

PROJECT SCHEDULING USING MICROSOFT PROJECT AND PROPOSED ANT COLONY OPTIMIZATION TECHNIQUE USING MATLAB

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Abstract – In our country, we are still facing issues such as time and cost overruns which has led to large delays in construction projects in turn has effected the common people. According to the Ministry of Statistics and Programme Implementation as many as nearly 245 Central Sector Infrastructure Projects out of the 1315 projects have shown time overrun and nearly 350 of them have shown cost escalation. There are cases where the projects have shown both time and cost overrun and the number goes up to 98 to be exact. Managing the time, Cost and quality in a construction project has become a tough challenge for a project manager in our country. In our project, we are representing a clear difference between Microsoft Project and Ant Colony optimization which makes it cost effective and in turn helps to reduce the duration of work to be done. Nearly 85% of construction companies still use the traditional MS Excel to schedule their activities and duration and among all of them many felt the need to adopt Modern Software.

Key Words: Construction management, Ant colony, Construction project, Matlab. Microsoft Project

1. INTRODUCTION

During any construction process, keeping the cost within the limits is the most difficult task for a manager and others involved in the process. There are various tools which record the financial transactions as well as providing the update of all the progress and problems related to the project. There are various problems in the field of resource utilization, monitoring and control of the project. The main focus should be to identify the deviations from the project plan. Major cost savings can be achieved during planning and the design of the project. During the construction, changes are likely to delay as well as increase the cost of the project.

On the other hand, Time control keeps the project on time, within budget and on track. The estimate of the duration of the activities is based on the resources available. The estimate should be realistic. There are certain delays and accelerations during the course of project which cancel out each other for example: there will be certain activities which will be done before estimated time, certain activities will take longer than the estimated time and some activities might finish exactly as estimated.

2. LITERATURE SURVEY

A proper construction plan is the backbone of any construction project. Proper management is required for proper allocation and balance between cost time and

resources. Scheduling enables the resource utilization, monitoring and control of the project. Time control keeps the project on time, within budget and on track. The estimate of the duration of the activities is based on the resources available. The estimate should be realistic. There are certain delays and the accelerations during the course of project. These are research review on application of project management tools in building construction project.

Prof P.M Wale and N.G Jain (2015)

They concluded that the construction of a building using MS EXCEL is proven to be an uneconomical and is more time consuming. Microsoft project is a precised and modern technique for construction management and planning. It also helps for the optimum organization of the tasks and duration which helps to give the vision to the complete the project in planned duration and within the Economy

El-Alfy and Ryosuke et al. (2010)

stated that the correct approach and a database of available systems with classification of compilation of each system with the different sustainability factors are proposed to be used during system's selection process, and also the need to update database on a regular basis with new and improved systems and materials.

Shruti Singh and Sahil Pandey (2018)

Stated that using the efficient software such as Microsoft project the work can be done prior to what has been expected from traditional planning methods. Hence software is required for proper planning of cost duration and resources.

KB VIGNESHWARAN (2017)

States that proper scheduling of tasks can result in cost efficiency of project and hence makes the project completed well on time and within the expense limits. Some factors affecting the cost and time are local social problems, Environmental conditions lack of resources and local festivals. Thus if they are managed properly work can be perfectly on estimated time.

Monish Kumar K and Sparsha B.P (2017)

Using microsoft project as a project management tool is a efficient way to manage and schedule a project this enables organisation and resources of the project can be efficiently used as the task resources planned. Cost of the project is

accurately obtained using the softwares. Labour management can also be carried out using MSP.

Mr Umesh Kamble and prof. Shashank U. Vanakudari (2015)

States that any construction project can be successfully scheduled using tools. Scheduling mainly depend on time and cost constraints and the resource allocation. They also told that cost ioverruns can be precisely handled if managed properly, it creates a huge difference in construction project considering material and labour management.

