

**Application of Information and Communication Technology with Share Grin 40 Software in the Field of Network Computations by Using Programme Evaluation Review Technique And Critical Path Method.**



**Mathematics**

**KEYWORDS :** CPM, Critical path, Grin 40 Software, network analysis, PERT, Predecessor Activities.

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**ABSTRACT**

*The focal summit of this review is to analyze the concept of plummeting the distance between Thiruvallur district and SCSVMV University using Network Analysis and to provide an empirical support to the central theories of this conceptual frame work. The work accentuates that, an indispensable real life application of network computations are uncomplicated to find by programmed evaluation review technique and critical path method using Grin 40 software. The paper also affirms that studies using social Network Analysis has the tend to focus the reality Network to venture relationship between interacting units or nodes of the network. It also launches the discrepancy involving amid units/nodes. Therefore social Network Analysis can offer a solution to the problem by providing the best. The topic taken in this paper for discussion has the shortest path, minimum cost, minimum time, critical distance, critical cost, critical time and PERT calculations for the path from Thiruvallur District to SCSVMV University, Enathur by using Share Grin 40 Software.*

**Introduction:**

Operations Research is the study of optimization techniques. It is applied decision theory. The existence of optimization techniques can be traced at least to the days of Newton and Lagrange. Rapid development and invention of new techniques occurred since the World War II essentially, because of the necessary to win the war with the limited resources available.

A Project is defined as a combination of interrelated activities all of which must be executed in a certain order to achieve a set goal. A large and complex project involves usually a number of interrelated activities requiring men, machines, and materials. A number of methods applying network scheduling techniques have been developed.Programme Evaluation Review Techniques (PERT) and Critical Path method (CPM) are two of the many network techniques which are widely used for planning, scheduling and controlling large complex projects.

**Application of Network Analysis:**

**Network diagram for maximum possible bus routes from Thiruvallur District to SCSVMV university,Enathur**

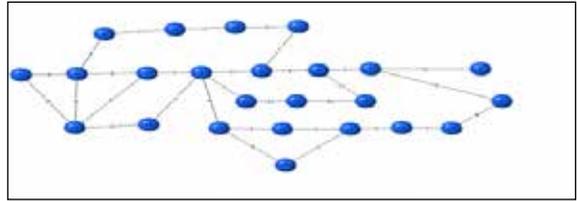
Activity	Description (bus routes)	Distance (in kms)	Amount (in Rs)	Time (in mins)
-	Start from Gummidipoondi	-	-	-
A	Gummidipoondi to Ponneri	18	14	27
B	Ponneri to Utthukkotai	23.7	15	33
C	Utthukkotai to Thiruvalur	23.7	15	32
D	Thiruvallur to Sriperumbudur	28	15	51
E	Sriperumbudur to Sungavarchatram	6.4	05	11
F	Sungavachatram to Kanchipuram	25	15	33
G	Thirumalpur to Kanchipuram	15.4	07	29
H	Ponneri to Madavaram	28.9	15	46
I	Madavaram to Ambattur	16.5	12	23
J	Ambattur to AVADI	9.9	07	20

K	Avadi to Poonamallee	9.6	07	24
L	Poonamallee to Sriperumbudur	25.6	15	40
M	Gummidipoondi to Periyapalayam	22	14	32
N	Periyapalayam to Vengal	8.6	07	14
O	Vengal to Thiruvallur	23.3	15	40
P	Periyapalayam to Utthukkotai	17.8	14	22
Q	Periyapalayam to Ponneri	19.3	14	31
R	Thiruvallur to Pallipattu	70	35	75
S	Pallipattu to R.K.Pet	24.7	15	31
T	R.K.Pet to K.G.Kandigai	8.7	07	11
U	K.G.Kandigai to Thiruttani	11.7	08	18
V	Thiruttani to Arakonam	14.6	07	30
W	AraKonam to Thirumalpur	15.6	07	26
X	Pallipattu to Pothaturpettai	14.9	07	18
Y	Pothaturpettai to K.G. kandigai	14.2	07	26
Z	Thiruvallur to Kadambathur	7.1	07	14
A1	Kadambathur to Perambakkam	9	07	14
B1	Perambakkam to Mappedu	9.9	07	23
NC1	Mappedu to Sungavarchatram	39.3	18	59
D1	Kanchipuram to SCSVMV university	5.1	05	12

