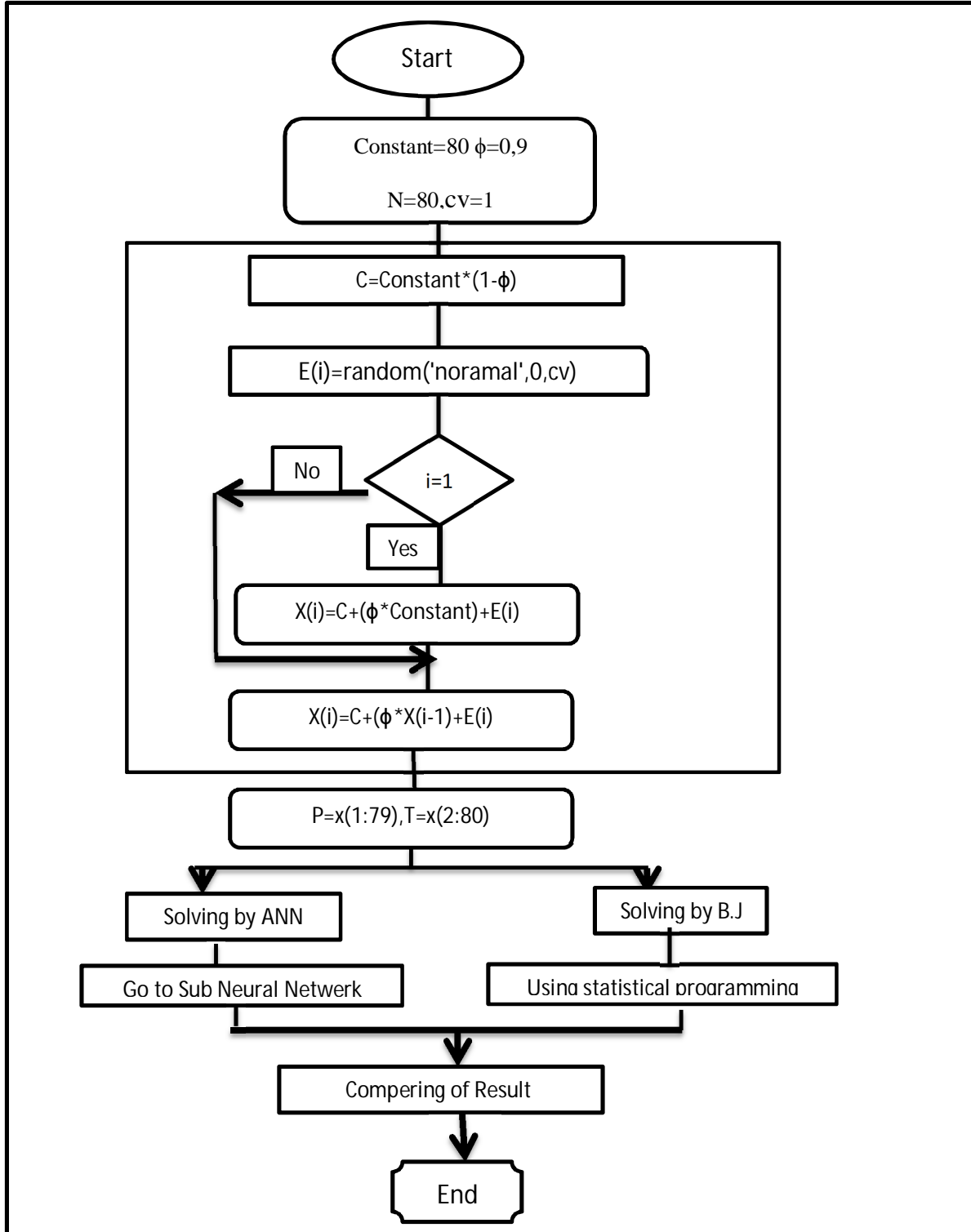


## الملاحق

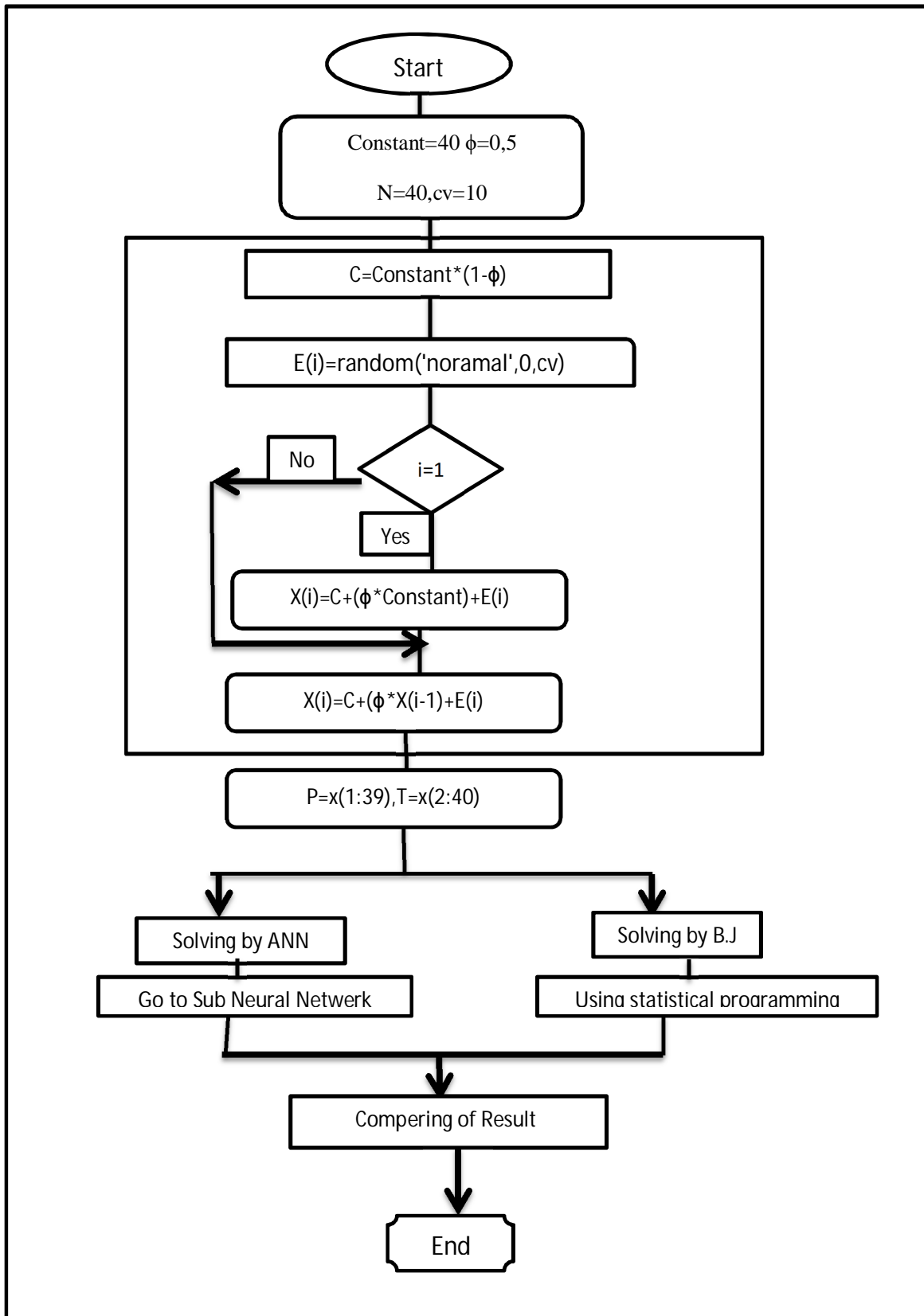
### ملاحق الفصل الثالث:

ملحق رقم (1): خوارزميات السلاسل الزمنية السبع المولدة بأسلوب المحاكاة

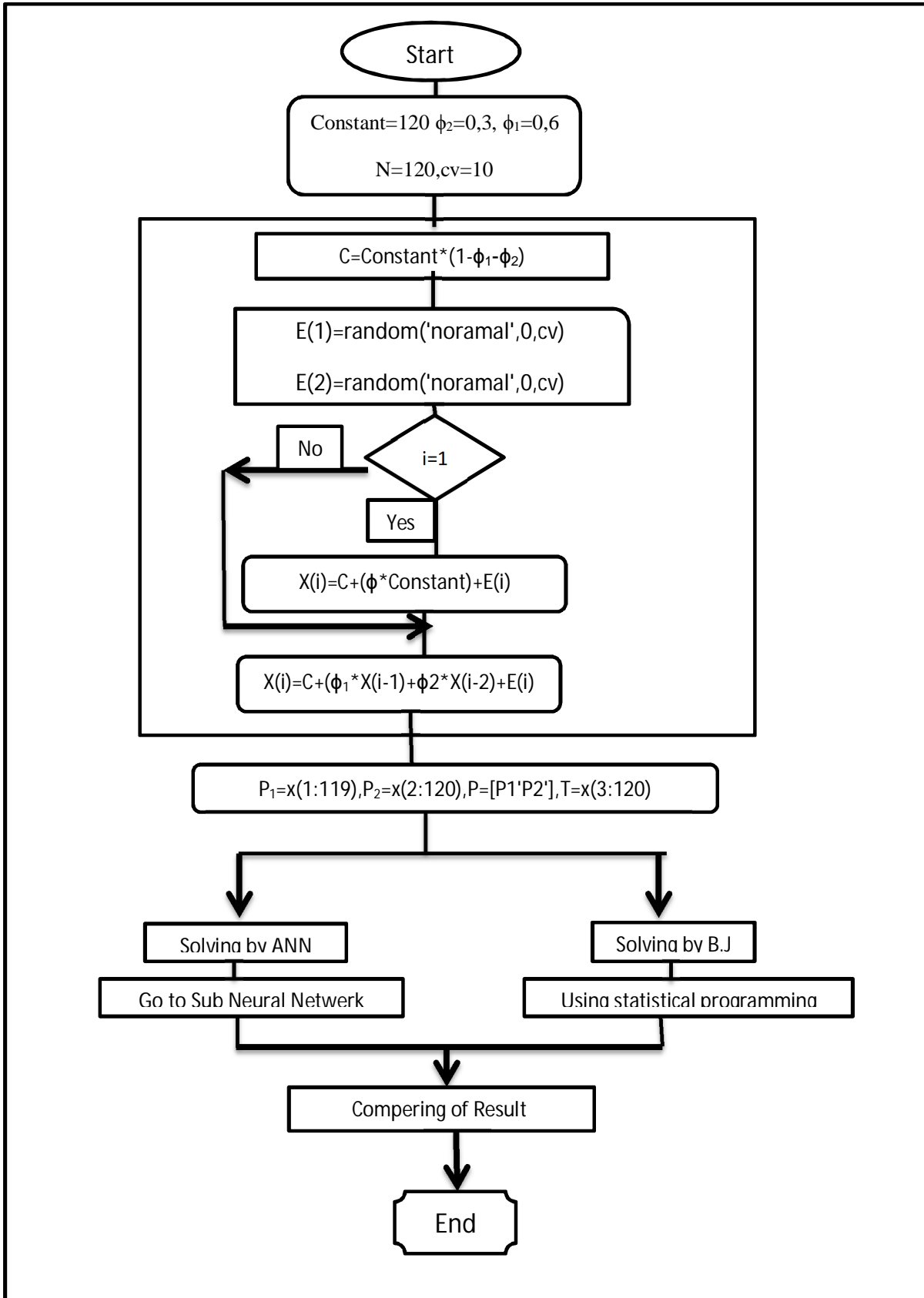
خوارزمية رقم (1) توليد سلسلة نموذج الانحدار الذاتي (AR(1) بمعلمة  $\phi=0,9$



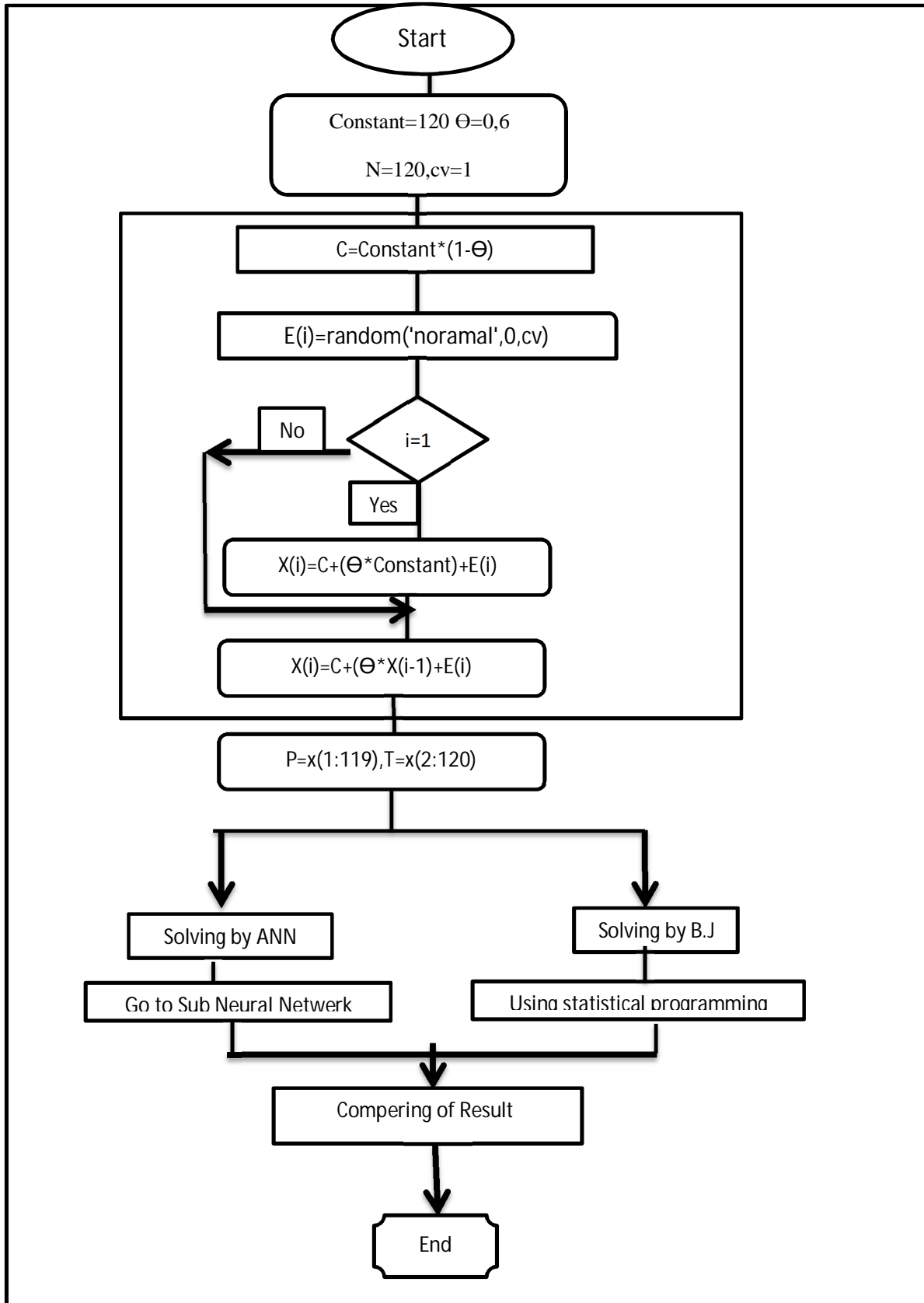
خوارزمية رقم (2) توليد سلسلة نموذج الانحدار الذاتي AR(1) بمعلمة  $\phi=0,5$  و  $\sigma_e^2 = 10$