3. METHODOLOGY

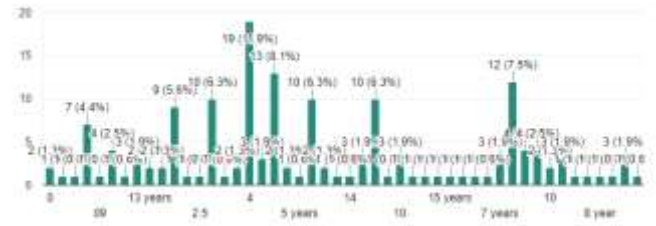
The aim of the study is to ensure that the construction projects do not face cost and time overruns. For that, we have conducted a survey to know the opinions of the people involved.



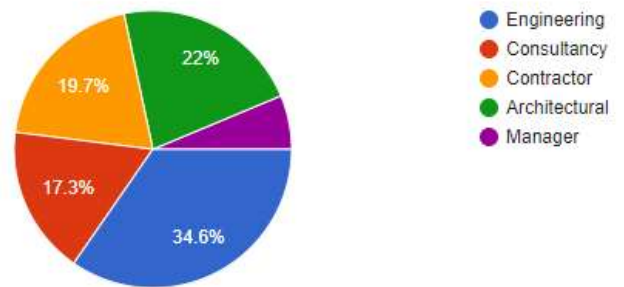
3.1 SURVEY REGARDING PROJECT MANAGEMENT

This survey is done to identify the notion of contractors, engineers and other people related to construction projects management issues and techniques used by them.

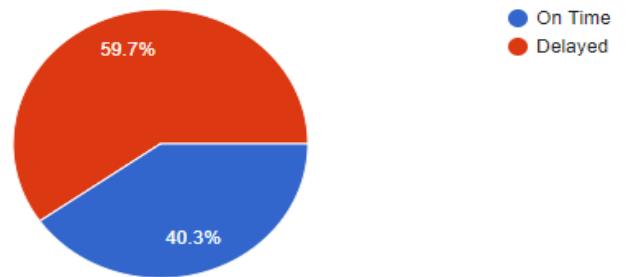
EXPERIENCE IN YEARS



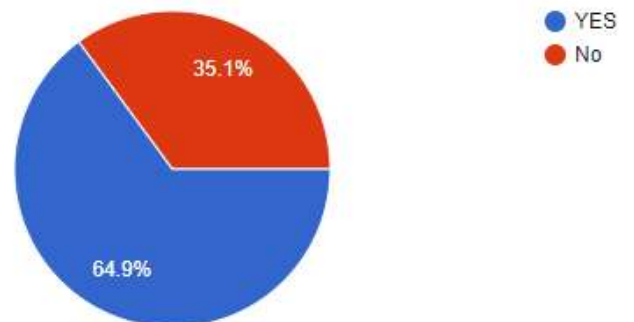
Kind of Work you are into?



Are your previous projects completed:



Are You facing problems related to cost and time balancing?

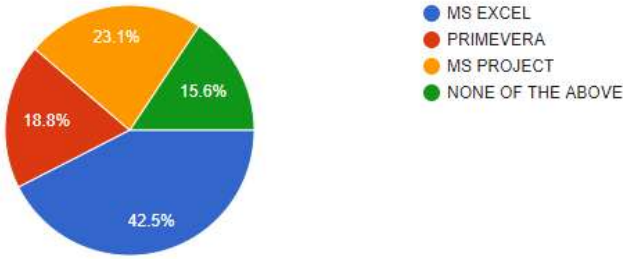


Which software do you use to carry out Construction Management for your projects ?

1-2-4-5=240.190974

1-3-4-5=320.660084

1-4-5=182.586667



RESULT OF THE SURVEY

- The common outcome of the survey was that almost all of them are using traditional methods, with only few of them having excess to Microsoft project.
- Many of them are frustrated over lagged and unorganised progress of their projects.

3.2 ANT COLONY OPTIMISATION

This algorithm is based on the behaviour of real ants i.e how they find the shortest path between the food source and their nest. While moving towards the food source, they deposit a substance on the ground called pheromone. Ants smell the pheromone while moving towards the food source and choose the path with higher pheromone concentration to determine the shortest path. We have applied this technique in MATLAB to generate a solution.

