
> library(forecast)
Error: package or namespace load failed for 'forecast' in loadNamespace(i, c(lib$
  there is no package called 'Rcpp'
In addition: Warning message:
package 'forecast' was built under R
> data1=table(AirPassengers)
> data1
AirPassengers
104 112 114 115 118 119 121 125 126 1
 1  1  1  1  2  1  1  1  1  1
150 158 162 163 166 170 171 172 178 1
 1  1  1  1  1  2  1  2  2  2
203 204 209 211 218 227 229 230 233 2
 1  1  1  1  1  1  3  1  1  1
271 272 274 277 278 284 293 301 302 3
 1  1  1  1  1  1  1  1  1  1
342 347 348 355 356 359 360 362 363 3
 1  2  2  2  1  1  1  2  1  1
419 420 422 432 435 461 463 465 467 4
 1  1  1  1  1  2  1  1  1  1
> view(data1)
Error in view(data1) : could not find
> View(data1)
> |
```

The Data Viewer window shows the frequency table for data1:

	AirPassengers	Freq
1	104	1
2	112	1
3	114	1
4	115	1
5	118	2
6	119	1
7	121	1
8	125	1
9	126	1
10	129	1
11	132	1
12	133	1
13	135	2
14	136	1
15	140	1
16	141	1
17	145	1
18	146	1
19	148	2

frequency (AirPassengers)