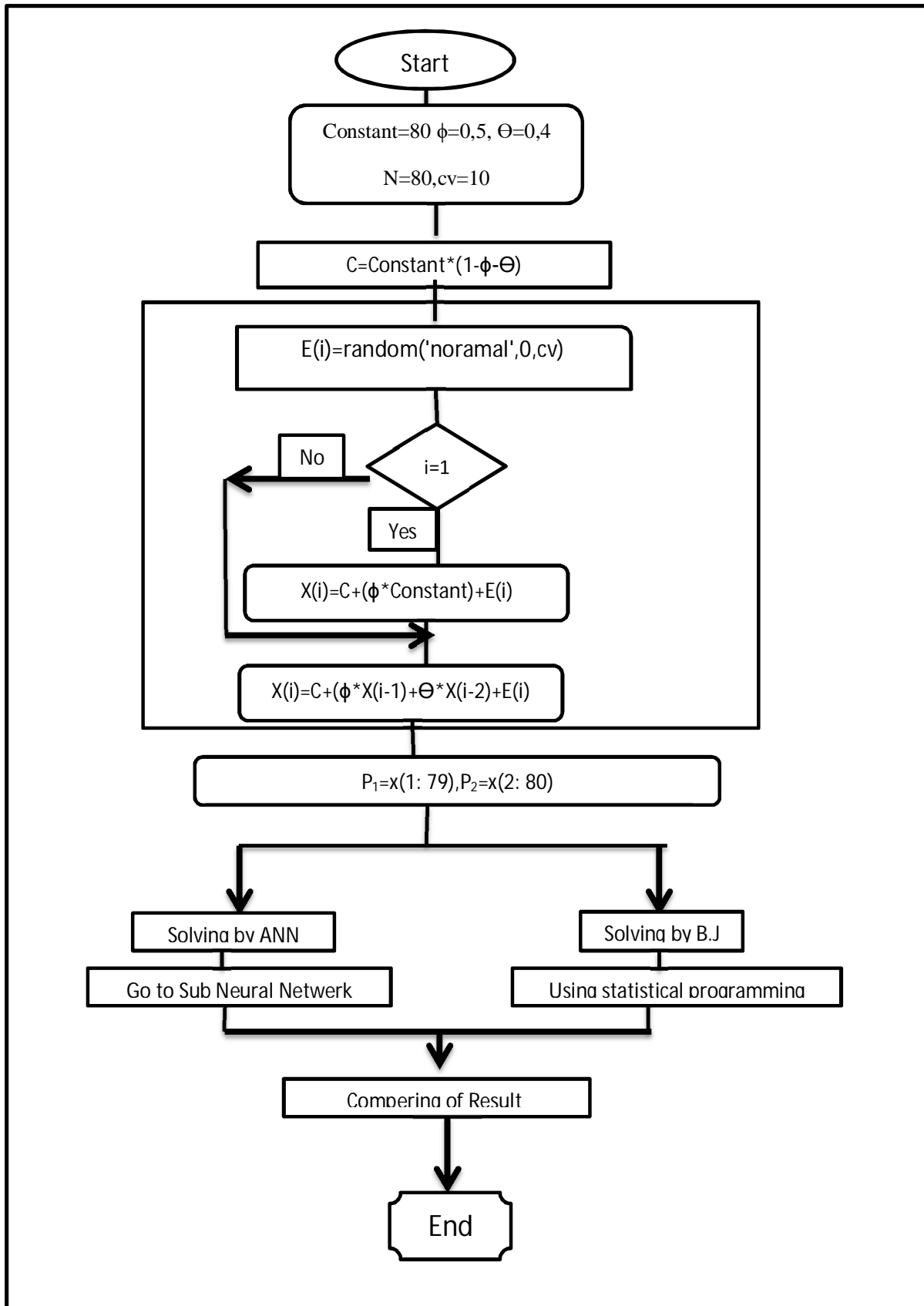
خوارزمية رقم (3) توليد سلسلة نموذج الانحدار الذاتي AR(2) بمعلمة  $(\phi_1=0,6, \phi_2 =0,3)$



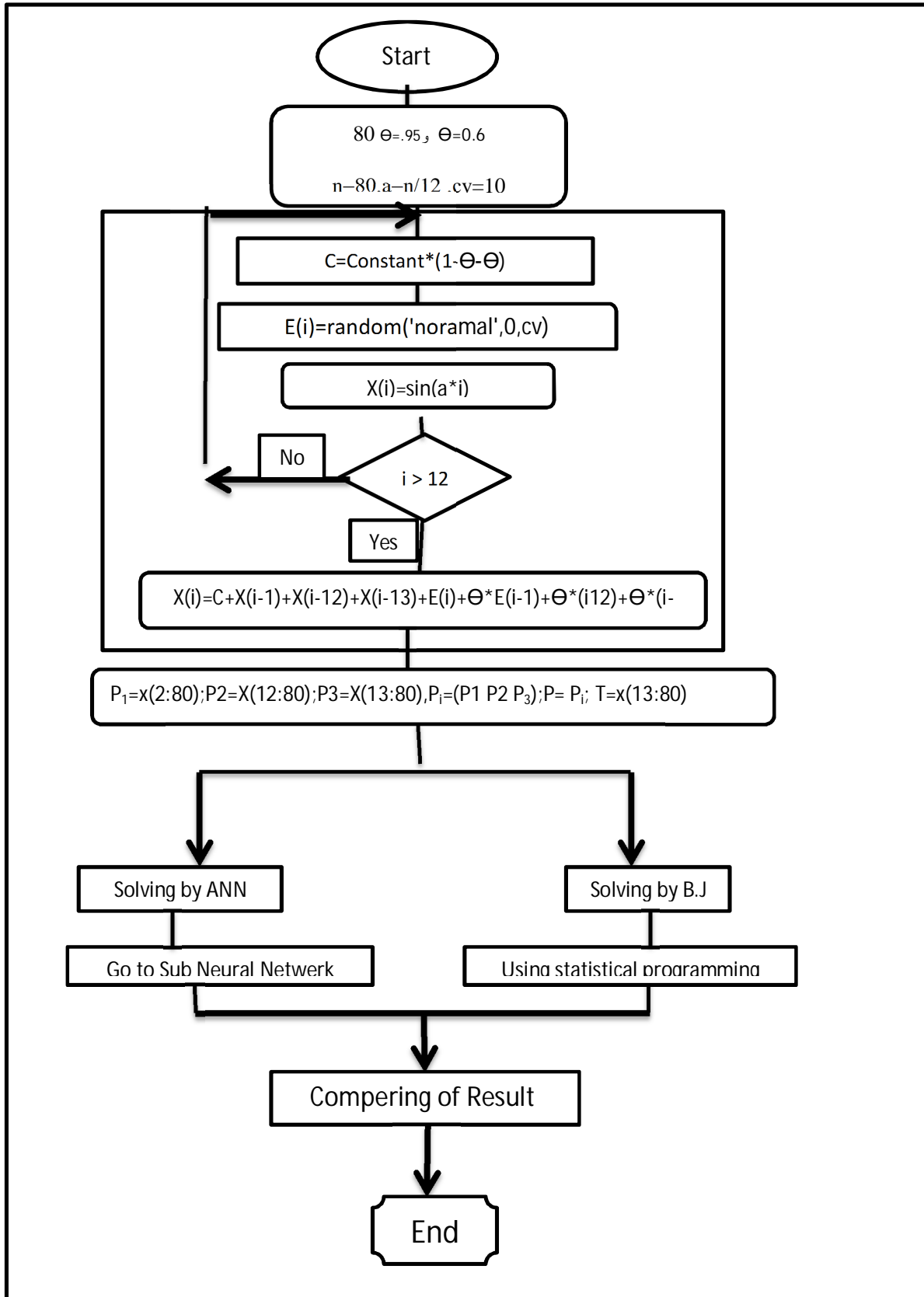
خوارزمية رقم (4) توليد سلسلة نموذج  $MA(1)$  أو  $ARMA(0,1)$  بمعلمة  $\phi=0,6$



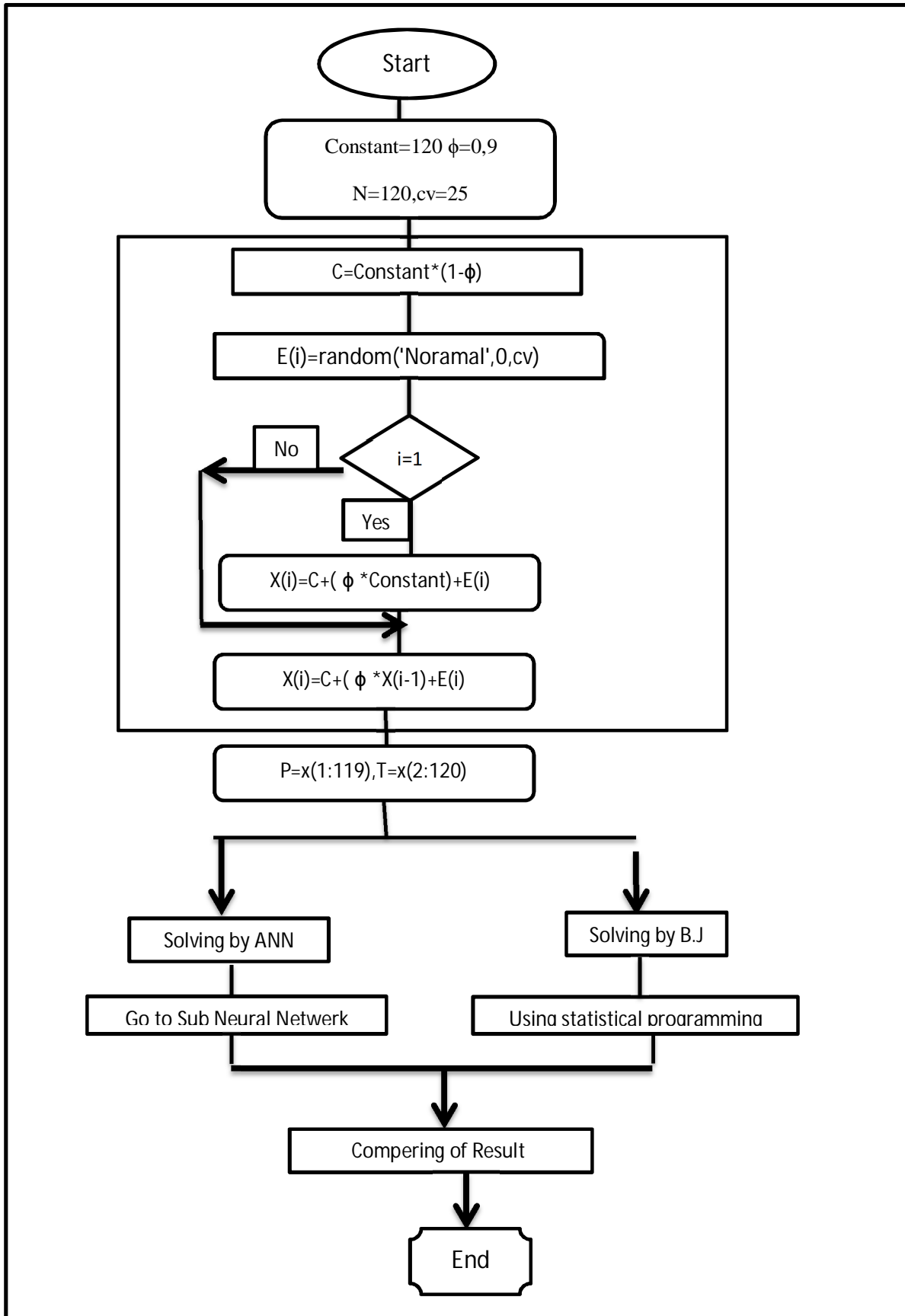
خوارزمية رقم (5) توليد نموذج المختلط ARMA(1,1,0) بمعلمة  $\phi=0,5$  ,  $\Theta=0,4$



خوارزمية رقم (6) توليد سلسلة النموذج الموسمي  $ARIMAs(0,1,1)(0.1,1)_{12}$ .



خوارزمية رقم (7) توليد سلسلة نموذج غير خطي لسلسلة زمنية ملوثة  $\sigma_e^2=75$



ملحق رقم (2): السلاسل الزمنية المولدة بأسلوب المحاكاة لسبع تجارب حسب المتوسط والتباين وحجم العينة وحسب (نماذج الانحدار الذاتي والمتوسطات المتحركة والمختلطة والنماذج الموسمية وغير الخطية ((ARIMA)

نتائج التجربة الاولى : نموذج الانحدار الذاتي(AR(1) بمعلمة  $\phi=0,9$  و  $\sigma_e^2=1$  KExp1(80)  
m =Discrete-time AR model:  $A(z)y(t) = e(t)$

$$A(z) = 1 - z^{-1}$$

Sample time: 1 seconds

Parameterization:

Polynomial orders: na=1

Number of free coefficients: 1

Use "polydata", "getpvec", "getcov" for parameters and their uncertainties.

Status: Estimated using AR ('fb/now') on "data1".

Fit to estimation data: 58.24%

FPE: 1.451, MSE: 1.415

نتائج التجربة الثانية: نموذج الانحدار الذاتي تلوث بسيطة ومعلمة  $\phi=0,5$  Exp2(40)

m =Discrete-time AR model:  $A(z)y(t) = e(t)$

$$A(z) = 1 - 0.8782 z^{-1}$$

Sample time: 1 seconds

Parameterization:

Polynomial orders: na=1

Number of free coefficients: 1

Use "polydata", "getpvec", "getcov" for parameters and their uncertainties.

Status: Estimated using AR ('fb/now') on "data3".

Fit to estimation data: -13.06%

FPE: 451.7, MSE: 429.7

y =Time domain data set with 39 samples.