Algorithm:

Step 1: Find the total number of paths using Depth First Search

Step 2 – Initialise a pheromone table

Step 3 – Initialise the first ant to initial node of the possible path

Step 4 – Find the probability of choosing next node for each single path

Step 5 – Calculate the amount of pheromone deposited on each node

Step 6 – Analyze that if a better solution is obtained than the previous one and perform a global update on the solution

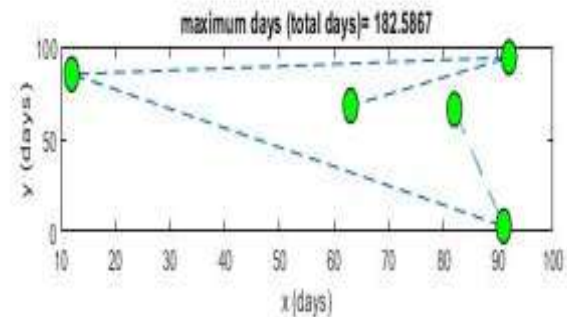
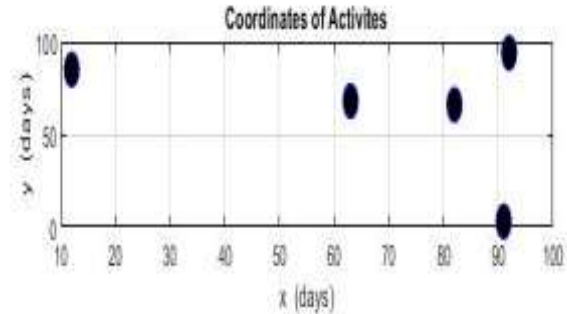
Step 7 - repeat steps 3 to 6.

enter the no of iteration 100

enter the number of ants 100

1-2-3-4-5=339.283348

1-3-4-5=185.009472



3.3 MICROSOFT PROJECT

In our project, we are representing a clear difference between Microsoft Project and Ant Colony optimization which makes it cost effective and in turn helps to reduce the duration of work to be done. Nearly 85% of construction companies still use the traditional MS Excel to schedule their activities and duration and among all of them many felt the need to adopt Modern Softwares.

Sometimes project might get off track due to some unavoidable reasons owing to this it is very essential to manage the work schedule in effective and precised manner . Microsoft Project arranges critical activities (Task Functions) in appropriate manner