**Predecessor Activities(Thiruvallur District To SCSVMV University,Enathur)**

Task	PREDECESSOR	Task	PREDECESSOR	Task	PREDECESSOR
A	-	K	J	U	T,Y
B	A	L	K	V	U
C	B	M	-	W	V
D	C	N	M,Q	X	R
E	D	O	N	Y	X
F	E	P	M,Q	Z	C,0
G	W	Q	M	A1	Z
H	A	R	C,O	B1	A1
I	H	S	R	C1	B1
J	I	T	S	D1	F

Network Diagram For All Possible Bus Routes From Thiruvallur District To SCSVMV University,Enathur



**Calculating Critical And Shortest Path (Distance, Time&Cost)**

S.NO	PATH	DISTANCE(in kms)	TIME( in mins)	COST(in Rs)
1	A-B-C-D-E-F-D1	18+23.7+23.7+28+6.4+25+5.1=129.9	27+33+32+51+11+33+12=199	14+15+15+15+5+15+5=84
2	A-H-I-J-K-L-E-F-D1	18+28.9+16.5+9.9+9.6+25.6+6.4+25+5.1=145	27+46+23+20+24+40+11+33+12=236	14+15+12+7+7+15+5+15+5=95
3	A-Q-P-C-D-E-F-D1	18+19.3+7.8+23.7+28+6.4+25+5.1=133.3	27+31+22+32+51+11+33+12=219	14+14+14+15+15+5+15+5=97
4	A-Q-N-O-R-S-T-U-V-W-G-D1	18+19.3+8.6+23.3+70+24.7+8.7+11.7+14.6+15.6+15.4+5.1=172	27+31+14+40+75+31+11+18+30+26+29+12=344	14+14+7+15+35+15+7+8+13+7+5=147
5	A-Q-N-O-D-E-F-D1	18+19.3+8.6+23.3+28+6.4+25+5.1=133.7	27+31+14+40+51+11+33+12=219	14+14+7+15+15+5+15+5=90
6	A-Q-N-O-Z-A1-D1-C1-F-D1	18+19.3+8.6+23.3+7.1+9+9.9+39.3+25+5.1=164.6	27+31+14+40+14+16+23+59+33+12=269	14+14+7+15+7+7+7+18+15+5=109
7	A-Q-P-C-R-X-Y-U-V-W-G-D1	18+19.3+17.8+23.7+70+14.9+14.2+11.7+14.6+15.6+15.4+5.1=240.3	27+31+22+32+75+18+26+18+30+26+29+12=346	14+14+14+15+35+7+14+8+13+7+7+5=153
8	A-Q-N-O-R-X-Y-U-V-W-G-D1	18+19.3+8.6+23.3+70+14.9+14.2+11.7+14.6+15.6+15.4+5.1=230.7	27+31+14+40+75+18+26+18+30+26+29+12=346	14+14+7+15+35+7+14+8+13+7+7+5=146
9	A-B-C-Z-A1-B1-C1-F-D1	18+23.7+23.7+7.1+9+9.9+39.3+25+5.1=160.8	27+33+32+14+16+23+59+33+12=249	14+15+15+7+7+7+18+15+5=103
10	A-B-C-R-S-T-U-V-W-G-D1	18+23.7+23.7+70+24.7+8.7+11.7+14.6+15.6+15.4+5.1=231.2	27+33+32+75+31+11+18+30+26+29+12=324	14+15+15+35+15+7+8+13+7+5=141
11	A-B-C-R-X-Y-U-V-W-G-D1	18+23.7+23.7+70+14.9+14.2+11.7+14.6+15.6+15.4+5.1=226.9	27+23+32+75+18+26+18+30+26+29+12=326	14+15+15+35+7+14+8+13+7+5=140
12	M-P-C-D-E-F-D1	22+17.8+23.7+28+6.4+25+5.1=128	32+22+32+51+11+33+12=193	14+14+15+15+5+15+5=83
13	M-N-O-R-S-T-U-V-W-G-D1	22+8.6+23.3+70+24.7+8.7+11.7+14.6+15.6+15.4+5.1=219.7	32+14+40+75+31+11+18+30+26+29+12=318	14+7+15+35+15+7+8+13+7+7+5=133
14	M-N-O-D-E-F-D1	22+8.6+23.3+28+6.4+25+5.1=118.4	32+14+40+51+11+33+12=193	14+7+15+15+5+15+5=76
15	M-N-O-R-X-Y-U-V-W-G-D1	22+8.6+23.3+70+14.9+14.2+11.7+14.6+15.6+15.4+5.1=215.4	32+14+40+75+18+26+18+30+26+29+12=320	14+7+15+35+7+14+8+13+7+7+5=132
16	A-Q-P-C-R-S-T-U-V-W-G-D1	18+19.3+17.8+23.7+70+24.7+8.7+11.7+15.6+15.4+5.1=244.6	27+31+22+32+75+31+11+18+30+26+29+12=344	14+14+14+15+35+15+7+8+13+7+7+5=154