Sample time: 1 seconds

Outputs Unit (if specified)

y1 z =Time domain data set with 39 samples.

Sample time: 1 seconds

Outputs Unit (if specified)



y1            Inputs    Unit (if specified)

u1            sys =Discrete-time BJ model:  $y(t) = [B(z)/F(z)]u(t) + [C(z)/D(z)]e(t)$

$$B(z) = -29.73 z^{-1} + 13.44 z^{-2}$$

$$C(z) = 1 + 1.122 z^{-1} + 0.1323 z^{-2}$$

$$D(z) = 1 - 1.572 z^{-1} + 0.5699 z^{-2}$$

$$F(z) = 1 - 1.82 z^{-1} + 0.8316 z^{-2}$$

Sample time: 1 seconds

Parameterization:

Polynomial orders: nb=2 nc=2 nd=2 nf=2 nk=1

Number of free coefficients: 8

Use "polydata", "getpvec", "getcov" for parameters and their uncertainties.

Status:            Estimated using BJ on time domain data "z".

Fit to estimation data: 75.87% (prediction focus)

FPE: 1.379e+05, MSE: 1.019e+05

Exp3(120)

**نتائج التجربة الثالثة: نموذج الانحدار الذاتي AR(2) مع نسبة تلوث بسيطة**

m =Discrete-time AR model:  $A(z)y(t) = e(t)$

$$A(z) = 1 - 0.7201 z^{-1} - 0.2732 z^{-2}$$

Sample time: 1 seconds

Parameterization:

Polynomial orders: na=2

Number of free coefficients: 2

Use "polydata", "getpvec", "getcov" for parameters and their uncertainties.

Status:            Estimated using AR ('fb/now') on "data4".

Fit to estimation data: 45.19%

FPE: 207.8, MSE: 199.2

y =Time domain data set with 118 samples.

Sample time: 1 seconds

Outputs    Unit (if specified)

y1            z =Time domain data set with 118 samples.

Sample time: 1 seconds

Outputs Unit (if specified)

y1 Inputs Unit (if specified)

u1 sys =Discrete-time BJ model:  $y(t) = [B(z)/F(z)]u(t) + [C(z)/D(z)]e(t)$

$$B(z) = 14.23 z^{-1} + 2.19 z^{-2}$$

$$C(z) = 1 - 0.05527 z^{-1} - 0.03057 z^{-2}$$

$$D(z) = 1 - 0.4579 z^{-1} - 0.5547 z^{-2}$$

$$F(z) = 1 - 0.4307 z^{-1} - 0.5623 z^{-2}$$

Sample time: 1 seconds

Parameterization:

Polynomial orders: nb=2 nc=2 nd=2 nf=2 nk=1

Number of free coefficients: 8

Use "polydata", "getpvec", "getcov" for parameters and their uncertainties.

Status: Estimated using BJ on time domain data "z".

Fit to estimation data: 99.34% (prediction focus)

FPE: 4.559e+04, MSE: 3.98e+04

نتائج التجربة الرابع : نموذج **MA(1)** أو **AR ARMA(0,1)** بمعلمة  **$\phi=0,6$**  Exp4(80)

m =Discrete-time ARMA model:  $A(z)y(t) = C(z)e(t)$

$$A(z) = 1 - 0.8383 z^{-1}$$

$$C(z) = 1 + 0.09041 z^{-1}$$

Sample time: 1 seconds

Parameterization:

Polynomial orders: na=1 nc=1

Number of free coefficients: 2

Use "polydata", "getpvec", "getcov" for parameters and their uncertainties.

Status: Estimated using ARMAX on time domain data "data5".

Fit to estimation data: 24.5% (prediction focus)

FPE: 273.1, MSE: 256.3

y =Time domain data set with 79 samples.

Sample time: 1 seconds

Outputs Unit (if specified)

y1 z=Time domain data set with 79 samples.

Sample time: 1 seconds

Outputs Unit (if specified)

y1 Inputs Unit (if specified)

u1 sys =Discrete-time BJ model:  $y(t) = [B(z)/F(z)]u(t) + [C(z)/D(z)]e(t)$

$$B(z) = 3.5 z^{-1} - 13.99 z^{-2}$$

$$C(z) = 1 + 0.01936 z^{-1} + 0.8772 z^{-2}$$

$$D(z) = 1 - 1.522 z^{-1} + 0.5326 z^{-2}$$

$$F(z) = 1 - 0.855 z^{-1} - 0.145 z^{-2}$$

Sample time: 1 seconds

Parameterization:

Polynomial orders: nb=2 nc=2 nd=2 nf=2 nk=1

Number of free coefficients: 8

Use "polydata", "getpvec", "getcov" for parameters and their uncertainties.

Status: Estimated using BJ on time domain data "z".

Fit to estimation data: 77.23% (prediction focus)

FPE: 6.622e+04, MSE: 5.453e+04

نتائج التجربة الخامسة: النموذج المختلط ARMA(1,1) بحجم عينة 80 ومعلمة نموذج  $\phi=0,5$ ,  $\Theta=0.4$

m =Discrete-time MA model:  $y(t) = C(z)e(t)$

$$C(z) = 1 + 0.9313 z^{-1}$$

Sample time: 1 seconds

Parameterization:

Polynomial orders: nc=1

Number of free coefficients: 1

Use "polydata", "getpvec", "getcov" for parameters and their uncertainties.

Status: Estimated using ARMAX on time domain data "data6".

Fit to estimation data: -2229% (prediction focus)

FPE: 684.4, MSE: 667.2

y =Time domain data set with 119 samples.

Sample time: 1 seconds

Outputs Unit (if specified)

y1 z =Time domain data set with 119 samples.

Sample time: 1 seconds

Outputs Unit (if specified)

y1 Inputs Unit (if specified)

u1 sys =Discrete-time BJ model:  $y(t) = [B(z)/F(z)]u(t) + [C(z)/D(z)]e(t)$

$$B(z) = 8.217 z^{-1} - 26.28 z^{-2}$$

$$C(z) = 1 - 0.3098 z^{-1} + 0.1179 z^{-2}$$

$$D(z) = 1 - 1.6 z^{-1} + 0.6 z^{-2}$$

$$F(z) = 1 - 0.8139 z^{-1} - 0.1745 z^{-2}$$

Sample time: 1 seconds

Parameterization:

Polynomial orders: nb=2 nc=2 nd=2 nf=2 nk=1

Number of free coefficients: 8

Use "polydata", "getpvec", "getcov" for parameters and their uncertainties.

Status: Estimated using BJ on time domain data "z".

Fit to estimation data: 73.72% (prediction focus)

FPE: 768.7, MSE: 910.9

نتائج التجربة السادسة: النموذج الموسمي  $ARIMAs(0,1,1)(0.1,1)_{12}$  ومعلمة نموذج  $\Theta=0.6$  و  $\Theta=0.95$  Exp6(80)

m = ARIMA(1,1,1) Model Seasonally Integrated with Seasonal AR(12) and MA(12):

Distribution: Name = 'Gaussian'

P: 2

D: 1

Q: 13

Constant: 0

AR: {NaN} at Lags [1]

SAR: {NaN} at Lags [12]

MA: {NaN} at Lags [1]

SMA: {NaN} at Lags [12]

Seasonality: 1

Variance: Na

نتائج التجربة السابعة: نموذج الانحدار الذاتي غير الخطي بحجم عينة 120 ومعلمة  $\phi=0,9$  exp7(120)

m =Discrete-time AR model:  $A(z)y(t) = e(t)$

$$A(z) = 1 - 0.9857 z^{-1}$$

Sample time: 1 seconds

Parameterization:

Polynomial orders: na=1 autoregressive model of degree 1  
Number of free coefficients: 1

Use "polydata", "getpvec", "getcov" for parameters and their uncertainties.

Status: Estimated using AR ('fb/now') on "data2".

Fit to estimation data: 55.54%

FPE: 308.8, MSE: 303.7

y =Time domain data set with 119 samples.

Sample time: 1 seconds

Outputs Unit (if specified)

y1 z =Time domain data set with 119 samples.

Sample time: 1 seconds

Outputs Unit (if specified)

y1 Inputs Unit (if specified)

u1 sys =Discrete-time BJ model:  $y(t) = [B(z)/F(z)]u(t) + [C(z)/D(z)]e(t)$

$$B(z) = -10.33 z^{-1} + 10.11 z^{-2}$$

$$C(z) = 1 + 0.5426 z^{-1} + 0.1075 z^{-2}$$

$$D(z) = 1 - 1.86 z^{-1} + 0.8699 z^{-2}$$

$$F(z) = 1 - 1.971 z^{-1} + 0.9708 z^{-2}$$

Sample time: 1 seconds

Parameterization:

Polynomial orders: nb=2 nc=2 nd=2 nf=2 nk=1

Number of free coefficients: 8

Use "polydata", "getpvec", "getcov" for parameters and their uncertainties.

Status: Estimated using BJ on time domain data "z".

Fit to estimation data: 98.81% (prediction focus)

FPE: 9.28e+04, MSE: 8.107e+04

## السلاسل الزمنية المولدة لثمانية تجارب حسب المتوسط والتباين وحجم العينة

السلاسل الزمنية المولدة حسب نماذج الانحدار الذاتي والمتوسطات المتحركة والمختلطة والنماذج الموسمية وغير الخطية (ARIMA)													
Exp(1)n(80)		Exp(2) n(40)		Exp(3) n(120)		Exp(4) n(80)		Exp(5) n(120)		Exp(6) n(80)		Exp(7) n(120))	
Input	Target	Input	Target	Input	Target	Input	Target	Input	Target	Input	Target	Input	Target
0.4242	200.1769	14.9681	35.8603	7.7746	191.9188	20.6968	180.637	19.0008	121.3986	0.2758	0.0001	213.4417	213.4417
1.5150	199.8517	14.7537	33.5474	16.1077	188.8761	18.3780	147.742	24.7441	48.3257	0.3055	0.0001	257.9446	257.9446
2.4356	199.7348	13.7988	56.8076	14.1728	170.3857	5.9312	143.312	16.0401	49.6091	0.3153	0.0001	195.6790	195.6790
2.0174	200.3566	31.4126	57.9137	34.5756	174.4112	13.6041	162.120	29.6831	49.9287	0.3203	0.0001	217.6654	217.6654
2.6455	201.3678	25.0574	44.6368	33.1400	160.2505	18.3121	203.990	26.8894	48.2206	0.3494	0.0001	223.8680	223.8680
2.2969	201.0331	24.2670	48.8078	32.5780	177.7719	31.1694	248.553	7.3987	46.9486	0.3656	0.0002	188.7890	188.7890
2.9802	201.2574	33.2805	40.8031	36.5612	183.7577	12.9346	240.776	21.5715	46.9620	0.3813	0.0002	179.0703	179.0703
4.3507	200.8934	33.8589	47.4604	46.0935	184.9691	1.4312	228.693	33.0500	48.0770	0.4168	0.0002	189.7289	189.7289
2.7975	201.0336	47.7226	57.8887	38.1603	182.3247	2.8727	246.262	53.8161	45.8542	0.4926	0.0003	280.2159	280.2159
3.7934	201.3703	57.2356	32.8992	40.4706	186.3162	14.1516	253.890	37.3683	47.1927	0.5981	0.0003	341.4303	341.4303
5.2047	200.6164	58.5898	46.7381	63.6741	202.5375	14.5919	267.632	5.3194	48.6485	0.6770	0.0004	293.5401	293.5401
5.2506	200.8296	48.5699	57.9487	49.4362	210.9085	6.9884	280.326	10.8499	48.9865	0.7738	0.0005	360.0591	360.0591
6.9409	201.3477	53.1030	49.4491	64.7908	202.8219	15.2462	235.286	29.5735	50.5388	0.8633	0.0006	362.1883	362.1883
7.0912	201.3053	36.8380	62.1871	66.8773	206.6498	18.5346	245.266	63.3738	48.9048	0.9171	0.0008	344.3931	344.3931
5.8936	202.9046	38.3118	52.6474	82.1695	193.6315	3.6874	238.451	37.7504	46.8252	0.9287	0.0010	347.8224	347.8224
3.7702	202.0056	45.7183	33.9525	81.2958	202.1812	0.9988	215.600	111.9400	48.5913	0.9266	0.0012	327.9160	327.9160
3.4474	201.0679	46.5895	15.0413	56.4994	206.7888	10.4675	196.700	27.1041	49.6024	0.9625	0.0015	312.0208	312.0208
4.1381	199.2113	54.5000	24.1866	57.8004	213.7281	4.0681	229.066	11.6827	48.3938	0.9818	0.0018	338.0611	338.0611
4.4453	200.2006	74.4567	39.2287	62.4483	194.9613	4.6755	205.916	6.5095	47.3208	1.0067	0.0022	359.4809	359.4809
4.8456	201.0476	81.9909	42.7884	63.1558	206.1414	36.6730	174.404	8.3906	47.8928	1.0640	0.0027	378.9626	378.9626
4.2870	200.8630	82.3330	45.5303	82.8097	193.5311	22.9395	182.331	15.0673	47.0196	1.1877	0.0033	377.8538	377.8538
4.4263	201.6752	86.6365	36.9943	89.1361	194.1955	9.1375	234.367	10.3586	47.3882	1.3394	0.0039	329.8812	329.8812
2.8400	201.6914	88.5183	39.9372	91.5826	202.4567	16.1284	231.569	6.8289	47.4017	1.4258	0.0048	334.8241	334.8241
2.1042	201.8130	71.8987	23.5819	91.3798	202.7148	5.7011	236.120	23.0850	46.7979	1.5547	0.0059	362.0976	362.0976
1.3116	201.7447	65.3043	24.1901	75.6391	200.7285	3.3381	209.052	1.8027	48.4764	1.6910	0.0072	358.1101	358.1101
1.8147	202.0101	76.3038	38.4338	100.9183	207.3188	5.0739	250.002	51.1411	48.6111	1.7622	0.0090	368.1665	368.1665
1.8010	201.9108	73.5274	27.6616	92.0079	220.9548	4.9620	248.126	14.7587	49.3693	1.7930	0.0111	369.5219	369.5219
0.6824	204.5070	77.4702	33.7356	79.8093	208.5336	16.7147	256.566	24.2185	47.7243	1.7984	0.0138	344.9837	344.9837
0.6732	202.8897	64.4525	29.9697	89.0976	197.9056	37.5603	227.108	36.0706	47.5884	1.8316	0.0172	337.8321	337.8321
0.0054	200.7464	63.1813	28.3178	86.3377	189.6810	-20.5835	245.748	12.5796	47.0980	1.8578	0.0212	304.3668	304.3668
0.6400	199.5311	67.6273	42.8004	81.5914	183.7375	9.2803	250.902	26.5870	47.9910	1.9066	0.0261	316.1401	316.1401
0.1966	198.4846	51.1455	42.5344	88.4769	180.4347	20.9603	216.912	17.1413	49.6763	1.9844	0.0321	275.8493	275.8493
0.3063	198.2026	53.2782	45.2508	78.4366	189.1489	10.1859	216.214	9.3030	49.8065	2.1071	0.0393	241.5426	241.5426
0.6920	198.2138	49.7348	51.4651	68.7186	166.7620	20.3014	203.328	29.3771	46.4987	2.2396	0.0480	217.1509	217.1509
1.5476	198.1739	38.2682	47.5351	54.7403	179.1615	23.8824	205.726	74.9195	47.4125	2.2921	0.0587	141.8287	141.8287
1.7221	198.8979	36.7096	49.2761	56.6482	169.7413	12.9388	198.890	50.5537	48.4177	2.4278	0.0718	183.6053	183.6053
2.2553	199.3973	15.4974	51.4677	49.4573	186.5889	18.6057	194.253	-9.8949	48.3395	2.5950	0.0881	193.3746	193.3746
2.9164	200.2088	7.5269	57.4399	56.8119	174.3201	23.4323	169.005	20.2108	47.6532	2.6749	0.1082	175.1639	175.1639
4.0495	201.9662	19.7727	53.4786	38.5070	180.6443	21.5861	164.022	62.1551	46.0206	2.7247	0.1331	211.9050	211.9050
4.5101	202.9927			43.7567	171.3067	3.6762	186.783	33.2343	47.9022	2.7307	0.1641	167.9266	167.9266
5.8771	201.4101			26.2850	170.1617	15.3861	231.722	40.5654	48.0286	2.7494	0.2025	168.5778	168.5778
5.8989	198.9402			51.7507	170.8877	10.5675	199.536	56.8180	47.3660	2.7689	0.2498	165.6839	165.6839
5.8525	199.9481			40.2406	171.2932	5.3321	259.018	13.6684	47.9705	2.8192	0.3080	177.0957	177.0957
7.4993	198.1176			57.3485	168.7941	0.6746	291.268	15.2193	50.6378	2.8999	0.3794	187.2076	187.2076
7.0058	198.3726			55.4407	183.9476	14.7792	286.354	51.2777	51.8157	3.0006	0.4667	166.8648	166.8648
7.0030	198.5708			65.4267	186.5082	14.3220	270.189	43.4349	48.0575	3.1110	0.5734	169.4270	169.4270
7.8933	200.9409			49.6007	205.6406	2.4809	245.703	8.8183	46.7347	3.1320	0.7040	168.3624	168.3624
8.0383	200.7776			68.7652	196.5638	2.2224	261.952	46.0846	48.7029	3.2594	0.8639	187.2188	187.2188
9.3981	200.1925			75.7686	210.2968	1.7056	238.392	31.5873	46.5194	3.4543	1.0601	215.8286	215.8286
10.3991	200.4091			51.7480	184.1548	10.3805	223.006	5.8326	48.0002	3.5484	1.3014	241.9775	241.9775
10.6812	200.6140			59.6213	199.9668	23.0737	242.796	5.3272	48.4312	3.6050	1.5987	216.1885	216.1885
9.9282	200.6226			49.7646	198.9412	36.3537	249.415	48.3489	49.2102	3.6021	0.0072	216.5036	216.5036
10.4767	199.9518			55.3083	195.6130	43.4323	266.892	4.3934	47.9597	3.5973	0.0090	184.5003	184.5003
9.1382	198.7340			44.3780	204.0036	47.9844	272.821	34.3726	46.5496	3.5955	0.0111	158.2128	158.2128
9.3747	199.1771			51.6061	209.8623	66.6999	255.516	13.5223	49.7609	3.6374	0.0138	162.2203	162.2203
10.1572	197.9165			54.7328	217.4545	52.1340	237.119	14.3601	49.9767	3.7354	0.0172	204.3140	204.3140
10.3633	197.0927			55.9267	217.6293	38.0022	253.316	39.0126	48.0430	3.8377	0.0212	184.6409	184.6409
11.2147	198.7146			54.2042	221.8247	12.7103	231.205	23.9243	46.7812	3.9378	0.0261	195.4613	195.4613