```
> frequency (AirPassengers)
[1] 12
> |
```

```
tsdata=ts(AirPassengers,frequency=12) >
```

```
tsdata
```



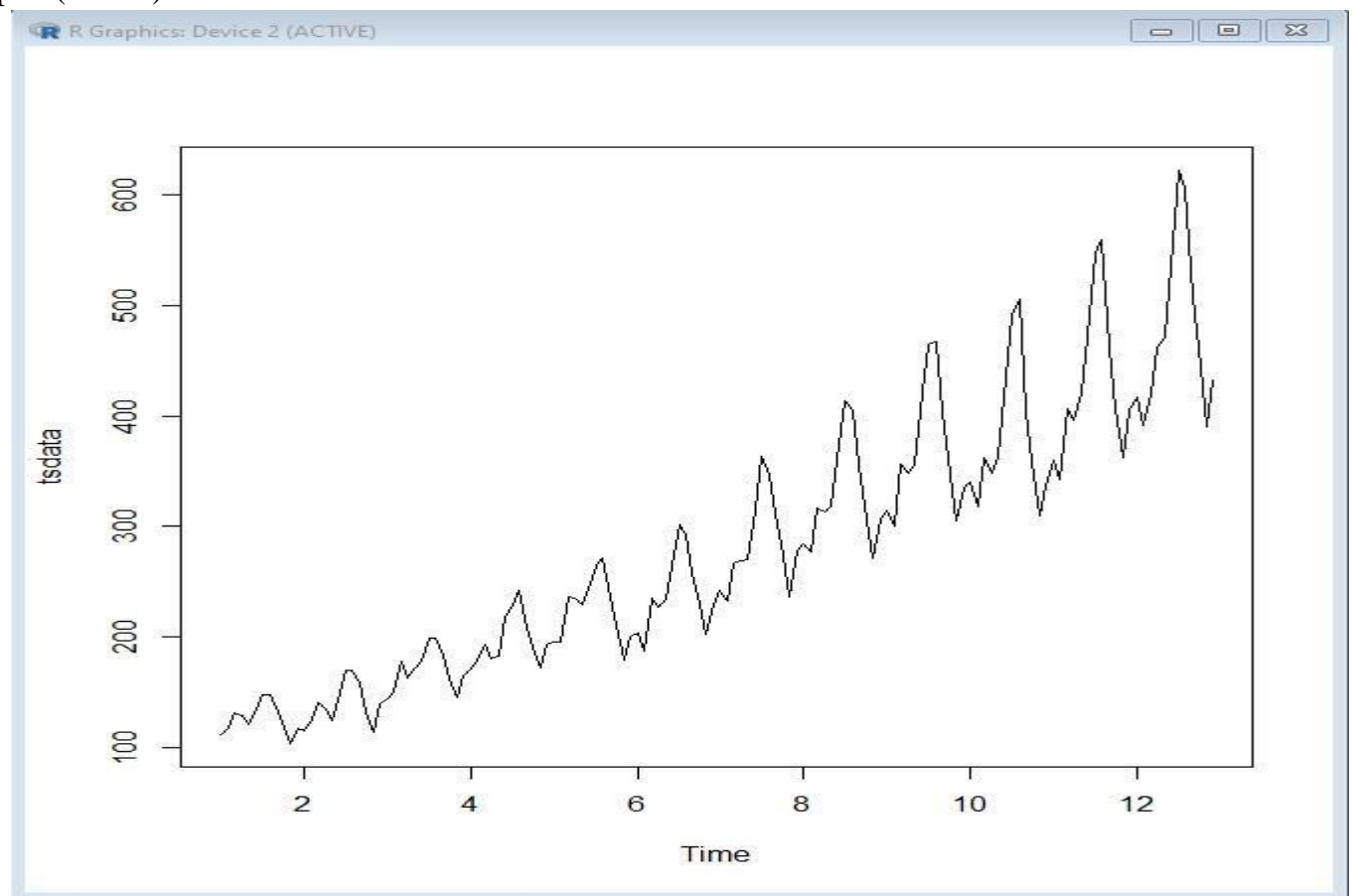
```

> tsdata=ts(AirPassengers,frequency=12)
> tsdata

```

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	112	118	132	129	121	135	148	148	136	119	104	118
