**I.E. 2001 OPERATIONS RESEARCH**

(*Homework Assignment 11: Due* ***Tuesday April 21, 2020***)

**Question 1:**

Consider the following set of activities. Construct the project network for the same. Identify the critical activities by inspection without actually using the critical path method (Hint - think longest path…).

| Activity | Time (days) | Immediate Predecessors |
|---|---|---|
| A | 12 | -- |
| B | 12 | A |
| C | 4 | A |
| D | 3 | A |
| E | 5 | B,C |
| F | 10 | B,C |
| G | 18 | C |
| H | 5 | C |
| I | 3 | C,D |
| J | 9 | H,I |
| K | 4 | E,F,G |
| L | 9 | C |
| M | 6 | J,K,L |

**Question 2**

Consider the project network we constructed in class (*Designer Genes* in your class notes). Using the Critical Path Method, find out which activities are critical, the minimum project duration and the available total float on all non-critical activities.

**Question 3**

A company is in the process of replacing its entire computer system since the present one is inadequate. It plans to upgrade all of its existing software to work with the new system, as well as to develop new applications that can take advantage of the new system. The steps involved in the project are listed in the table below along with the precedence constraints - all times are best estimates. Use CPM to come up with the minimum value of the expected projected duration. Also list which activities are critical and the total float time available for noncritical activities.

| Activity | Description | Time (weeks) | Immediate Predecessors |
|---|---|---|---|
| A | Wait for delivery from manufacturer | 8 | -- |
| B | Install computer | 2 | A |
| C | General test of new computer | 2 | B |
| D | Complete evaluation of work-force requirements | 2 | -- |
| E | Hire additional programmers & operators | 2 | D |
| F | Design modifications to existing applications | 3 | -- |
| G | Program modifications to existing applications | 4 | F |
| H | Test modified applications on new computer | 2 | C,G |
| I | Revise existing applications as required | 2 | P,H |
| J | Revise and update documentation for modified applications | 2 | I |
| K | Run existing applications in parallel on new and old computer | 2 | I |
| L | Implement modified applications on new computer | 1 | K |
| M | Design new applications | 8 | -- |
| N | Design interfaces between existing and new applications | 3 | F |
| O | Program new applications | 6 | E,M,N |
| P | Test new applications on new computer | 2 | O |
| Q | Revise new applications as required | 3 | P,H |
| R | Conduct second test of new applications on new computer | 2 | Q |
| S | Prepare documentation of the new applications | 3 | R |
| T | Implement new applications on the new computer | 2 | J,S |
| U | Demonstrate to CEO of company | 1 | L,T |