13.1882	198.4243			41.7384	211.6434	15.9872	257.751	14.6573	48.4836	3.9584	0.0321	190.2756	190.2756
14.0824	198.4415			47.3335	202.5817	17.5876	271.743	31.4407	49.0041	4.0966	0.0393	219.1819	219.1819
14.3406	199.4972			39.7400	202.3659	12.1470	271.762	70.9472	45.9413	4.3055	0.0480	190.0371	190.0371
14.9616	199.2474			29.7606	204.0595	10.2756	264.666	21.7323	45.7383	4.4087	0.0587	191.8473	191.8473
15.3733	200.3520			33.2004	212.6549	12.9580	267.340	14.3278	50.4281	4.4719	0.0718	206.4758	206.4758
14.1005	199.9717			29.6552	200.9056	13.8265	348.773	11.8010	49.7703	4.4759	0.0881	233.3435	233.3435
13.6972	200.9874			33.0243	199.4451	28.8451	331.085	48.3574	45.9934	4.4831	0.1082	268.6144	268.6144
14.8825	201.5180			41.7454	229.6835	43.6500	279.062	25.6791	45.9123	4.4758	0.1331	263.9013	263.9013
14.8402	201.1531			44.0630	211.4177	51.4587	319.033	52.5385	47.0473	4.4976	0.1641	220.2214	220.2214
15.4038	200.1721			56.3931	234.9587	-51.0442	322.376	60.8388	48.4426	4.5899	0.2025	199.6417	199.6417
14.4293	199.1118			43.9519	234.0120	65.1179	293.940	13.5413	48.2540	4.6839	0.2498	173.1380	173.1380
14.4916	198.9306			40.1475	225.3168	65.4180	349.980	24.0355	48.0039	4.7911	0.3080	234.5856	234.5856
15.0725	198.5994			40.6925	224.3281	51.3114	348.755	35.9064	48.0431	4.8267	0.3794	215.7370	215.7370
13.7544	198.3308			54.5291	220.0403	47.5739	341.235	18.1969	47.0290	4.9731	0.4667	232.8652	232.8652
14.0907	199.4812			62.1782	224.0575	51.4611	307.665	12.5989	48.5966	5.1866	0.5734	224.7682	224.7682
13.9145	199.2354			57.7683	234.1030	44.3907	270.276	13.8669	48.3384	5.2869	0.7040	244.5067	244.5067
13.0049	200.4555			53.4364	211.3010	25.3989	219.038	5.1052	47.3174	5.3558	0.8639	220.9348	220.9348
13.0049	200.4555			39.6709	237.2488	23.7891	206.561	44.3749	47.9169	5.3557	1.0601	183.7846	183.7846
12.9684	199.8784			52.0463	233.5175	27.9990	179.577	37.6890	48.0500	5.3614	1.3014	149.8467	149.8467
11.1326	200.8631			47.2471	225.7961	43.0337	197.814	3.5771	47.4383	5.3597	1.5987	167.0669	167.0669
7.9332	200.4057			37.1649	224.2728	54.3881	190.091	52.9435	47.8142	5.3727	1.9653	165.9258	165.9258
				37.8077	225.2983			15.5716	50.1893	5.9351	1.9814	164.4319	164.4319
				18.8986	225.4225			53.3038	49.8091			203.4715	203.4715
				30.9025	234.8509			1.6861	47.6697			210.4139	210.4139
				24.2627	239.4390			88.4858	46.7374			214.3178	214.3178
				43.5370	230.5316			16.3622	47.2394			252.5785	252.5785
				21.8837	228.8514			33.2349	46.2807			227.2090	227.2090
				40.4971	233.8077			29.0105	48.8802			241.9037	241.9037
				34.4153	230.1434			54.0930	49.2997			258.5906	258.5906
				37.6912	239.5916			7.6591	46.9592			246.6386	246.6386
				43.6405	225.9303			40.7422	47.4226			247.3665	247.3665
				53.3606	232.1525			32.1008	46.6288			213.4838	213.4838
				38.4962	229.9540			15.5973	47.7162			183.4366	183.4366
				57.9038	241.5367			34.5665	48.1679			187.7148	187.7148
				37.7088	220.4532			29.7383	47.9331			206.9996	206.9996
				34.9070	224.7404			53.0353	48.3870			270.9370	270.9370
				29.1695	221.5151			18.9403	49.0708			247.1710	247.1710
				38.9666	196.9121			30.0308	47.7025			247.1372	247.1372
				24.0914	217.0828			11.8377	46.0471			240.3611	240.3611
				33.4925	237.4156			5.6202	47.0159			187.9994	187.9994
				33.8672	225.2524			41.3268	47.1147			178.2253	178.2253
				64.9881	148.4649			104.1417	48.7805			135.5358	135.5358
				82.1367	164.5898			87.9544	47.2198			162.9916	162.9916
				86.1105	156.8472			83.2651	47.1189			144.4917	144.4917
				87.3955	143.1140			40.3172	47.4596			152.5448	152.5448
				93.0087	122.9876			38.5884	48.2849			143.6771	143.6771
				95.3490	125.3927			57.2239	47.3098			156.8974	156.8974
				81.9008	131.2674			49.1200	48.4848			146.1995	146.1995
				81.4285	131.5523			43.5831	50.4383			163.8287	163.8287
				93.1260	134.4477			31.3141	48.7672			185.9299	185.9299
				89.2985	126.3635			33.2613	47.8091			230.1341	230.1341
				95.7437	129.5924			63.6348	48.5014			222.2676	222.2676
				84.1222	111.2778			52.6437	49.5072			166.5820	166.5820
				87.7539	110.0435			105.0303	49.2440			148.9341	148.9341
				92.3252	103.2215			102.2910	48.7103			187.9055	187.9055
				77.8222	112.1433			48.1234	47.7554			162.3111	162.3111
				84.9722	110.1108			34.0168	47.4788			190.1038	190.1038
				81.0855	100.1542			32.6315	48.4745			194.1947	194.1947
				72.9743	105.030			35.4005	50.0509			230.6926	230.6926
				74.6873	148.4649			82.9503	49.5781			148.0223	225.9203
				55.880	164.5898			67.5167	47.135			213.4417	175.7983
				64.9881	156.8472			48.3395	47.6532			257.9446	225.9203

ملحق (3) نماذج تحليل منهجية بوكس - جنكبنز:

ملحق (1) النموذج ARMA(1,1,0) تجربة رقم (1)

Dependent Variable: ZT  
Method: Least Squares  
Date: 02/20/16 Time: 23:20  
Sample(adjusted): 2 79  
Included observations: 78 after adjusting endpoints  
Convergence achieved after 4 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.38306	4.369619	2.376194	0.0200
AR(1)	0.970882	0.021298	45.58482	0.0000
R-squared	0.964716	Mean dependent var		7.173185
Adjusted R-squared	0.964252	S.D. dependent var		4.950208
S.E. of regression	0.935941	Akaike info criterion		2.730778
Sum squared resid	66.57489	Schwarz criterion		2.791206
Log likelihood	-104.5003	F-statistic		2077.975
Durbin-Watson stat	1.474386	Prob(F-statistic)		0.000000

ملحق (2) النموذج ARMA(1,1,0) تجربة رقم (2)

Dependent Variable: ZT  
Method: Least Squares  
Date: 02/21/16 Time: 23:01  
Sample(adjusted): 2 39  
Included observations: 38 after adjusting endpoints  
Convergence achieved after 3 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	27.57667	4.557761	6.050487	0.0000
AR(1)	0.166086	0.169559	0.979517	0.3339
R-squared	0.025960	Mean dependent var		27.35049
Adjusted R-squared	-0.001097	S.D. dependent var		23.37350
S.E. of regression	23.38632	Akaike info criterion		9.193375
Sum squared resid	19689.11	Schwarz criterion		9.279564
Log likelihood	-172.6741	F-statistic		0.959454
Durbin-Watson stat	1.894433	Prob(F-statistic)		0.333861

ملحق (3) النموذج ARMA(2,0,0) لتجربة رقم (3)

Dependent Variable: ZT  
Method: Least Squares  
Date: 03/08/16 Time: 16:01  
Sample(adjusted): 3 120  
Included observations: 118 after adjusting endpoints  
Convergence achieved after 3 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	61.38788	8.315792	7.382085	0.0000
AR(1)	0.560985	0.088402	6.345832	0.0000
AR(2)	0.319356	0.086526	3.690864	0.0003
R-squared	0.758335	Mean dependent var		57.25223
Adjusted R-squared	0.754132	S.D. dependent var		21.25137
S.E. of regression	10.53750	Akaike info criterion		7.572853
Sum squared resid	12769.48	Schwarz criterion		7.643294
Log likelihood	-443.7983	F-statistic		180.4329
Durbin-Watson stat	1.894444	Prob(F-statistic)		0.000000

ملحق (4) النموذج ARMA(0,1,1) لتجربة رقم (4):

Dependent Variable: ZT  
Method: Least Squares  
Date: 02/22/16 Time: 10:16  
Sample: 1 120  
Included observations: 120  
Convergence achieved after 87 iterations  
Backcast: 0

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	192.0234	3.700080	51.89709	0.0000
MA(1)	0.701215	0.065184	10.75741	0.0000
R-squared	0.647956	Mean dependent var		192.1320
Adjusted R-squared	0.644125	S.D. dependent var		35.33359
S.E. of regression	23.85673	Akaike info criterion		9.198536
Sum squared resid	67158.94	Schwarz criterion		9.244994
Log likelihood	-549.9122	F-statistic		143.0362
Durbin-Watson stat	0.961527	Prob(F-statistic)		0.000000



ملحق (5) النموذج ARMA(1,1,1) لتجربة رقم (5):

Dependent Variable: ZT  
Method: Least Squares  
Date: 02/22/16 Time: 12:53  
Sample(adjusted): 2 80  
Included observations: 79 after adjusting endpoints  
Convergence achieved after 12 iterations  
Backcast: 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	240.5734	16.78084	14.33620	0.0000
AR(1)	0.815274	0.079245	10.28798	0.0000
MA(1)	0.068273	0.136492	0.500196	0.6184
R-squared	0.697212	Mean dependent var	240.8404	
Adjusted R-squared	0.689244	S.D. dependent var	46.30140	
S.E. of regression	25.81094	Akaike info criterion	9.376709	
Sum squared resid	50631.55	Schwarz criterion	9.466688	
Log likelihood	-367.3800	F-statistic	87.50042	
Durbin-Watson stat	1.975800	Prob(F-statistic)	0.000000	