Task	Task Name	Duration	Start	Finish	Early Start	Early Finish	Late Start	Late Finish	Predecessors	
1	~ Civil Works	123 days	Mon 05-21-18	Mon 23-04-19	Mon 05-21-18	Mon 23-04-19	Mon 05-21-18	Fri 04-06-19		
2	Excavation	27 days	Mon 05-14-18	Tue 11-12-18	Mon 05-14-18	Tue 11-12-18	Mon 05-14-18	Tue 11-12-18		
3	PC	17 days	Mon 05-14-18	Wed 15-12-18	Mon 05-14-18	Wed 15-12-18	Wed 15-12-18	Fri 14-06-19		
4	Steels Foundation	13 days	Wed 14-11-18	Fri 10-11-18	Wed 14-11-18	Fri 10-11-18	Wed 14-11-18	Fri 10-11-18	239-7 days	
5	RC in Foundation	8 days	Fri 23-11-18	Fri 30-11-18	Fri 23-11-18	Fri 30-11-18	Fri 23-11-18	Fri 30-11-18	405-7 days	
6	RC in Column Sinks plate	8 days	Tue 04-12-18	Fri 14-12-18	Tue 04-12-18	Fri 14-12-18	Tue 04-12-18	Fri 14-12-18	338-7 days	
7	RC in Pile Beam	10 days	Wed 05-12-18	Tue 19-12-18	Wed 05-12-18	Tue 19-12-18	Wed 05-12-18	Fri 14-06-19		
8	Back Filling	10 days	Fri 28-12-18	Thu 27-12-18	Fri 28-12-18	Thu 27-12-18	Mon 27-02-19	Fri 14-06-19		
9	27702 Grade Slab	5 days	Fri 07-12-18	Tue 18-12-18	Fri 07-12-18	Tue 18-12-18	Wed 05-06-19	Fri 14-06-19		
10	GF Column Casting (not included)	7 days	Mon 18-12-18	Tue 18-12-18	Mon 18-12-18	Tue 18-12-18	Tue 06-06-19	Fri 14-06-19		
11	GF Lintel Beam with column	10 days	Mon 18-12-18	Fri 21-12-18	Mon 18-12-18	Fri 21-12-18	Mon 03-06-19	Fri 14-06-19		
12	GF Slab shuttering & reinforcement	13 days	Mon 17-12-18	Wed 02-01-19	Mon 17-12-18	Wed 02-01-19	Mon 17-12-18	Wed 02-01-19		
13	GF Slab Casting	3 days	Thu 01-01-19	Fri 04-01-19	Thu 01-01-19	Fri 04-01-19	Thu 03-01-19	Fri 04-01-19	11	
14	FF Column Casting (not included)	11 days	Fri 04-01-19	Fri 18-01-19	Fri 04-01-19	Fri 18-01-19	Fri 11-01-19	Fri 14-06-19		
15	FF Lintel Beam with column	10 days	Tue 18-01-19	Mon 21-01-19	Tue 18-01-19	Mon 21-01-19	Mon 03-06-19	Fri 14-06-19		
16	FF Slab shuttering & reinforcement	14 days	Mon 14-01-19	Thu 11-01-19	Mon 14-01-19	Thu 11-01-19	Thu 11-01-19	Thu 05-01-19		
17	FF Slab Casting	3 days	Fri 01-02-19	Mon 04-02-19	Fri 01-02-19	Mon 04-02-19	Fri 04-02-19	Mon 07-02-19	18	
18	GF Column Casting (not included)	11 days	Tue 05-02-19	Tue 19-02-19	Tue 05-02-19	Tue 19-02-19	Fri 11-02-19	Fri 14-06-19		
19	GF Lintel Beam with column	10 days	Tue 19-02-19	Mon 04-03-19	Tue 19-02-19	Mon 04-03-19	Mon 03-06-19	Fri 14-06-19		
20	GF Slab shuttering & rebar	14 days	Mon 25-02-19	Thu 14-03-19	Mon 25-02-19	Thu 14-03-19	Mon 01-04-19	Thu 15-04-19		
21	GF Slab Casting	3 days	Fri 15-03-19	Mon 18-03-19	Fri 15-03-19	Mon 18-03-19	Fri 19-04-19	Mon 22-04-19	28	
22	FF Column Casting (not included)	11 days	Wed 28-03-19	Wed 09-04-19	Wed 28-03-19	Wed 09-04-19	Fri 11-05-19	Fri 14-06-19		
23	FF Lintel Beam with column	10 days	Wed 27-03-19	Tue 09-04-19	Wed 27-03-19	Tue 09-04-19	Wed 27-03-19	Tue 09-04-19		
24	GF Brick Work	12 days	Wed 14-01-19	Thu 10-01-19	Wed 14-01-19	Thu 10-01-19	Wed 15-01-19	Thu 11-01-19	195-7 days	
25	FF Brick Work	12 days	Thu 04-02-19	Fri 01-03-19	Thu 04-02-19	Fri 01-03-19	Mon 28-01-19	Tue 12-02-19	175-7 days	
26	GF Brick Work	14 days	Thu 14-01-19	Tue 05-02-19	Thu 14-01-19	Tue 05-02-19	Thu 17-01-19	Tue 05-02-19	175-7 days	
27	FF Brick Work	14 days	Thu 04-02-19	Tue 05-03-19	Thu 04-02-19	Tue 05-03-19	Tue 12-02-19	Fri 01-03-19	175-7 days	