**According To The Distance The Critical Path Is** - A-Q-P-C-R-S-T-U-V-W-G-D1=244.6Kms

**ACCORDING TO THE TIME THE CRITICAL PATH IS** - A-Q-P-C-R-X-Y-U-V-W-G, A-Q-N-O-R-X-Y-U-V-W-G-D1=346mins

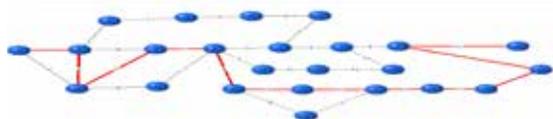
**ACCORDING TO THE COST THE CRITICAL PATH IS** - A-Q-P-C-R-S-T-U-V-W-G-D1=Rs.152

**ACCORDING TO THE DISTANCE THE SHORTEST PATH IS** -M-N-O-D-E-F-D1=118.4Kms

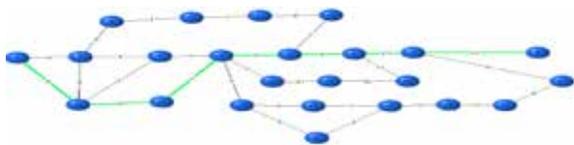
**ACCORDING TO THE TIME THE MINIMUM TIME IS** - M-N-O-D-E-F-D1=193mins

**ACCORDING TO THE COST THE MINIMUM COST IS** - M-N-O-D-E-F-D1=Rs.76

Network Diagram For Critical Path

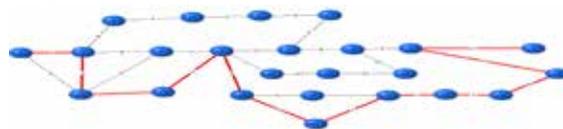


Network Diagram For Shortest Path ,Minimum Time,Minimum Cost



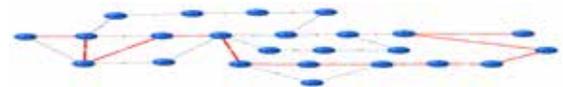
Task	PREDECESSOR	Task	PREDECESSOR	Task	PREDECESSOR
A	-	K	J	U	T,Y
B	A	L	K	V	U
C	B	M	-	W	V
D	C	N	M,Q	X	R
E	D	O	N	Y	X
F	E	P	M,Q	Z	C,0
G	W	Q	M	A1	Z
H	A	R	C,O	B1	A1
I	H	S	R	C1	B1
J	I	T	S	D1	F