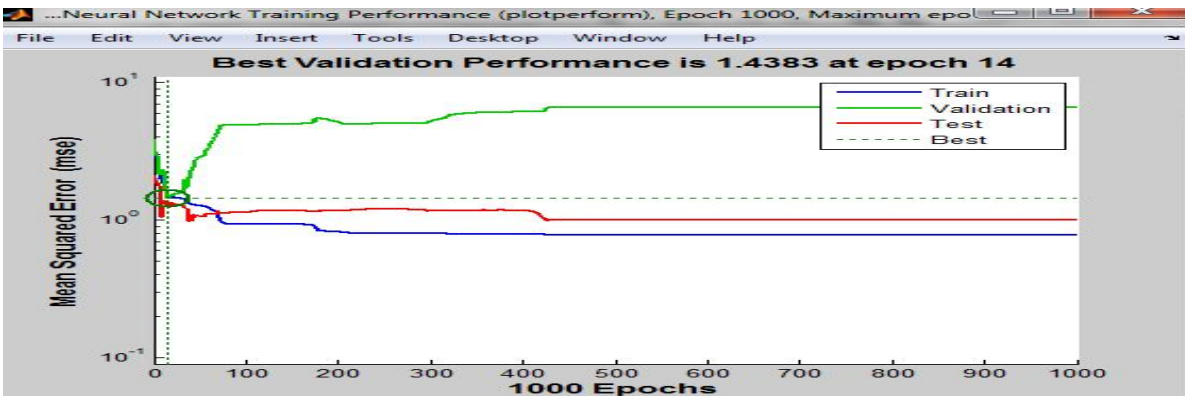
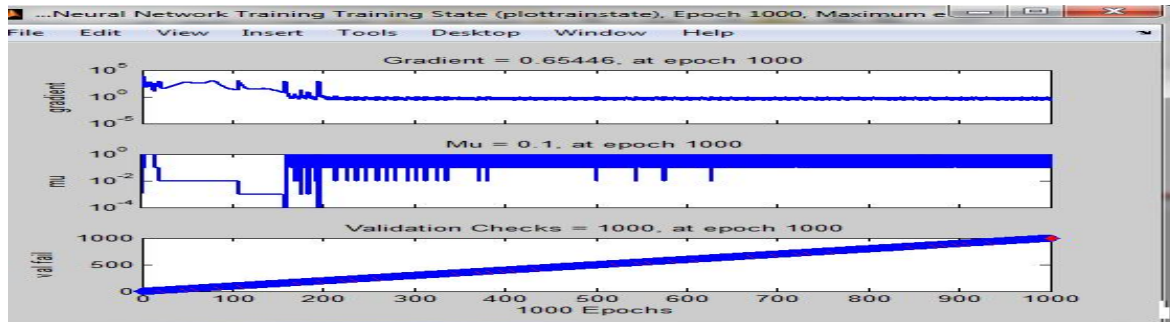
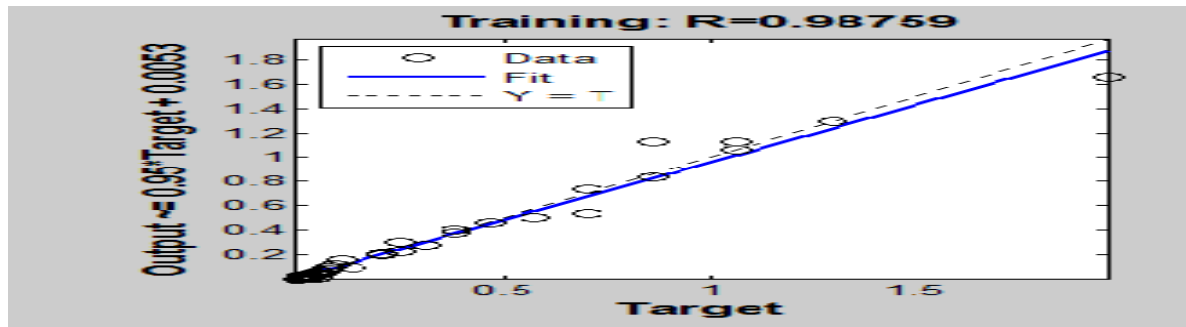
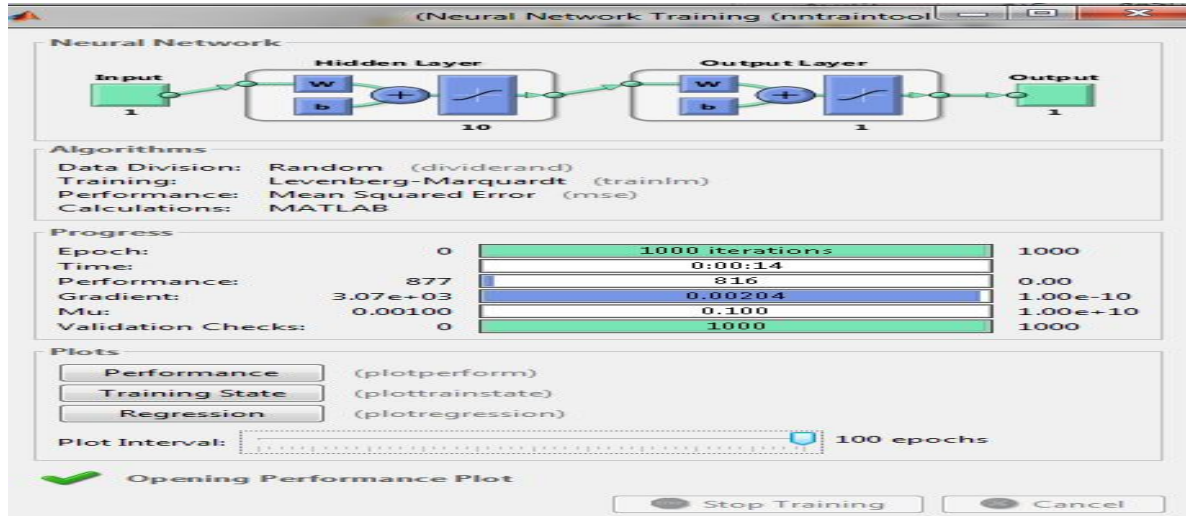
ملحق (6) النموذج ARMA(1,0,0) لتجربة رقم (6)

Dependent Variable: ZT  
Method: Least Squares  
Date: 04/25/16 Time: 02:08  
Sample(adjusted): 2 120  
Included observations: 119 after adjusting endpoints  
Convergence achieved after 3 iterations

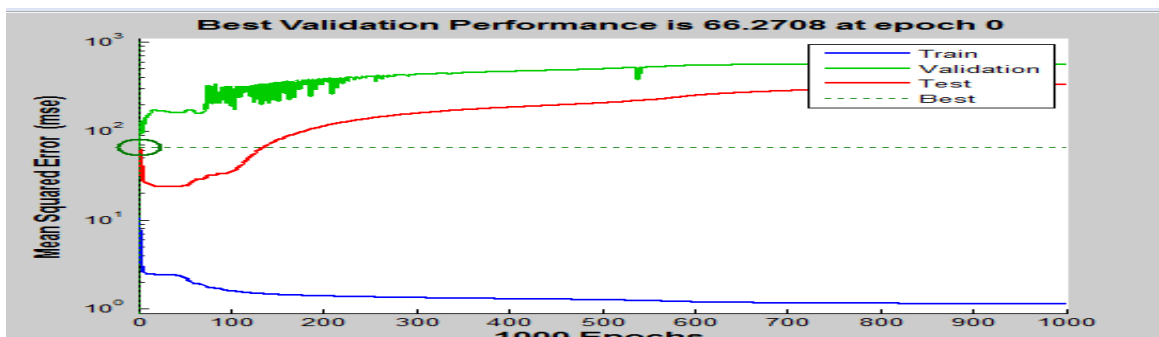
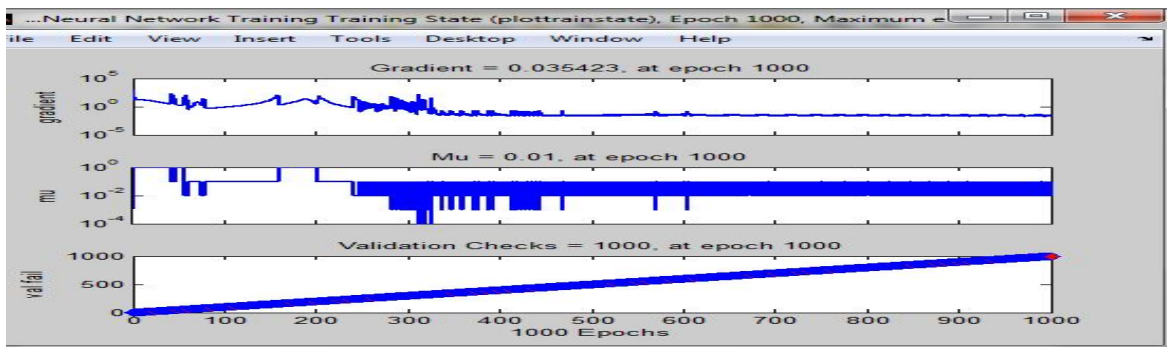
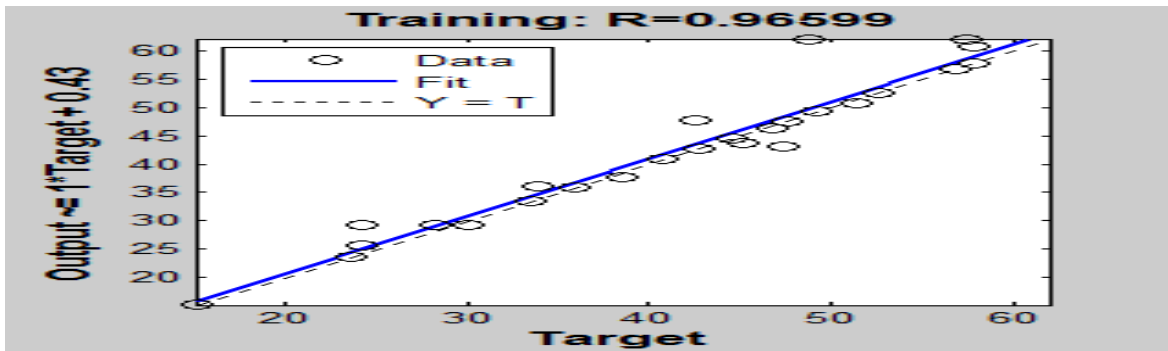
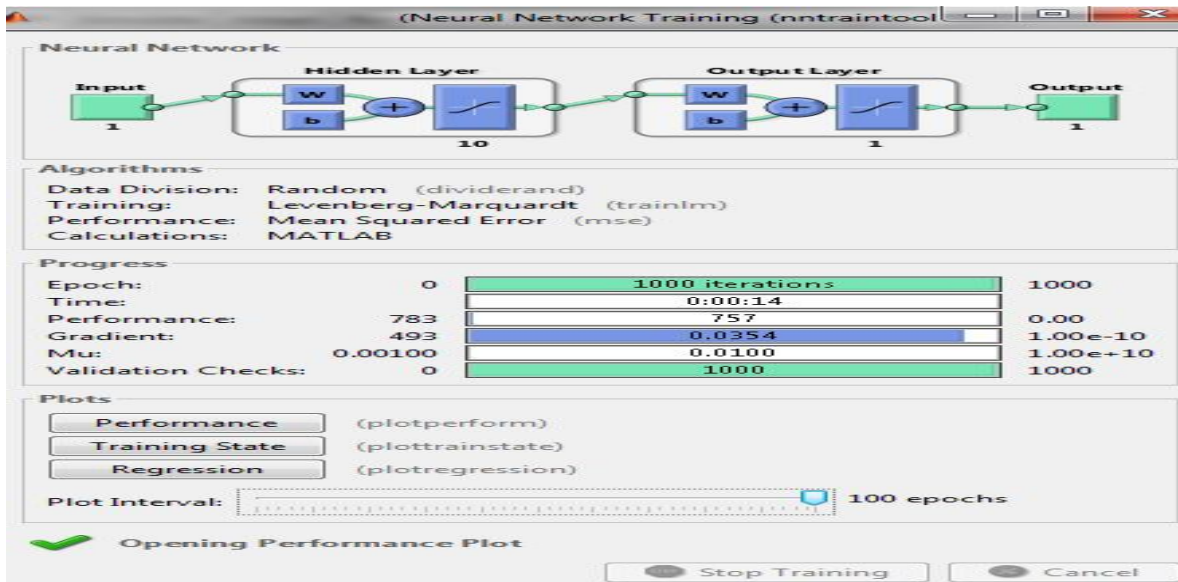
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	230.3094	24.73610	9.310660	0.0000
AR(1)	0.888283	0.042615	20.84438	0.0000
R-squared	0.53784670	Mean dependent var	227.3358	
Adjusted R-squared	0.54603343	S.D. dependent var	65.08342	
S.E. of regression	30.10533	Akaike info criterion	9.663945	
Sum squared resid	106040.7	Schwarz criterion	9.710653	
Log likelihood	-573.0047	F-statistic	434.4880	
Durbin-Watson stat	2.95316434	Prob(F-statistic)	0.000000	