28	GF Plaster	15 days	Fri 01-03-19	Thu 11-03-19	Thu 01-03-19	Thu 11-03-19	Thu 07-03-19	Wed 27-03-19	495-7 days	
29	FF Plaster	15 days	Wed 27-03-19	Tue 19-04-19	Wed 27-03-19	Tue 19-04-19	Fri 09-03-19	Thu 28-03-19	45	
30	GF Plaster	17 days	Wed 03-04-19	Thu 25-04-19	Wed 03-04-19	Thu 25-04-19	Wed 08-03-19	Thu 28-03-19	495-7 days	
31	FF Plaster	17 days	Mon 11-03-19	Tue 02-04-19	Mon 11-03-19	Tue 02-04-19	Thu 07-03-19	Fri 29-03-19	275-7 days	
32	GF Water Proofing	31 days	Mon 11-03-19	Mon 21-04-19	Mon 11-03-19	Mon 21-04-19	Mon 11-03-19	Mon 21-04-19	275-7 days	
33	FF Flooring	16 days	Mon 25-03-19	Mon 21-04-19	Mon 25-03-19	Mon 15-04-19	Mon 11-04-19	Mon 21-04-19	395-7 days	
34	FF Flooring	16 days	Thu 18-04-19	Thu 09-05-19	Thu 18-04-19	Thu 09-05-19	Mon 11-04-19	Mon 21-04-19	395-7 days	
35	GF Flooring	16 days	Mon 25-04-19	Mon 20-05-19	Mon 25-04-19	Mon 20-05-19	Mon 11-04-19	Mon 21-04-19	395-7 days	
36	FF Flooring	16 days	Wed 03-04-19	Wed 24-04-19	Wed 03-04-19	Wed 24-04-19	Mon 11-04-19	Mon 21-04-19	31	
37	GF False ceiling	16 days	Tue 26-03-19	Tue 19-04-19	Tue 26-03-19	Tue 19-04-19	Mon 11-04-19	Mon 21-04-19	395-7 days	
38	GF False ceiling	16 days	Tue 26-03-19	Tue 19-04-19	Tue 26-03-19	Tue 19-04-19	Mon 11-04-19	Mon 21-04-19	395-7 days	
39	GF False ceiling	16 days	Tue 26-03-19	Tue 19-04-19	Tue 26-03-19	Tue 19-04-19	Mon 11-04-19	Mon 21-04-19	395-7 days	
40	GF False ceiling	16 days	Tue 26-03-19	Tue 19-04-19	Tue 26-03-19	Tue 19-04-19	Mon 11-04-19	Mon 21-04-19	395-7 days	
41	Map out the Rooms with floor	10-17 days	Fri 28-03-19	Mon 22-04-19	Fri 28-03-19	Mon 22-04-19	Thu 25-03-19	Fri 14-06-19		
42	~ Electrical Works	16 days	Fri 01-02-19	Thu 25-04-19	Fri 01-02-19	Thu 25-04-19	Wed 06-02-19	Thu 25-04-19		
43	LF supply & Commissioning	15 days	Fri 12-04-19	Thu 25-04-19	Fri 12-04-19	Thu 25-04-19	Fri 12-04-19	Thu 25-04-19	235-7 days	
44	GF Electrical Works	17 days	Fri 01-02-19	Mon 25-02-19	Fri 01-02-19	Mon 25-02-19	Thu 07-02-19	Fri 01-02-19	24	
45	FF Electrical Works	17 days	Mon 04-03-19	Tue 26-03-19	Mon 04-03-19	Tue 26-03-19	Wed 13-02-19	Thu 07-03-19	25	
46	GF Electrical Works	17 days	Wed 06-03-19	Thu 28-03-19	Wed 06-03-19	Thu 28-03-19	Wed 06-03-19	Thu 28-03-19	25	
47	~ AC Works	14 days	Fri 01-02-19	Wed 28-02-19	Fri 01-02-19	Wed 28-02-19	Fri 01-02-19	Wed 28-02-19		
48	GF A C Works	14 days	Fri 01-02-19	Wed 28-02-19	Fri 01-02-19	Wed 28-02-19	Fri 01-02-19	Wed 28-02-19	24	
49	GF A C Works	14 days	Fri 01-02-19	Wed 28-02-19	Fri 01-02-19	Wed 28-02-19	Fri 01-02-19	Wed 28-02-19	24	
50	GF A C Works	14 days	Fri 01-02-19	Wed 28-02-19	Fri 01-02-19	Wed 28-02-19	Fri 01-02-19	Wed 28-02-19	24	
51	~ Others Works	14 days	Fri 05-04-19	Fri 14-06-19	Fri 05-04-19	Fri 14-06-19	Tue 21-04-19	Fri 14-06-19		
52	Furniture Supply	24 days	Mon 22-04-19	Thu 23-05-19	Mon 22-04-19	Thu 23-05-19	Thu 23-05-19	Tue 14-06-19	Fri 14-06-19	
53	Lift System	30 days	Fri 12-04-19	Thu 23-05-19	Fri 12-04-19	Thu 23-05-19	Mon 06-05-19	Fri 14-06-19		
54	Lift System	30 days	Fri 12-04-19	Thu 23-05-19	Fri 12-04-19	Thu 23-05-19	Mon 06-05-19	Fri 14-06-19		
55	Other Misc. Works	30 days	Fri 12-04-19	Wed 05-06-19	Fri 12-04-19	Wed 05-06-19	Tue 23-04-19	Fri 14-06-19		
56	Handy Over	30 days	Mon 28-05-19	Fri 14-06-19	Mon 28-05-19	Fri 14-06-19	Mon 28-05-19	Fri 14-06-19		

