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**Unit: Introduction of Software Engineering**

**Unit Code: ISEN100**

**WORKSHEET 1: PLANNING**

*A music festival to be held in the Cayman Islands. Consider the following needs: marketing, transport (planes/ships, buses/taxis), accommodation, catering (meals and drinks), signing up bands to play, hiring staff, stage setup (including seating, light and sound), first-aid, insurance, and anything else that comes to mind!*

1. **Work Breakdown**
2. Accommodation
   1. Finding Land
   2. Renting Land
3. Artist
   1. Find artist
   2. Make contracts
4. Hiring staff
   1. Emergency Services
   2. Volunteers
5. Marketing
   1. Tickets
   2. Adverts & Social media
6. Stage setup
   1. Equipment requirement analysis
   2. Order the equipment
   3. Setting the equipment
7. Transport: Planes/ ships/ buses/ taxis
8. Catering
   1. Delivery
   2. Food services
9. COVID screening
10. Rehearsal
11. **Estimation**
12. Accommodation
    1. Finding Land (5W)
    2. Renting Land (2W)
13. Artist
    1. Find artist (10W)
    2. Make contracts (3W)
14. Hiring staff
    1. Emergency services (4W)
    2. Volunteers (3W)
15. Marketing
    1. Tickets (2W)
    2. Adverts & Social media (6W)
16. Stage setup
    1. Equipment requirement analysis (3W)
    2. Order the equipment (5W)
    3. Setting the equipment (5W)
17. Transport : Planes/ ships/ buses/ taxis (8W)
18. Catering
    1. Delivery (4W)
    2. Food services (4W)
19. COVID screening (2W)
20. Rehearsal (1W)
21. **Prerequisite Activities**

|  |  |  |
| --- | --- | --- |
| **Activity** | **Dependencies** | **Duration** |
| 1.1 | - | 5 |
| 1.2 | 1.1 | 2 |
| 2.1 | 1.2 | 10 |
| 2.2 | 2.1 | 3 |
| 3.1 | 1.2 | 4 |
| 3.2 | 1.2 | 3 |
| 4.1 | 2.2 | 2 |
| 4.2 | 2.2 | 6 |
| 5.1 | 3.1 & 3.2 | 3 |
| 5.2 | 5.1 | 5 |
| 5.3 | 5.2 | 5 |
| 6 | 5.3 | 8 |
| 7.1 | 6 | 4 |
| 7.2 | 6 | 4 |
| 8 | 4.1 & 4.2 | 2 |
| 9 | 7 & 8 | 1 |

**Activity-on-Arc (AOA) Graph With Timing**

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1. **Critical Path and Slack time**
2. *Find the earliest start (ES) and earliest finish (EF) times for each activity. Start with the activities that don’t depend on anything, and work forwards until you get to the final activities. This should also give you the estimated project duration (i.e. take the maximum of all the EF times).*

Because the activity 1.1 does not depend on anything, its Early Start time equal 0 and EF = ES + DURATION. Additionally, when we move forward we take the

maximum of all the EF times. Therefore, we have the table below:

|  |  |  |  |
| --- | --- | --- | --- |
| **Activity** | **Duration** | **ES** | **EF** |
| 1.1 | 5 | 0 | 0 + 5 = 5 |
| 1.2 | 2 | 5 | 5 + 2 = 7 |
| 2.1 | 10 | 7 | 7 + 10 = 17 |
| 2.2 | 3 | 17 | 17 + 3 = 20 |
| 3.1 | 4 | 7 | 7 + 4 = 11 |
| 3.2 | 3 | 7 | 7 + 3 = 10 |
| 4.1 | 2 | 20 | 20 + 2 = 22 |
| 4.2 | 6 | 20 | 20 + 6 = 26 |
| 5.1 | 3 | 11 | 11 + 3 = 14 |
| 5.2 | 5 | 14 | 14 + 5 = 19 |
| 5.3 | 5 | 17 | 17 + 5 = 22 |
| 6 | 8 | 22 | 22 + 8 = 30 |
| 7.1 | 4 | 30 | 30 + 4 = 34 |
| 7.2 | 4 | 30 | 30 + 4 = 34 |
| 8 | 2 | 26 | 26 + 2 = 28 |
| 9 | 1 | 34 | 34 + 1 = 35 |