### ملحق رقم (3): مراحل التدريب للشبكة BP حسب تجارب

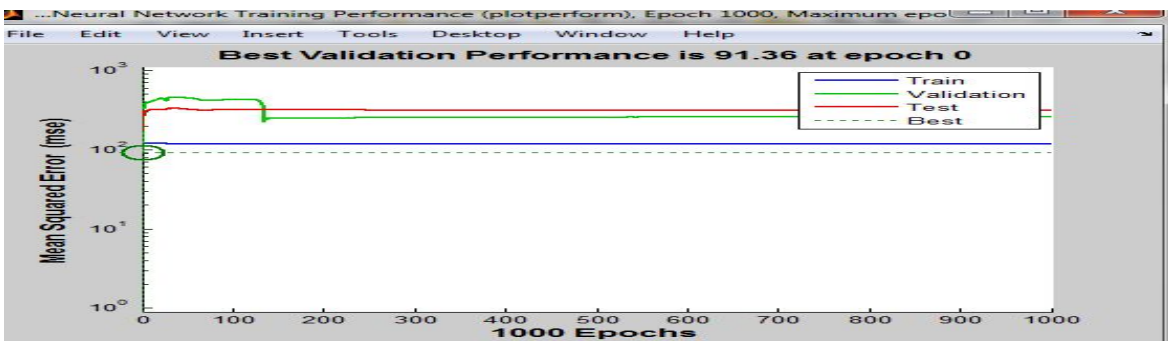
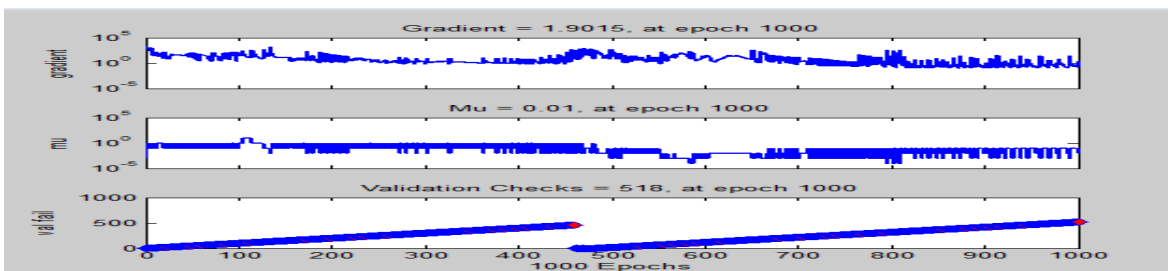
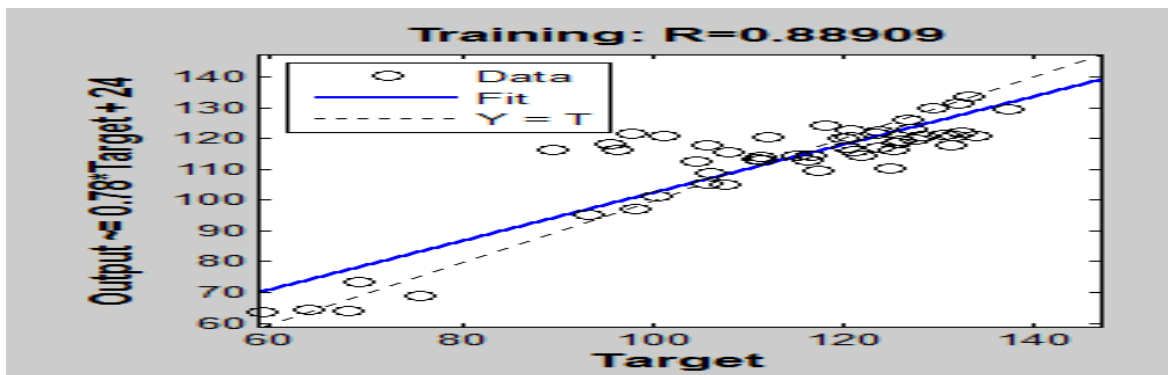
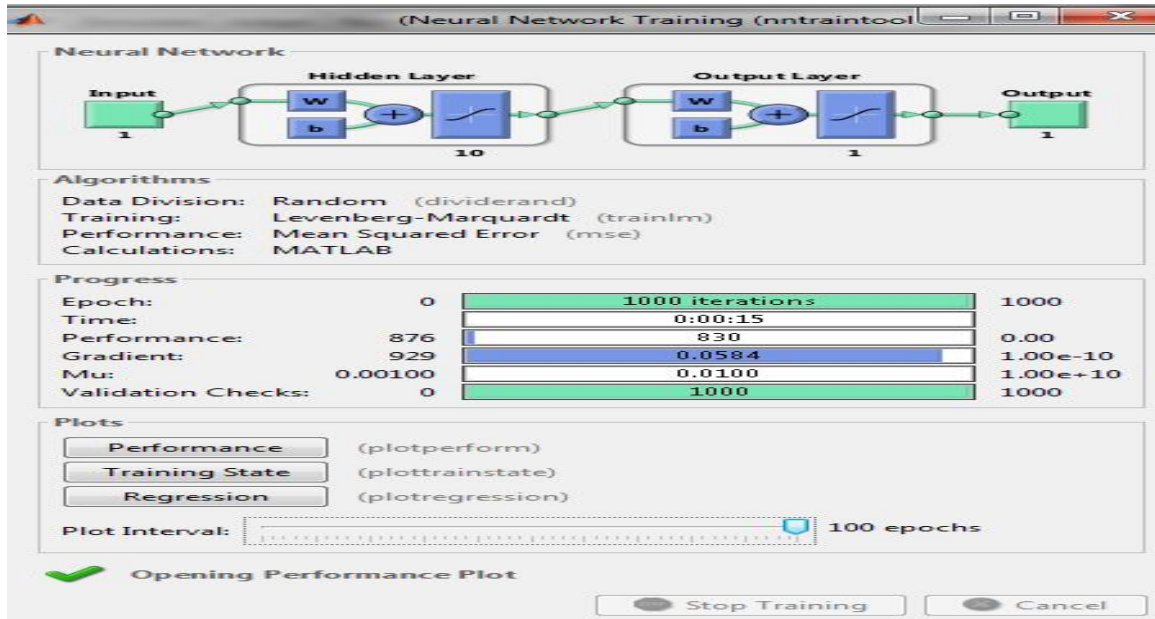
ملحق رقم (1) الاشكال رقم (1) أدناه تبين مراحل تدريب شبكة BP قيد البحث و النتائج التجربة الاولى:



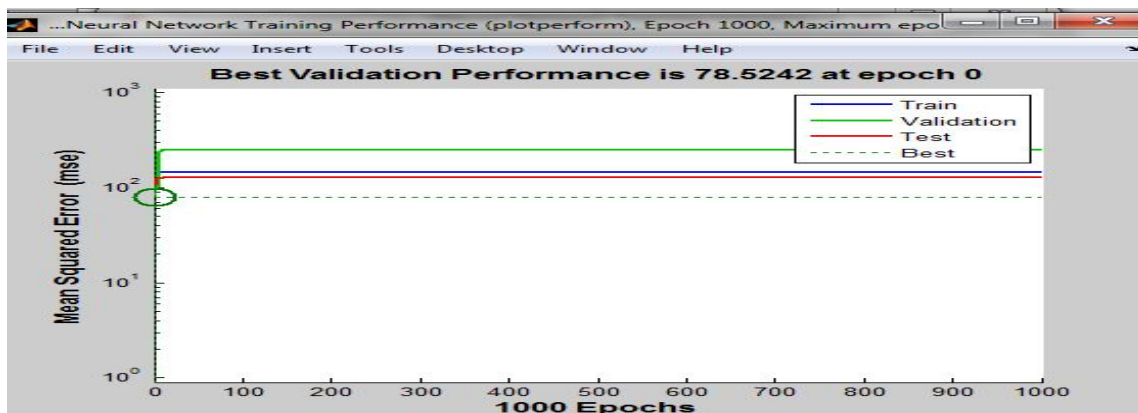
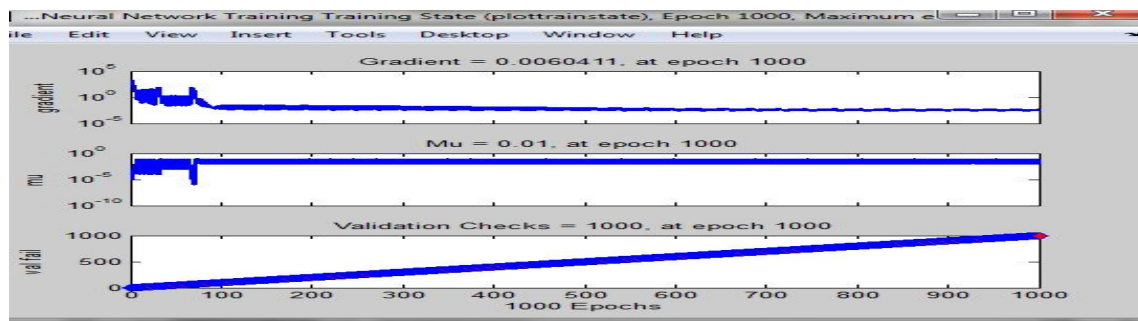
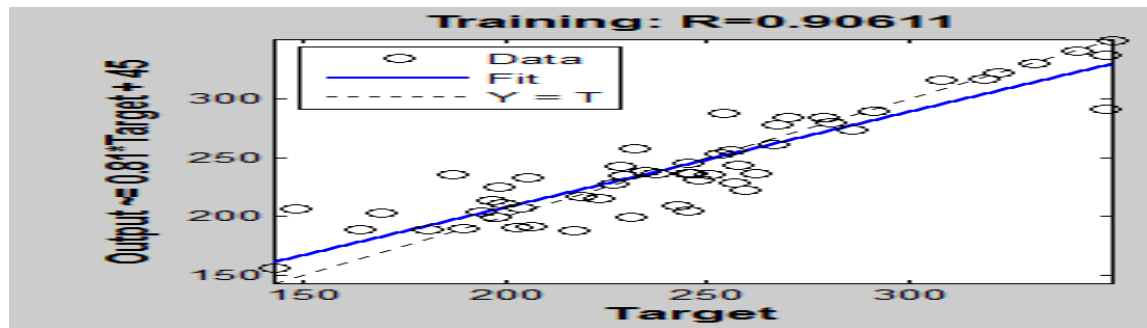
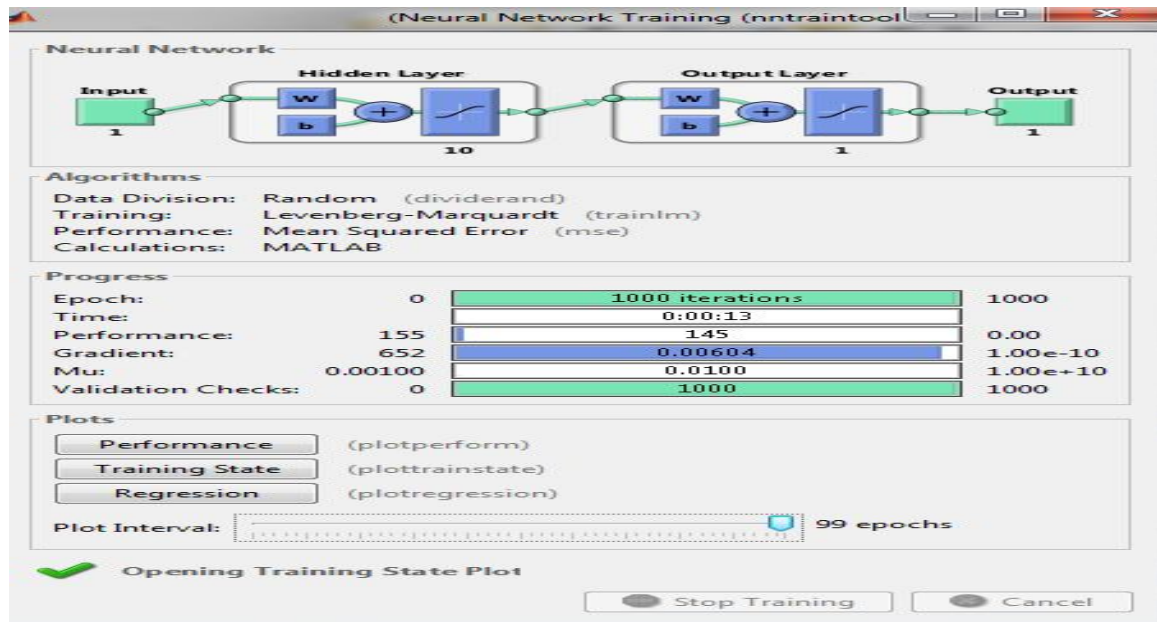
ملحق رقم (2) الاشكال رقم (3-17) أدناه تبين مراحل تدريب شبكة BP قيد البحث و النتائج التجربة الثانية:



ملحق رقم(3) الاشكال رقم(3-18) أدناه تبين مراحل تدريب شبكة BP قيد البحث و النتائج التجربة الثالثة:

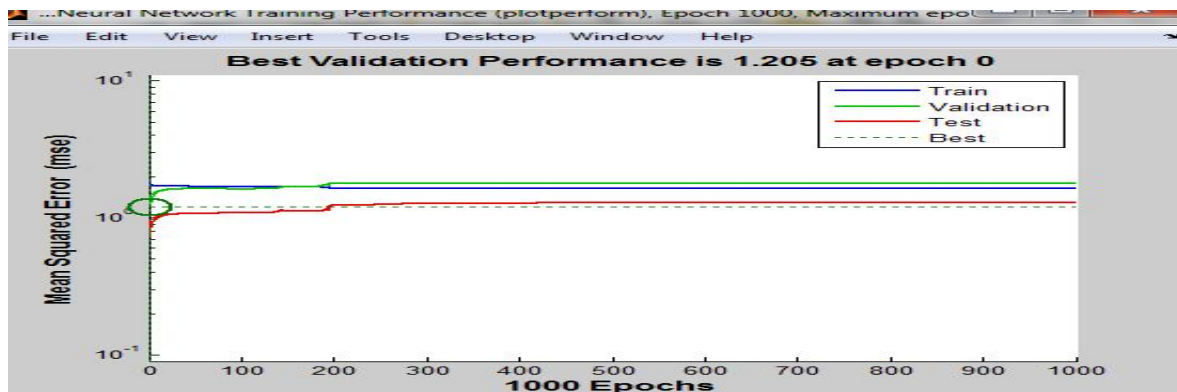
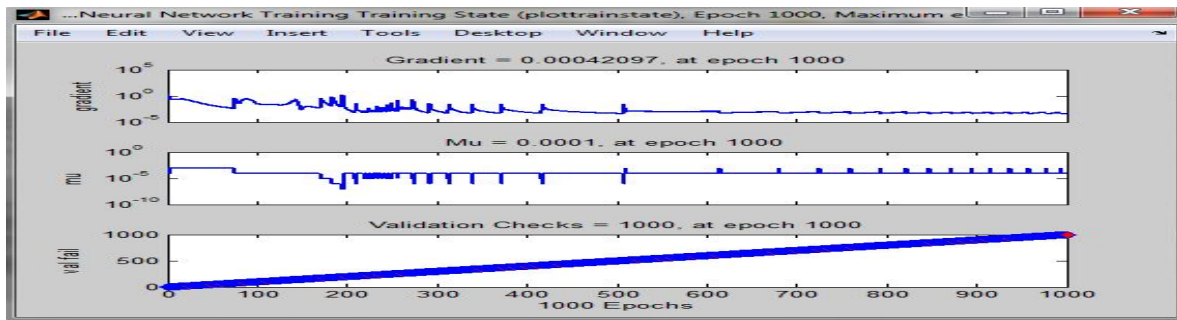
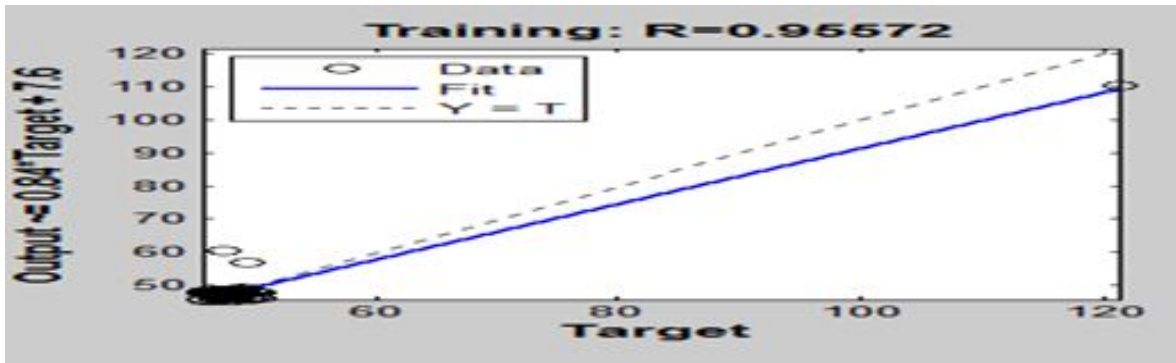
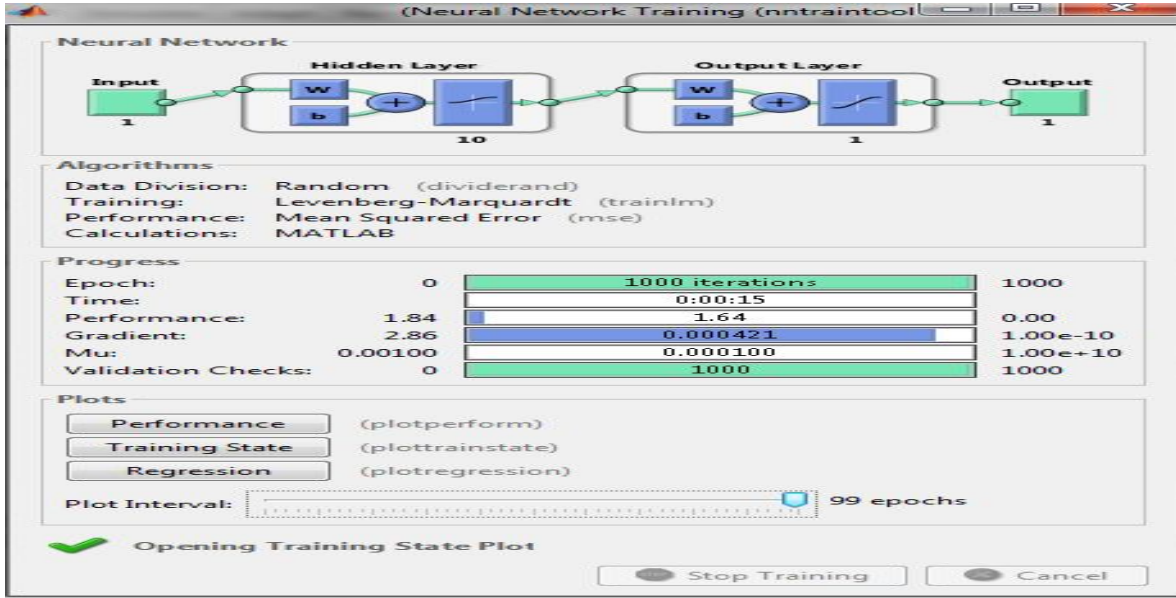