**Network Diagram For Structured Approach(Critical-Duration)**



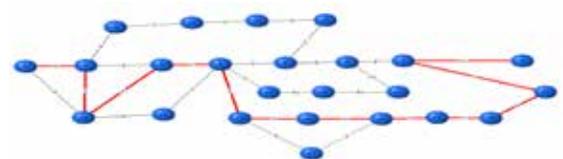
- Critical events : 1,2,13,14,4,15,21,17,18,19,20,7,8
- Critical activities: 1-2,2-13,13-14,14-4,4-15,15-21,21-17,17-18,18-19,19-20,20-7,7-8
- Critical path : A-Q-N-O-R-X-Y-U-V-W-G-D1

**Network Diagram For Critical Distance**



- Critical events : 1,2,13,3,4,15,16,17,18,19,20,7,8
- Critical activities: 1-2,2-13,13-3,3-4,4-15,15-16,16-17,17-18,18-19,19-20,20-7,7-8
- Critical path : A-Q-P-C-R-S-T-U-V-W-G-D1

**Network Diagram For Structured Approach(Critical-Cost)**



- Critical events : 1,2,13,3,4,15,16,17,18,19,20,7,8
- Critical activities: 1-2,2-13,13-3,3-4,4-15,15-16,16-17,17-18,18-19,19-20,20-7,7-8
- Critical path : A-Q-P-C-R-S-T-U-V-W-G-D

**Calculating The Floates Associated With Each Activity**

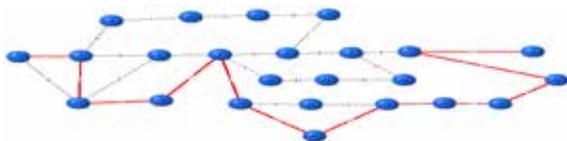
ACTIVITY	DURATION (tij)(in mins)	EARLIEST TIME		LATEST TIME		FLOATES		
		START (Ei)	FINISH (Ei+tij)	START (Lj-tij)	FINISH (Lj)	TOTAL (Lj-tij)-Ei	FREE (Ej-Ei)-tij	INDEPENDENT (Ej-Li)-tij
1-2	27	0	27	0	27	0	0	0
1-13	32	0	32	26	58	26	26	26
2-3	33	27	60	47	80	20	20	20
2-13	31	27	58	27	58	0	0	0
2-9	46	27	73	137	183	110	0	0
3-4	32	80	112	80	112	0	0	0
4-5	51	112	163	239	290	127	17	17
4-22	14	112	126	189	203	77	0	0
4-15	75	112	187	112	187	0	0	0
5-6	11	180	191	290	301	110	0	-110
6-7	33	191	224	301	334	110	110	0
7-8	12	334	346	334	346	0	0	0
9-10	23	73	96	183	206	110	0	-110
10-11	20	96	116	206	226	110	0	-110
11-12	24	116	140	226	250	110	0	-110
12-5	40	140	180	250	290	110	0	-110
13-3	22	58	80	58	80	0	0	0
13-14	14	58	72	58	72	0	0	0
14-4	40	72	112	72	112	0	0	0
15-16	31	187	218	189	220	2	0	0
15-21	18	187	205	187	205	0	0	0

16-17	11	218	229	220	231	2	2	0
17-18	18	231	249	231	249	0	0	0
18-19	30	249	279	249	279	0	0	0
19-20	26	279	305	279	305	0	0	0
20-7	29	305	334	305	334	0	0	0
21-17	26	205	231	205	231	0	0	0
22-23	16	126	142	203	219	77	0	-77
23-24	23	142	165	219	242	77	10	-67
24-6	59	175	234	242	301	67	-43	-110