*(c) Find the latest start (LS) and latest finish (LF) times for each activity. This is similar to part (a), except you work backwards. Start with activities at the end of the project (i.e. that nothing else depends on). These will have an LS equal to the project duration.*

Because the Latest Finish of the activity 9 = Earliest Finish of the activity 9

and LS = LF – DURATION. Additionally, when we move forward we take the

minimum of all the LS times. Therefore, we have the table below:

|  |  |  |  |
| --- | --- | --- | --- |
| **Activity** | **Duration** | **LF** | **LS** |
| 9 | 1 | 35 | 35 – 1 = 34 |
| 8 | 2 | 34 | 34 – 2 = 32 |
| 7.2 | 4 | 34 | 34 – 4 = 30 |
| 7.1 | 4 | 34 | 34 – 4 = 30 |
| 6 | 8 | 30 | 30 – 8 = 22 |
| 5.3 | 5 | 22 | 22 – 5 = 17 |
| 5.2 | 5 | 17 | 17 – 3 = 14 |
| 5.1 | 3 | 14 | 14 – 3 = 11 |
| 4.2 | 6 | 32 | 32 – 6 = 26 |
| 4.1 | 2 | 32 | 32 – 2 = 30 |
| 3.2 | 3 | 11 | 11 – 4 = 7 |
| 3.1 | 4 | 11 | 11 – 3 =8 |
| 2.2 | 3 | 22 | 22 – 3 =19 |
| 2.1 | 10 | 19 | 19 – 10 = 9 |
| 1.2 | 2 | 7 | 7 – 2 = 5 |
| 1.1 | 5 | 5 | 5 – 5 = 0 ( equal to theproject duration) |

*(b) Identify any activities that appear to be on the critical path, and determine how much slack time all the non-critical activities have.*

**Slash Time** = LF – EF = LS - ES

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Activity** | **Duration** | **ES** | **EF** | **LF** | **LS** | **Slash Time** |
| 1.1 | 5 | 0 | 5 | 5 | 0 | 5 – 5 = 0 |
| 1.2 | 2 | 5 | 7 | 7 | 5 | 7 – 7 = 0 |
| 2.1 | 10 | 7 | 17 | 19 | 9 | 19 – 17 = 2 |
| 2.2 | 3 | 17 | 20 | 22 | 19 | 22 – 20 = 2 |
| 3.1 | 4 | 7 | 11 | 11 | 7 | 11 – 11 = 0 |
| 3.2 | 3 | 7 | 10 | 11 | 8 | 11 – 10 = 1 |
| 4.1 | 2 | 20 | 22 | 32 | 30 | 32 – 22 = 10 |
| 4.2 | 6 | 20 | 26 | 32 | 26 | 32 – 26 = 6 |
| 5.1 | 3 | 11 | 14 | 14 | 11 | 14 – 14 = 0 |
| 5.2 | 5 | 14 | 17 | 17 | 14 | 17 – 17 = 0 |
| 5.3 | 5 | 17 | 22 | 22 | 17 | 22 – 22 = 0 |
| 6 | 8 | 22 | 30 | 30 | 22 | 30 – 30 = 0 |
| 7.1 | 4 | 30 | 34 | 34 | 30 | 34 – 34 = 0 |
| 7.2 | 4 | 30 | 34 | 34 | 30 | 34 – 34 = 0 |
| 8 | 2 | 26 | 28 | 34 | 32 | 34 – 28 = 6 |
| 9 | 1 | 34 | 35 | 35 | 34 | 35 – 35 = 0 |