ملحق رقم(4) الاشكال رقم(3-19) أدناه تبين مراحل تدريب شبكة BP قيد البحث و النتائج التجربة الرابعة:

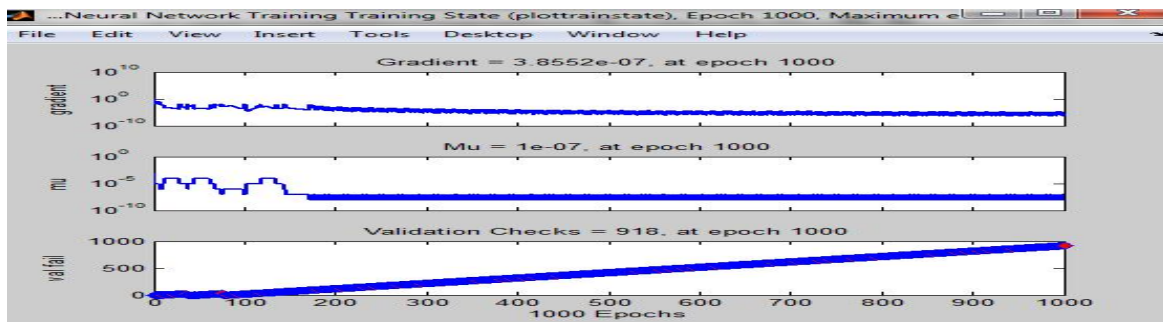
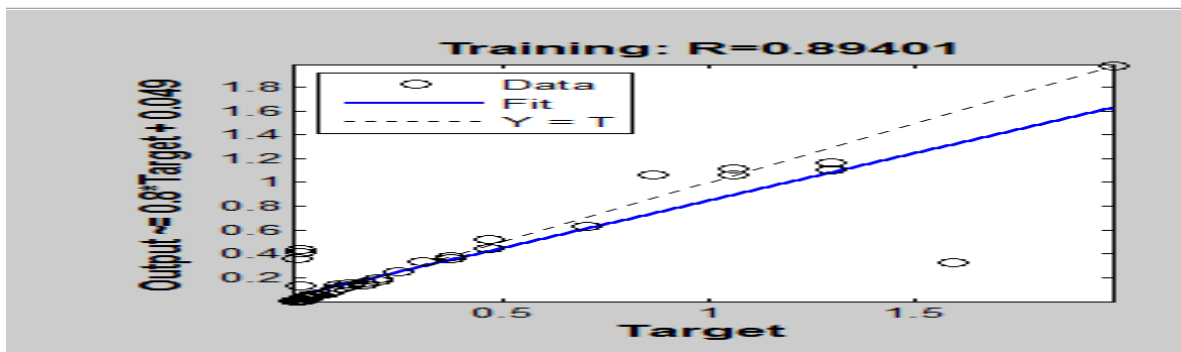
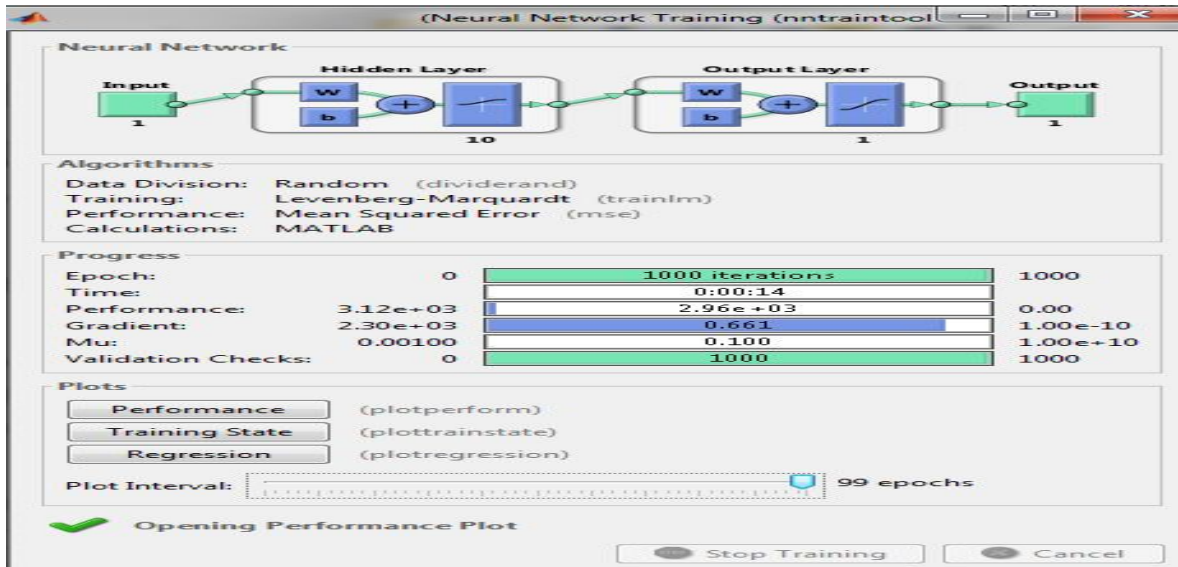




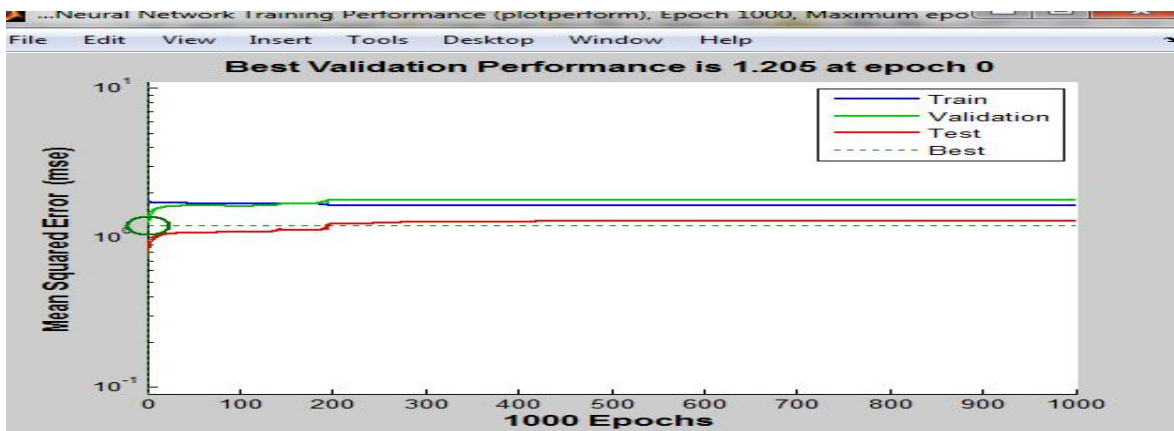
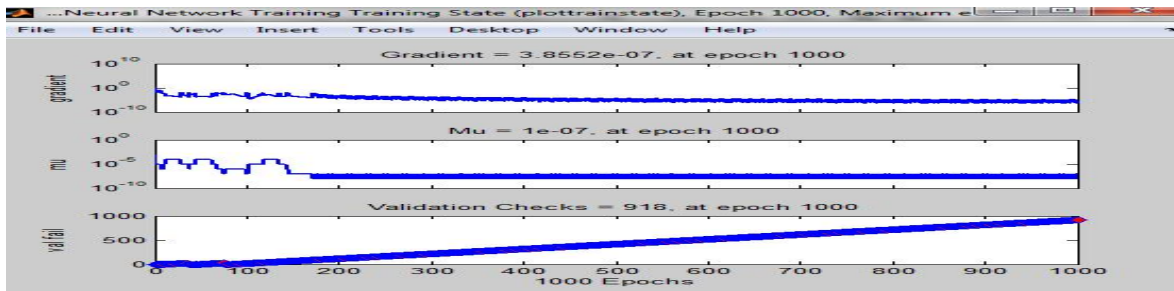
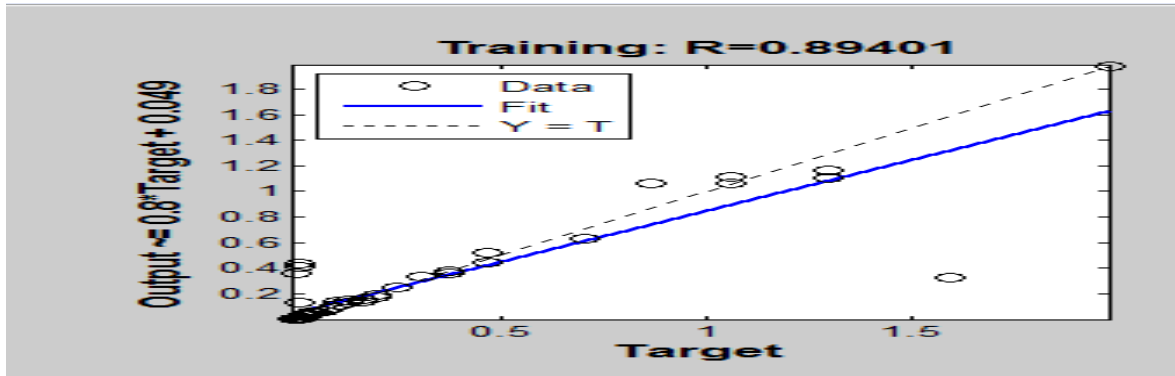
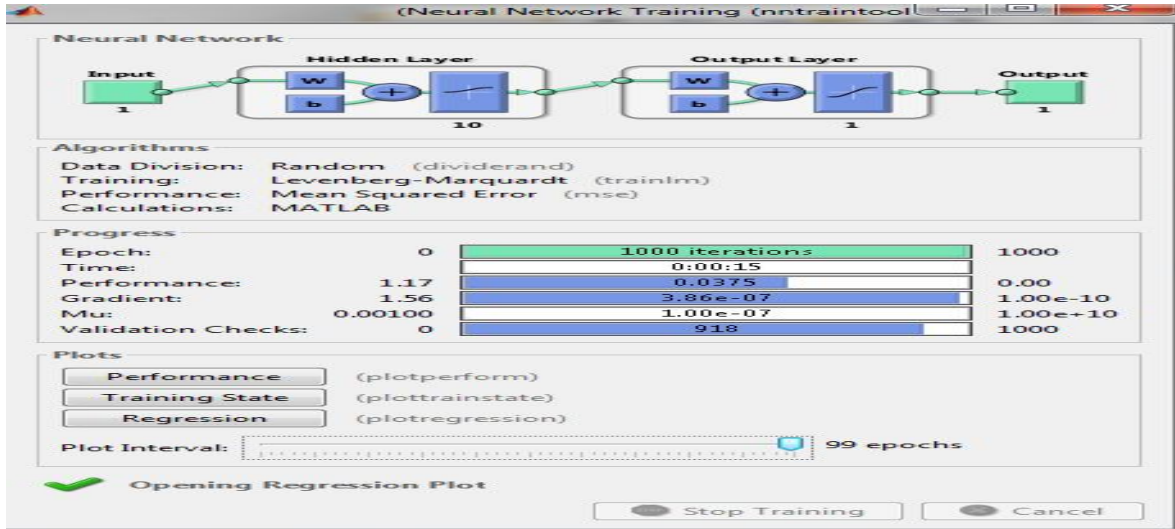
ملحق رقم (5) الاشكال رقم (20-3) أدناه تبين مراحل تدريب شبكة BP قيد البحث و النتائج التجربة الخامسة:



ملحق رقم (6) الاشكال رقم (3-21) أدناه تبين مراحل تدريب شبكة BP قيد البحث و النتائج التجربة السادسة:



ملحق رقم (7) الاشكال رقم (22-3) أدناه تبين مراحل تدريب شبكة BP قيد البحث و النتائج التجربة السابعة :