2	115	126	141	135	125	149	170	170	158	133	114	140
3	145	150	178	163	172	178	199	199	184	162	146	166
4	171	180	193	181	183	218	230	242	209	191	172	194
5	196	196	236	235	229	243	264	272	237	211	180	201
6	204	188	235	227	234	264	302	293	259	229	203	229
7	242	233	267	269	270	315	364	347	312	274	237	278
8	284	277	317	313	318	374	413	405	355	306	271	306
9	315	301	356	348	355	422	465	467	404	347	305	336
10	340	318	362	348	363	435	491	505	404	359	310	337
11	360	342	406	396	420	472	548	559	463	407	362	405
12	417	391	419	461	472	535	622	606	508	461	390	432

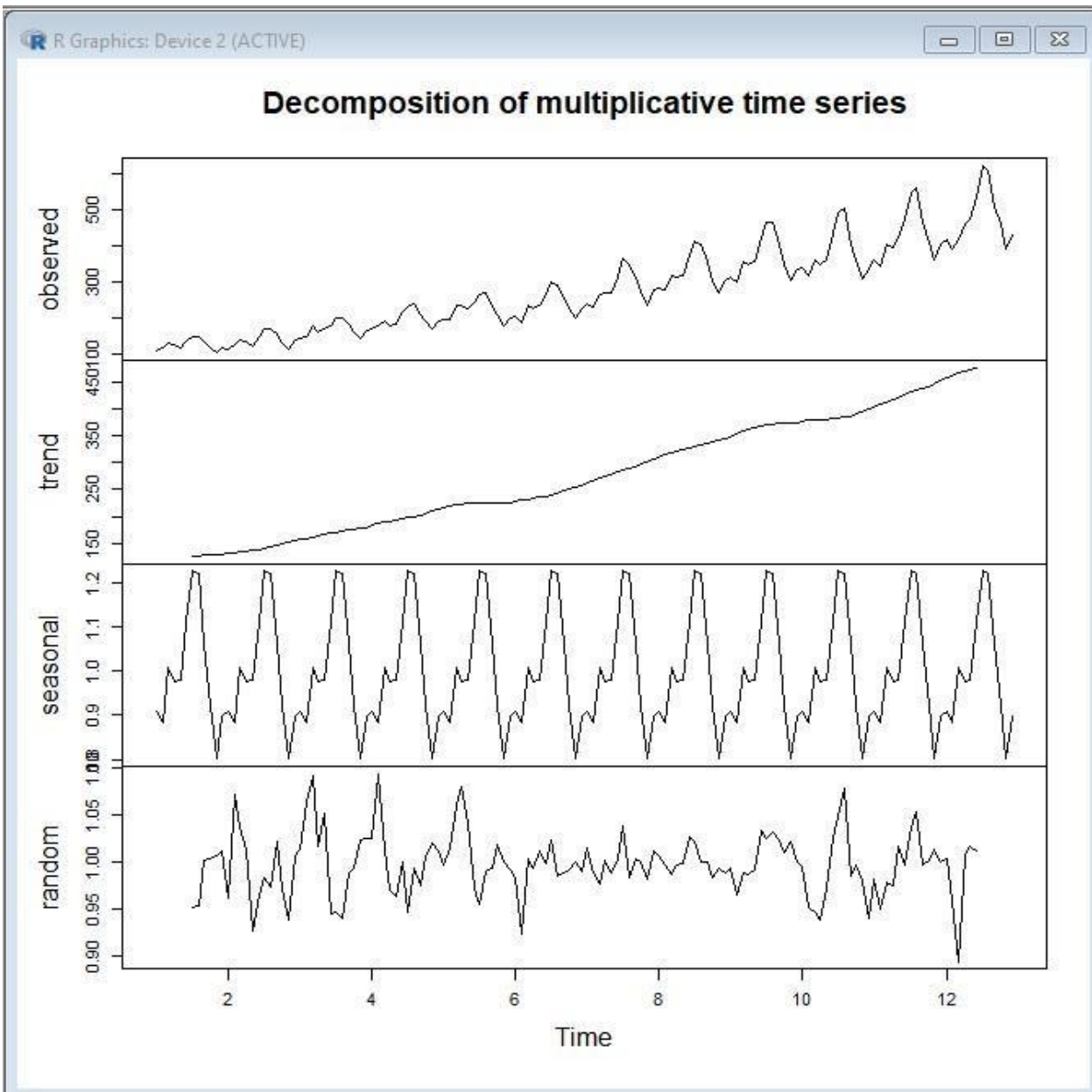
```
plot(tsdata)
```



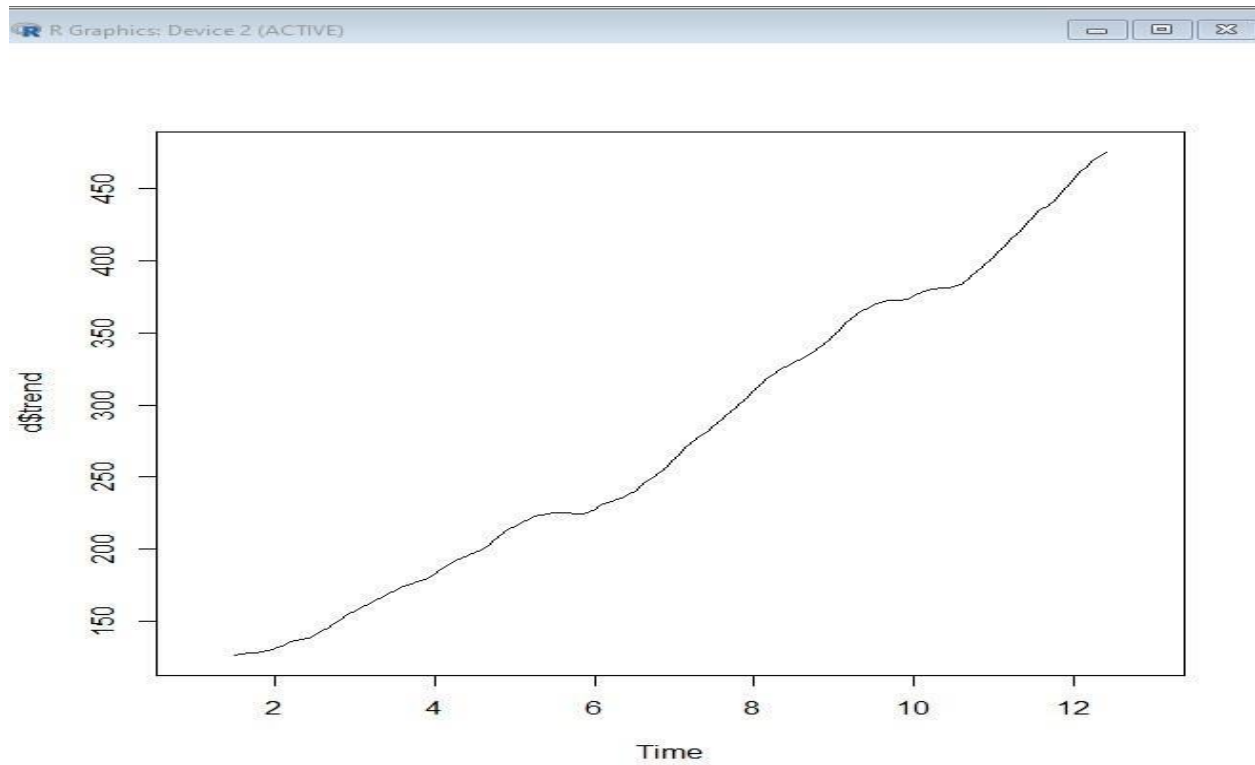
```

