Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

V SEMESTER B. TECH (CIVIL) END SEMESTER EXAMINATIONS
NOVEMBER 2022
SUBJECT: CONSTRUCTION MANAGEMENT [CIE 3153]

Date of Exam: Time of Exam: Max. Marks: **50**

Instructions to Candidates:

- Answer ALL the questions & missing data may be suitably assumed

1A	Following are the relationships between different activities making up a project. Draw a neat network for the interrelationships mentioned and number the events using Fulkerson's rule. 1. A B and C are concurrent activities. 2. Activity I succeeds B. 3. A is the immediate predecessor of activity D 4. E and F are concurrent activities which can commence only after the completion of activities B, C and D. 5. Starting of activity G depends on the completion of activities A and E. 6. Activity H can start only after the completion of activity F. 7. Activity J is the last activity, which follows G, H and I.	**5**	CO1
1B	Define scheduling. Explain the roles and responsibilities of the owner during different stages of construction.	**5**	CO1
2A	For the activity table below, i) identify the critical path and project duration using a tabular approach. ii) calculate the expected completion time of the project with 82 % probability	**5**	CO2

Activity	t_o	t_m	t_p
1-2	3	6	15
1-6	2	5	14
2-3	6	12	30
2-4	2	5	8
3-5	5	11	17
4-5	3	6	15
6-7	3	9	27
5-8	1	4	7
7-8	4	19	28

<table>
<tr><td>2B</td><td>Discuss with a neat sketch the failure rate behavior of the equipment with respect to the lifespan. Describe how preventive maintenance helps in extending the life span.</td><td>5</td><td>CO5</td></tr>
<tr><td>3A</td><td>For the activity relationships shown in the following table find the optimum duration and minimum cost for each stage of crashing. (Crash up to 3 stages). Take indirect cost as Rs. 100/week and all costs in below table are in rupees)
<table>
<tr><th>Activity</th><th>tn (Weeks)</th><th>tc (Weeks)</th><th>Cn (Rupees)</th><th>Cc (Rupees)</th></tr>
<tr><td>10-20</td><td>3</td><td>2</td><td>200</td><td>300</td></tr>
<tr><td>10-30</td><td>7</td><td>6</td><td>500</td><td>900</td></tr>
<tr><td>20-30</td><td>6</td><td>4</td><td>330</td><td>420</td></tr>
<tr><td>20-40</td><td>5</td><td>4</td><td>200</td><td>280</td></tr>
<tr><td>30-50</td><td>9</td><td>6</td><td>720</td><td>900</td></tr>
<tr><td>40-60</td><td>11</td><td>10</td><td>820</td><td>900</td></tr>
<tr><td>50-60</td><td>6</td><td>5</td><td>830</td><td>900</td></tr>
</table></td><td>5</td><td>CO4</td></tr>
<tr><td>3B</td><td>Draw the network for the activities pertaining to small construction activities. Identify the longest path in the network using the tabular approach. Compute free float and independent floats for non-critical activities
<table>
<tr><th>Activity</th><th>Predecessor</th><th>Duration</th></tr>
<tr><td>A</td><td>-</td><td>14</td></tr>
<tr><td>B</td><td>-</td><td>6</td></tr>
<tr><td>C</td><td>A</td><td>12</td></tr>
<tr><td>D</td><td>B</td><td>6</td></tr>
<tr><td>E</td><td>D, F</td><td>6</td></tr>
<tr><td>F</td><td>B</td><td>4</td></tr>
<tr><td>G</td><td>C</td><td>6</td></tr>
<tr><td>H</td><td>E, G</td><td>4</td></tr>
</table></td><td>5</td><td>CO3</td></tr>
<tr><td>4A</td><td>Justify why construction projects prefer the CPM technique. Illustrate how activity times are estimated in CPM. Discuss the significance of total float, free float, and independent float in CPM.</td><td>5</td><td>CO3</td></tr>
<tr><td>4B</td><td>Discuss with a neat sketch the various components of a wheel mounted back hoe</td><td>5</td><td>CO5</td></tr>
<tr><td>5A</td><td>Describe the operation cycle of a scraper. Compare any two scrapers based on their operation.</td><td>5</td><td>CO5</td></tr>
<tr><td>5B</td><td>Book value of a construction equipment after a useful life of 5 years is estimated to be 160000. With an estimated salvage value of 10% of principal cost, determine the ownership cost of the equipment following straight line method of depreciation. Equipment has a crankcase capacity of 40 litres with an oil change at 80hour interval. Calculate the quantity of the lubricating oil required for the equipment with the rated horse power of 150 HP and power factor 0.7. It is operated for 1200 hours in an year.</td><td>5</td><td>CO5</td></tr>
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