## ملاحق الفصل الرابع

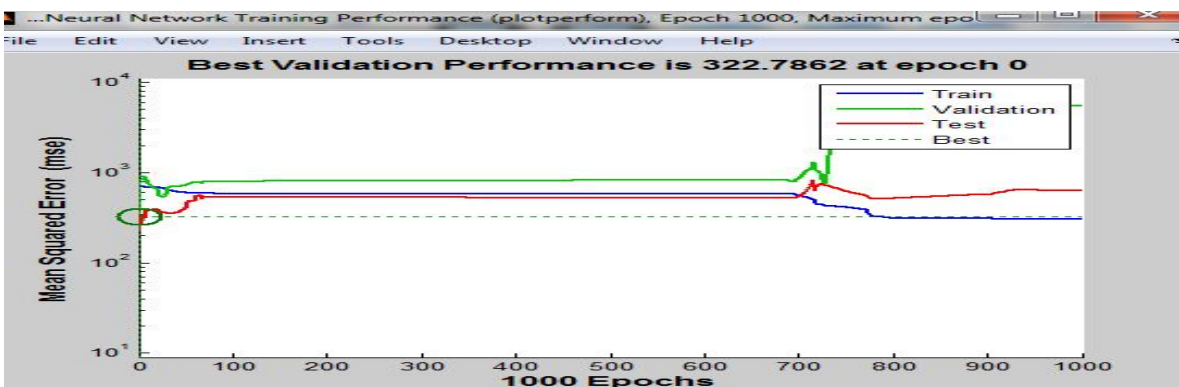
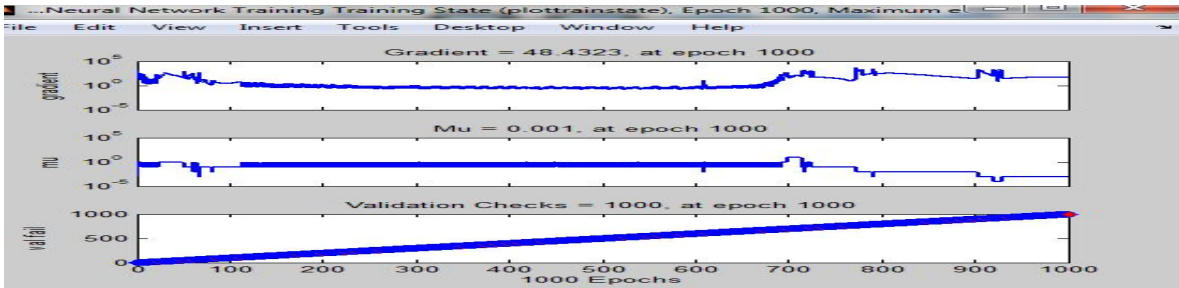
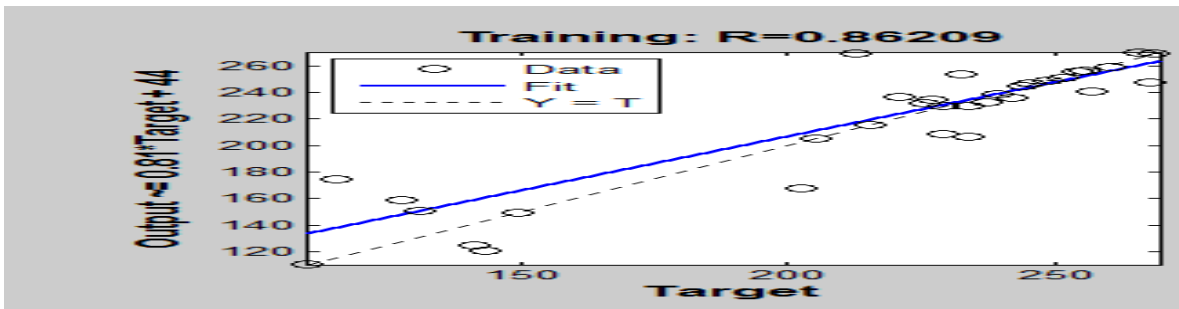
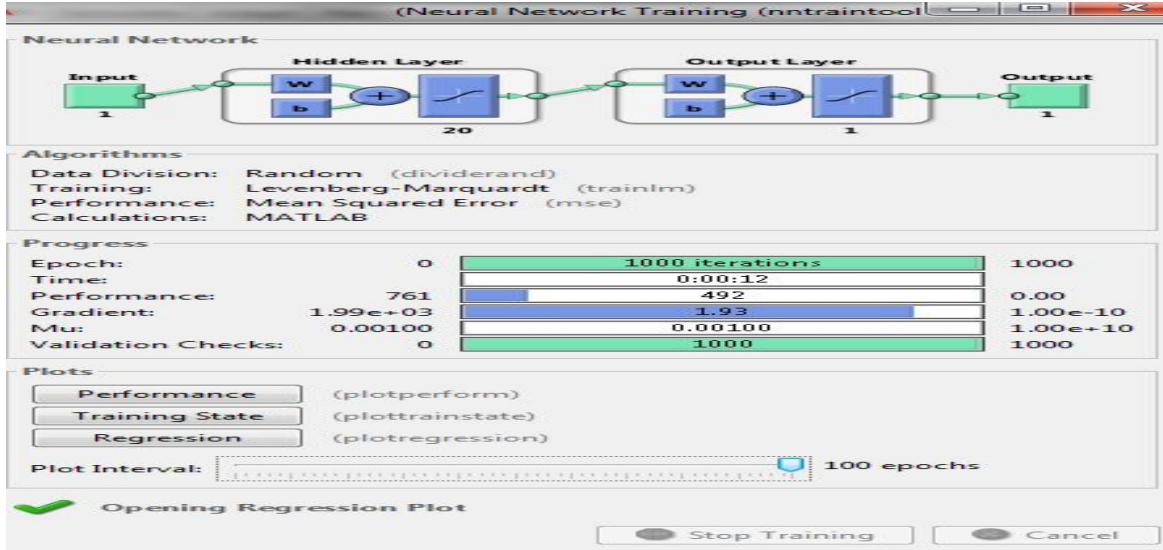
### ملحق رقم (1)

يحتوي قيم البيانات محل الدراسة في الفترة من 1965 وحتى 2015 (51) مشاهدة  
السلسلة الزمنية لبيانات السكان حسب سن الصف الاول اساس وبيانات التلاميذ المقيدون بالصف الاول اساس  
بولاية الخرطوم

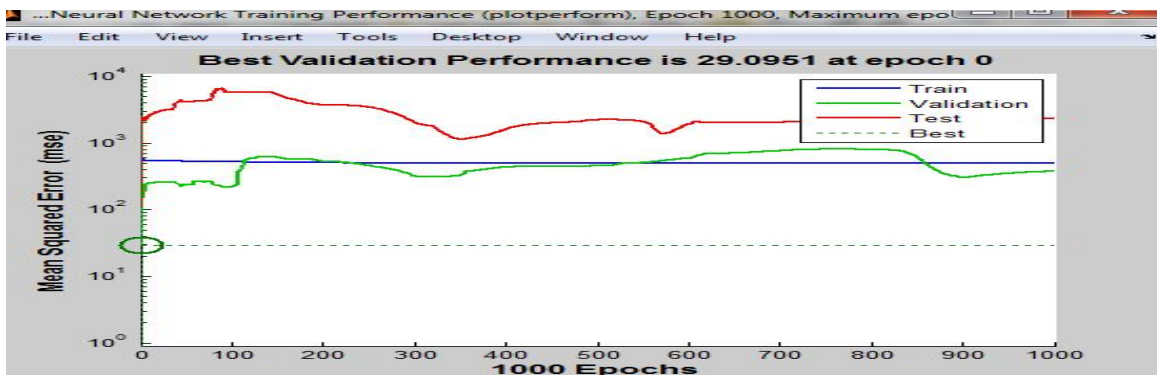
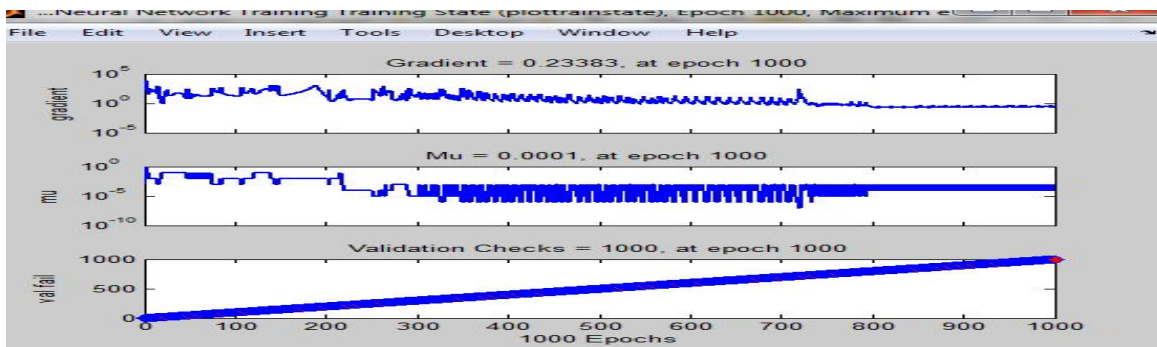
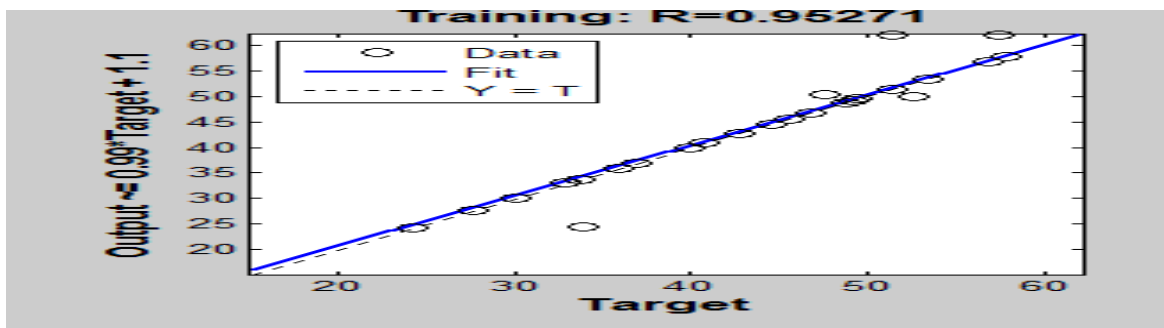
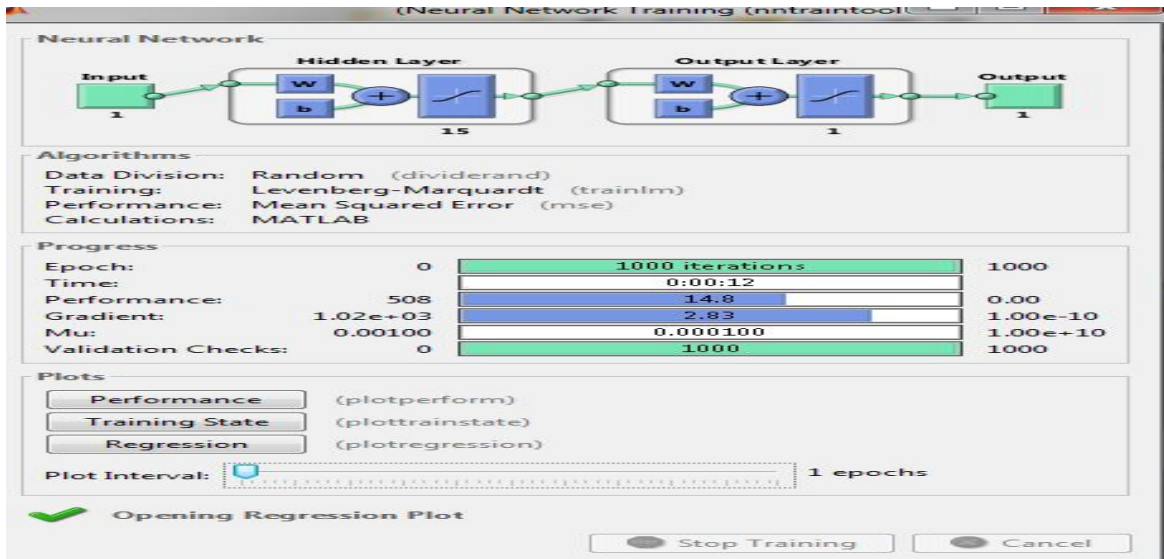
عدد التلاميذ المقيدون بالصف الاول اساس	عدد السكان حسب سن الصف الاول اساس	العام	الرقم	عدد التلاميذ المقيدون بالصف الاول اساس	عدد السكان حسب سن الصف الاول اساس	العام	الرقم
57037	100191	1991	27	13471	42970	1965	1
66230	104000	1992	28	13522	43812	1966	2
71783	107954	1993	29	14447	44709	1967	3
72312	111908	1994	30	18371	45832	1968	4
74530	116007	1995	31	19573	46917	1969	5
75265	120152	1996	32	22021	48251	1970	6
78766	124054	1997	33	23102	49294	1971	7
81732	126321	1998	34	25432	51280	1972	8
82223	128212	1999	35	26913	52936	1973	9
82439	130923	2000	36	27225	54772	1974	10
91777	132700	2001	37	28791	56805	1975	11
93930	134989	2002	38	29443	59042	1976	12
95349	136031	2003	39	29994	61348	1977	13
96118	138541	2004	40	31311	63744	1978	14
97994	138820	2005	41	34711	66384	1979	15
98957	142966	2006	42	30770	68956	1980	16
104357	140849	2007	43	39339	71950	1981	17
118187	138220	2008	44	40368	74760	1982	18
125358	144957	2009	45	43258	77780	1983	19
126202	151238	2010	46	44812	80481	1984	20
128202	157645	2011	47	46222	83275	1985	21
132128	164354	2012	48	45959	86166	1986	22
126372	171194	2013	49	51573	89158	1987	23
129160	177967	2014	50	51929	92254	1988	24
131948	185482	2015	51	53381	95448	1989	25
				56802	98762	1990	26

ملحق رقم (2) ملحق رقم(2)

ملحق رقم (1) الاشكال رقم(6-4) أدناه تبيين مراحل تدريب شبكة BP للسلسلة الأصلية للتلاميذ بعدد عد في الطبقة الخفية يبلغ (10) عقد والنتائج التجربة (1).



ملحق رقم (2) لاشكال رقم(4-7) أذناه تبين مراحل تدريب شبكة BP للسلسلة الأصلية للتلاميذ بعدد عد في الطبقة الخفية يبلغ (15) عقد والنتائج التجربة (2)



ملحق رقم (3) الاشكال رقم(8-4) أدناه تبين مراحل تدريب شبكة BP للسلسلة الأصلية للتلاميذ بعدد عد في الطبقة الخفية يبلغ (20)عقد والنتائج التجربة (3).