> d=decompose(tsdata,"multiplicative")
> plot(d)

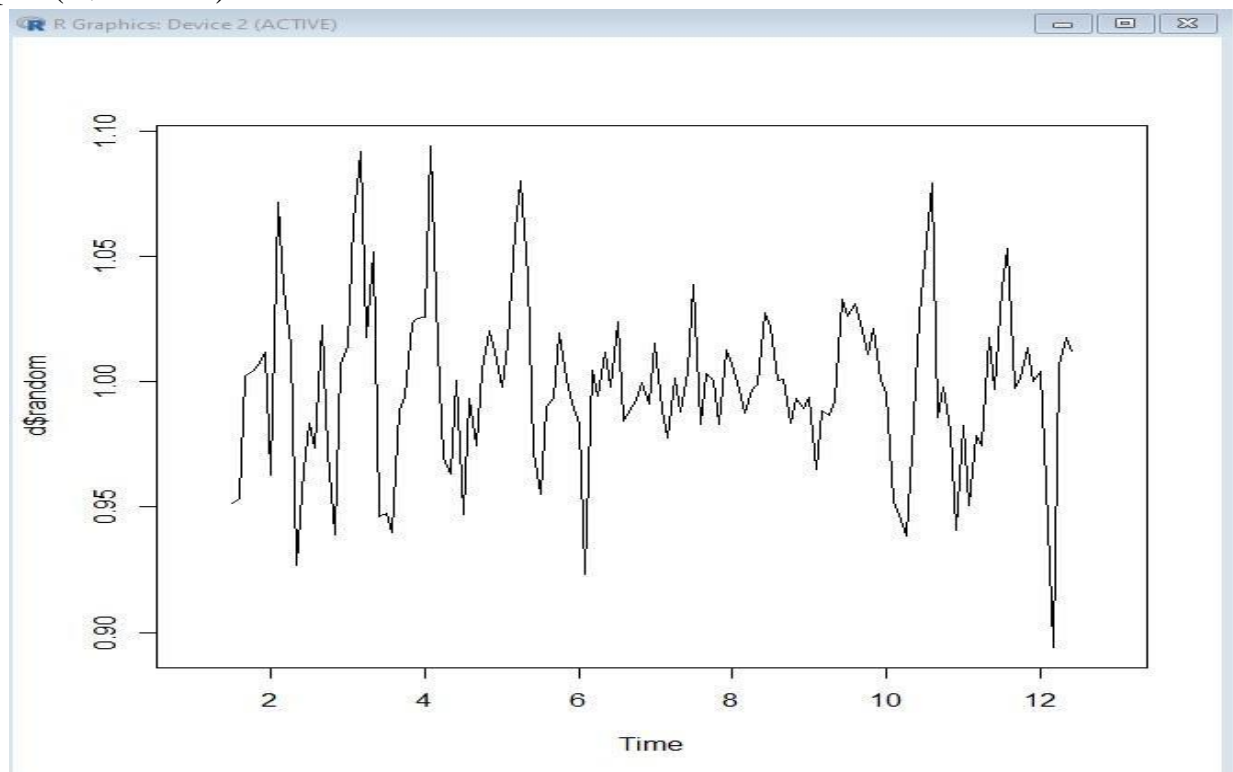
```



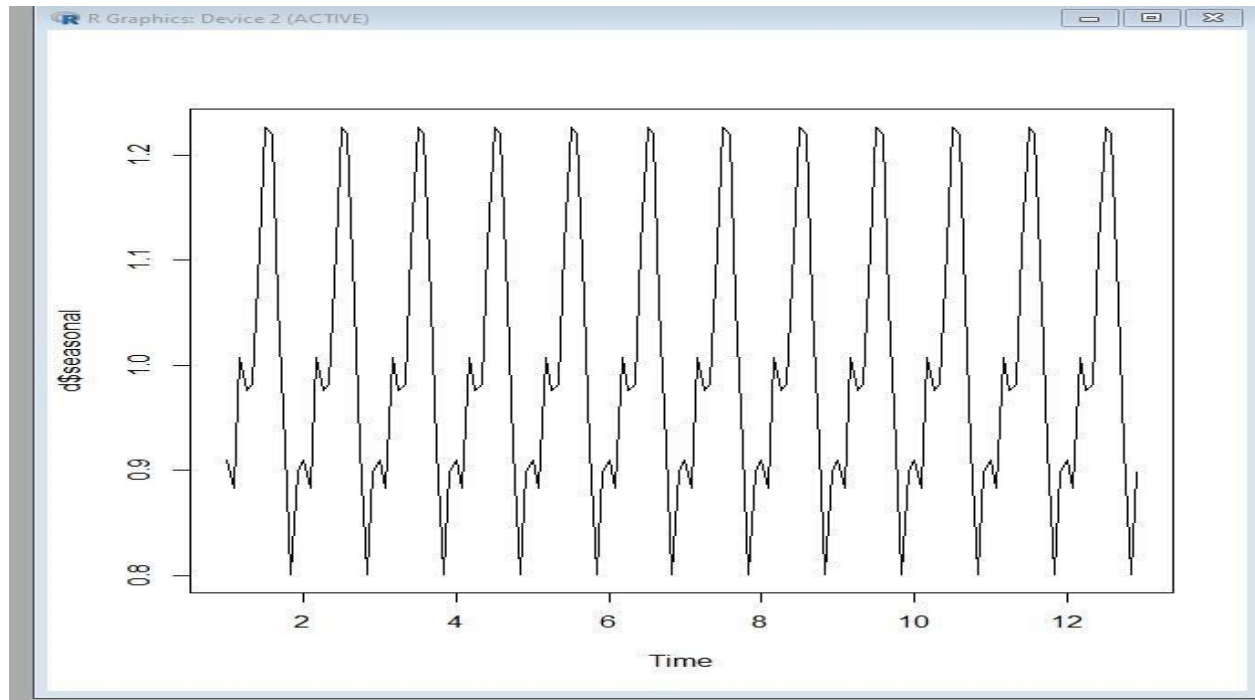
`plot(d$trend)`



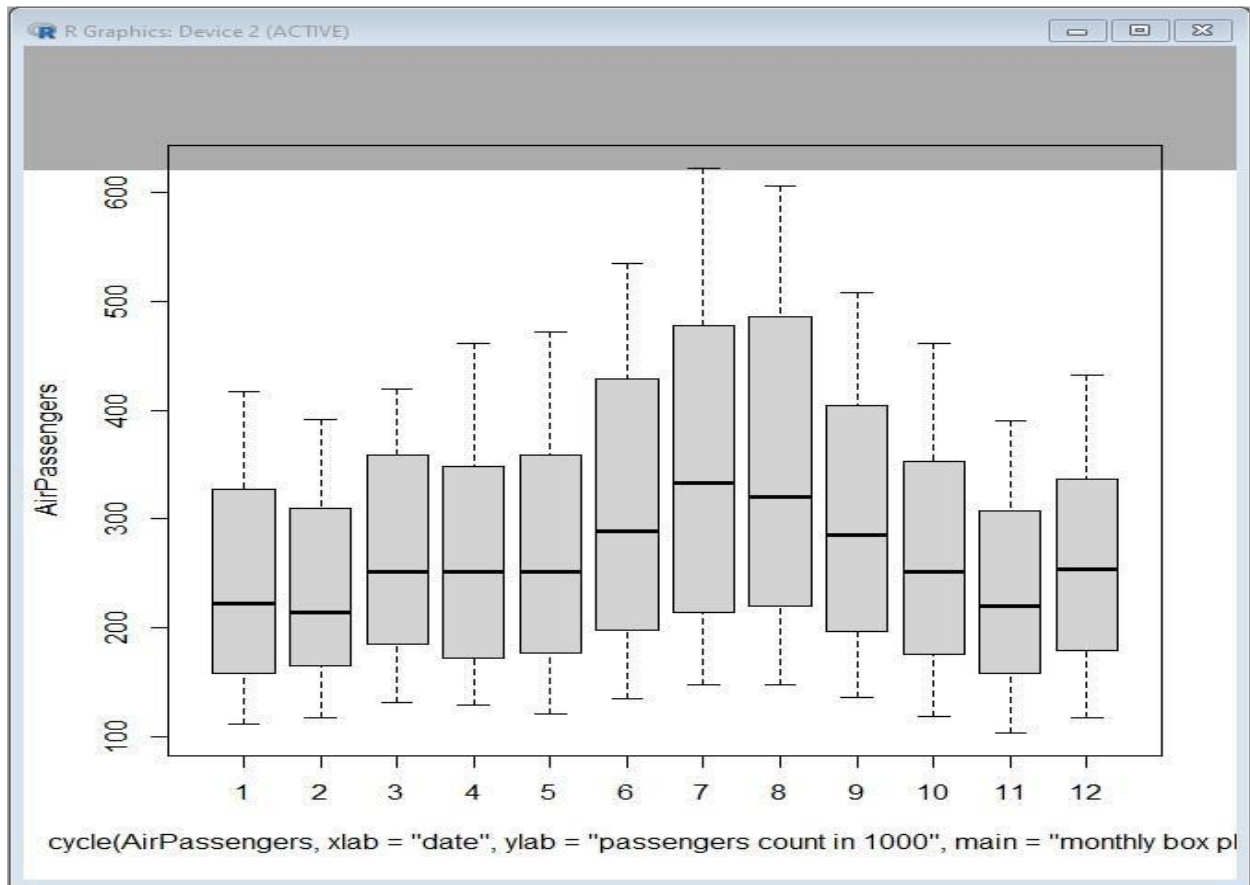
`plot(d$random)`



`plot(d$seasonal)`



```
boxplot(AirPassengers~cycle(AirPassengers,xlab="date",ylab="passengers count  
in 1000",main="monthly box plot"))
```

```
mymodel<- arima(AirPassengers) mymodel
```

```
> mymodel<- arima(AirPassengers)
> mymodel
```

```
Call:
arima(x = AirPassengers)
```

```
Coefficients:
    intercept
    280.2986
s.e.      9.9624
```

```
sigma^2 estimated as 14292: log likelihood = -893.18, aic = 1790.37
```

```
> |
```

Conclusion: Hence we successfully implemented Time series forecasting.