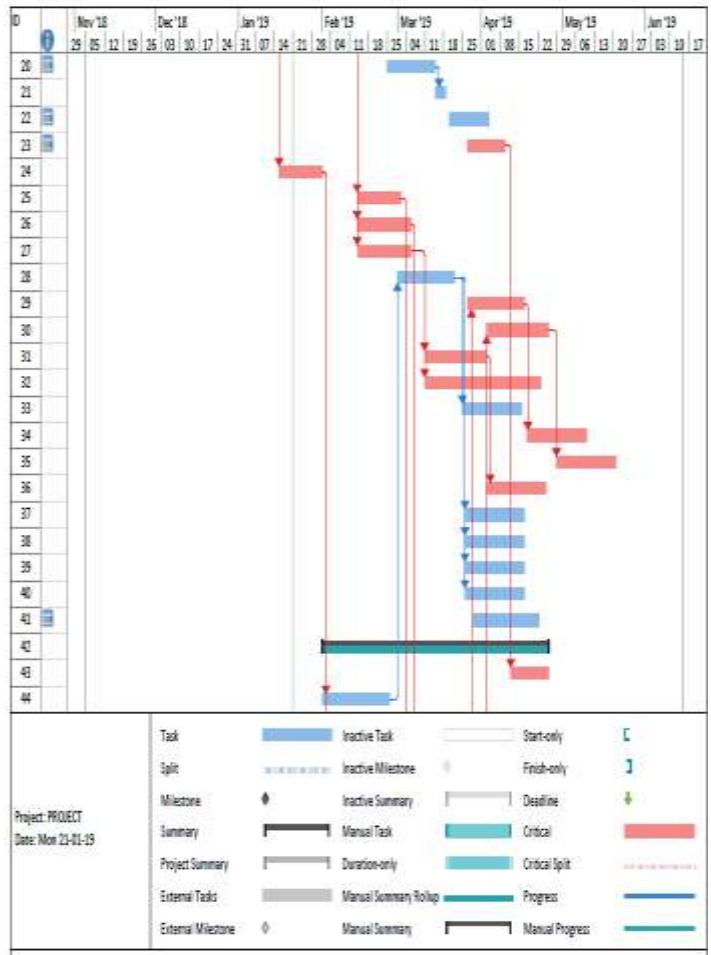
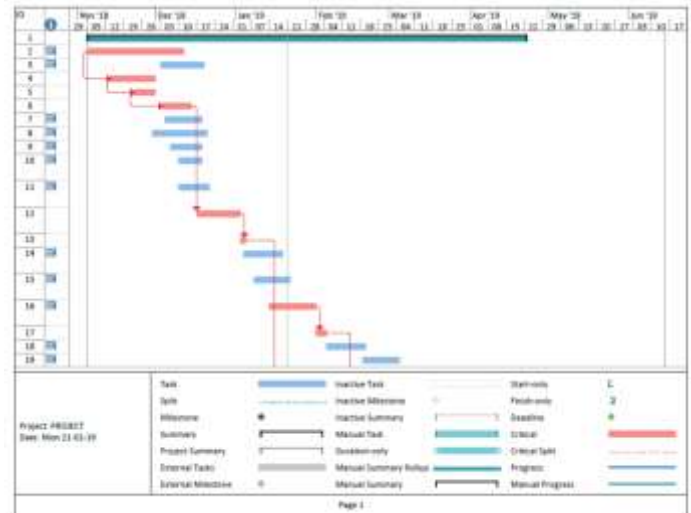
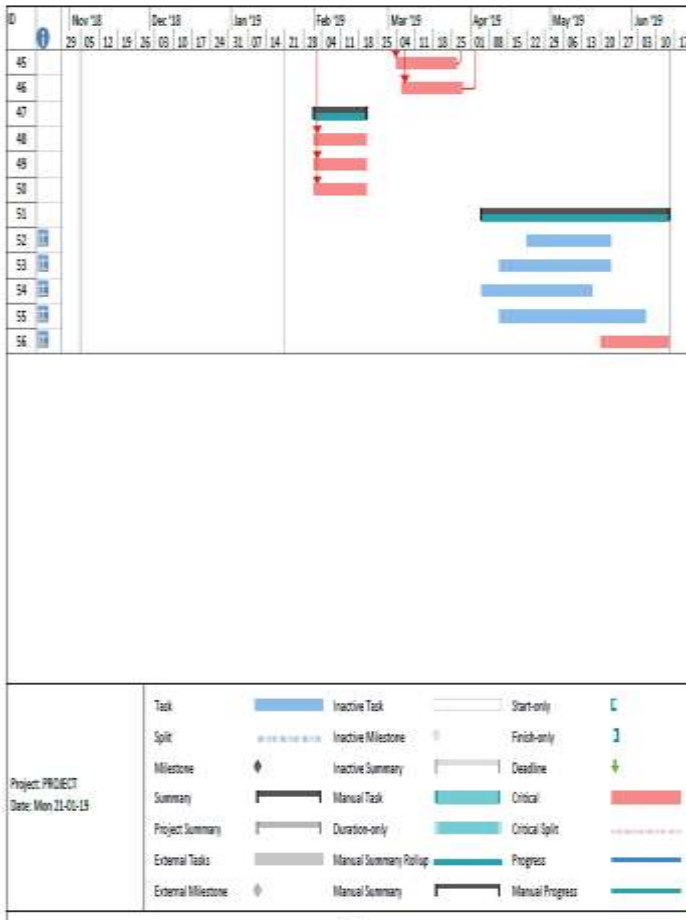