**Program Evaluation And Review Technique (Pert)**

Activity	t <sub>o</sub>	t <sub>m</sub>	t <sub>p</sub>
1-2	25	27	29
1-13	30	32	36
2-3	31	33	40
2-13	29	31	33
2-9	44	46	58
3-4	30	32	36
4-5	49	51	58
4-22	12	14	19
4-15	73	75	77
5-6	09	11	23
6-7	31	33	48
7-8	10	12	14
9-10	21	23	38
10-11	18	20	34
11-12	22	24	39
12-5	38	40	48
13-3	20	22	39
13-14	12	14	16
14-4	38	40	42
15-16	29	31	38
15-21	16	18	20
16-17	09	11	33
17-18	16	18	20
18-19	28	30	32
19-20	24	26	38
20-7	27	29	31
21-17	24	26	28
22-23	14	16	28
23-24	21	23	36
24-6	57	59	65

**Network Diagram For Project Duration**



CRITICAL PATH :1-2-13-14-4-15-21-17-18-19-20-7-8  
 EXPECTED PROJECT DURATION t<sub>c</sub> =346 mins

**PERT Calculations**

ACTIVITY	t <sub>o</sub>	t <sub>m</sub>	t <sub>p</sub>	$\frac{t_o+t_m+4t_p}{6}$	VARIANCE $(\frac{t_p-t_o}{6})^2$	S.D $(\frac{t_p-t_o}{6})$	CRITICAL ACTIVITIES
1-2	25	27	29	27	0.4356	0.66	1-2
1-13	30	32	36	32.33	1	1	
2-3	31	33	40	33.83	2.25	1.5	
2-13	29	31	33	31	0.4356	0.66	2-13
2-9	44	46	58	47.66	5.4289	2.33	

3-4	30	32	36	32.33	1	1	
4-5	49	51	58	51.83	2.25	1.5	
4-22	12	14	19	14.83	1.3456	1.16	
4-15	73	75	77	75	0.4356	0.66	4-15
5-6	09	11	23	12.66	5.4289	2.33	
6-7	31	33	48	35.16	8.0089	2.83	
7-8	10	12	14	12	0.4356	0.66	7-8
9-10	21	23	38	25.16	8.0089	2.83	
10-11	18	20	34	22	7.0756	2.66	
11-12	22	24	39	26.16	8.0089	2.83	
12-5	38	40	48	41	2.7556	1.66	
13-3	20	22	39	24.5	9.9856	3.16	
13-14	12	14	16	14	0.4356	0.66	13-14
14-4	38	40	42	40	0.4356	0.66	14-4
15-16	29	31	38	31.83	2.25	1.5	
15-21	16	18	20	18	0.4356	0.66	15-21
16-17	09	11	33	14.33	0.4356	4	
17-18	16	18	20	18	0.4356	0.66	17-8
18-19	28	30	32	30	0.4356	0.66	18-19
19-20	24	26	38	27.66	5.4289	2.33	
20-7	27	29	31	29	0.4356	0.66	20-7
21-17	24	26	28	26	0.4356	0.66	21-17
22-23	14	16	28	17.66	5.4289	2.33	
23-24	21	23	36	24.83	6.25	2.5	
24-6	57	59	65	59.66	1.7689	1.33	

**The Results Of The Cpm/Pert Analysis**

- Distance Of Critical Path =A-Q-P-C-R-S-T-U-V-W-G-D1 =-244.6 Kms
- Duration Of Critical Path=A-Q-P-C-R-X-Y-U-V-W-G-D1=346mins
- Cost Of Critical Path = A-Q-P-C-R-S-T-U-V-W-G-D1 =Rs 154
- Distance Of Shortest Path = M-N-O-D-E-F-D1=118.4kms
- Duration Of Shortest Path =M-N-O-D-E-F-D1 =193 Mins
- Cost Of Shortest Path = M-N-O-N-D-E-F-D =Rs 76



**Conclusio**

While applying the PERT/CPM technique and utilizing essential tool in Information and communication Technology as Share Grin 40 software, a practical method of application Network Analysis has been highlighted. Using the Network diagram, the precedence and inter-relation of domestic prerequisite such as bus routes are stumble on. In this regard, the shortest path, minimum time, minimum cost, critical time, critical cost, critical path and PERT calculation for the path from Thiruvallur district to SCSVMV University, Enathur has been found.

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