



**VIT**

Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)

**SCHOOL OF MECHANICAL ENGINEERING**

**CONTINUOUS ASSESSMENT TEST – II - WINTER SEMESTER 2019-2020**

Programme Name & Branch: B. Tech. Mechanical Engineering

Course Code: MEE1014

Course Name: Industrial Engineering and Management

Faculty Name(s): Dr. T. Sampath Kumar

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Class Number(s): VL2019205002556 Exam Duration: 90 mins Maximum Marks: 50

General instruction(s): Answer all the questions

Sl. No	Question	CO	Marks																											
1.	<p>An electrical equipment manufacturing company manufactures AC Motors, DC Motors and Transformers. During the month of December, the production of these items in Rupee terms has been, respectively, Rs.140 million, Rs.250 million and Rs.90 million. The inputs of human resources, capital, materials and power have been as given in the table below:</p> <table><tr><th></th><th></th><th colspan="3">Product</th></tr><tr><th></th><th></th><th>AC Motors</th><th>DC Motors</th><th>Transformers</th></tr><tr><td rowspan="4">Input Rs. Million</td><td>Human</td><td>14</td><td>23</td><td>12</td></tr><tr><td>Capital</td><td>28</td><td>81</td><td>14</td></tr><tr><td>Materials</td><td>72</td><td>108</td><td>24</td></tr><tr><td>Power</td><td>9</td><td>20</td><td>10</td></tr></table> <p>What are the partial productivities of each of the inputs? What are the total productivities of each of the three products? What is the Total Factor Productivity of the company?</p>			Product					AC Motors	DC Motors	Transformers	Input Rs. Million	Human	14	23	12	Capital	28	81	14	Materials	72	108	24	Power	9	20	10	3	10
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2.	<p>During an experiment 27 observations were made using stop clock. Check whether the numbers of observations are sufficient for <math>\pm 5</math> percent accuracy with 90 percent confidence level. Find the minimum number of observation required.</p> <table><tr><td>Time x (in min)</td><td>0.06</td><td>0.07</td><td>0.04</td><td>0.03</td><td>0.02</td><td>0.05</td></tr><tr><td>Frequency</td><td>4</td><td>5</td><td>3</td><td>2</td><td>8</td><td>5</td></tr></table>	Time x (in min)	0.06	0.07	0.04	0.03	0.02	0.05	Frequency	4	5	3	2	8	5	4	10													
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Frequency	4	5	3	2	8	5																								
3.	<p>An industrial job involves six elements with the following observed times and performance ratings.</p>	4	10																											



Elements	Observed time (min)	Performance rating (%)
1	0.32	85
2	0.11	95
3	0.62	90
4	0.14	100
5	0.22	95
6	1.10	80

Calculate normal time for each element and standard time per piece. Assume rest and personal allowances as 9% and contingency allowance as 2% of the basic time.

4. Apply **ALDEP** algorithm to design a suitable layout:

5

20

Assume:

1 grid = 5 m<sup>2</sup>

sweep width = 3

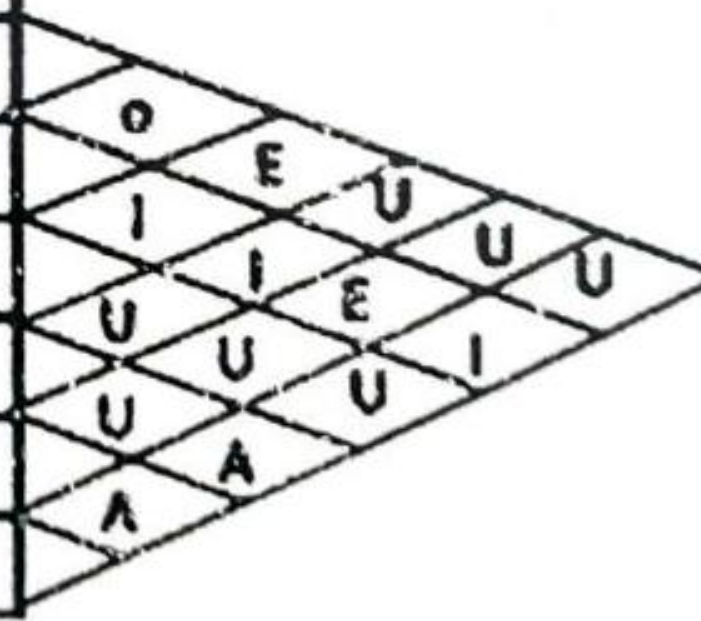
Total area = 240 m<sup>2</sup>

Minimum department preference (MDP) value = 4

Number of iterations to be performed = 1

Considered department '3' as first department in the layout.

Dept. No.	Department	Area in m <sup>2</sup>	No. of Grids
1	Office	70	14
2	Foreman	20	4
3	Conference room	30	6
4	Receiving	40	8
5	Parts Shipment	30	6
6	General Storage	50	10



Assume :

Notation	Value
A	64
E	16
I	4
O	1
U	0
X	-1024