Fig -1: Activities and Durations of the project



4. CONCLUSION

If one is using optimised and modernized methods it sequesters a manager from all others who are using traditional methods using ant colony optimization we propose that scheduling can be more precised and efficient if the algorithm is used. Modern techniques enables us to manage activities and duration and tasks are completed well on time

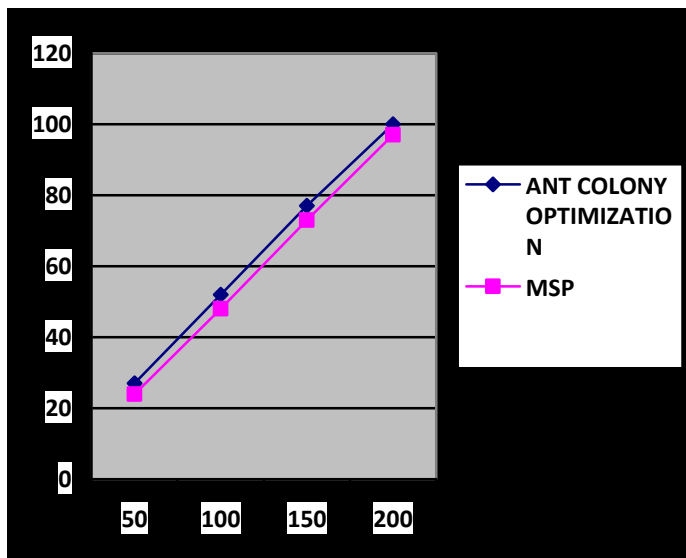
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RESULTS



Ant colony optimization technique was found out to be more efficient and worthy technique as it completes the work as early as possible considering all the labour material and cost overruns issues

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