VIT
Vellore Institute of Technology

School of Mechanical Engineering
CAT- II, Fall Semester 2019-20
B. Tech (Common to all branches)

Course Name: Industrial Engineering and Management
Course Code : MEE1014
Slot : D1+TD1
Faculty Name: Dr. Soumen Pal

Duration: 90 min.
Max. Marks: 50
Class No: VL2019201001655

Answer all Questions
Normal Distribution Table Permitted

1) Using the following information, determine the sample size needed if the standard time estimate is to be within 5 percent of the true mean 95 percent of the time.

Work Element	*Standard Deviation (mins)*	*Mean Observed Time (mins)*
1	*0.60*	*2.40*
2	*0.20*	*1.50*
3	*1.10*	*3.85*
4	*0.85*	*2.55*
5	*0.40*	*1.60*
6	*0.50*	*2.50*

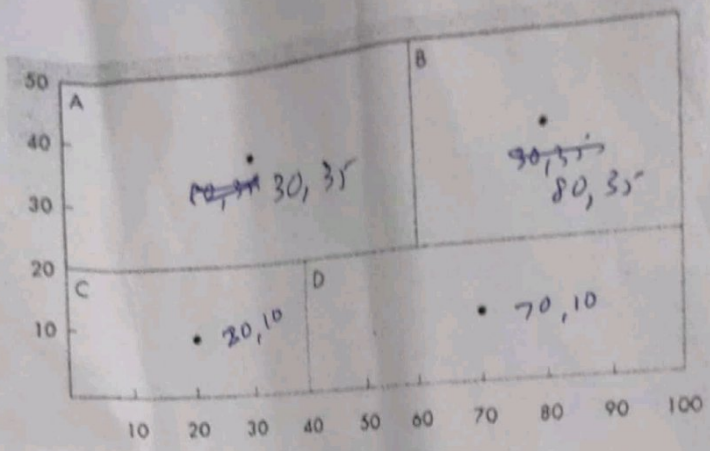
Further, using the above information, calculate the sample size needed if the standard time estimate is to be within 5 percent of the true mean 99 percent of the time. Calculate the percentage increase in sample size for the higher precision. [10]

Course Outcome = 4

2) It is needed that you have to visit a bank to withdraw money from the ATM (adjacent to bank) and make one demand draft (DD) of Rs 5000/- which is the registration charges for attending one important workshop at IIT Bombay. After making the DD you have to courier it to IIT Bombay.
Starting from your residence list all the activities needed to complete the above tasks and again you have to return back to your residence. Develop a suitable flow process chart to demonstrate the above activities. [10]

Course Outcome = 4

3) A local manufacturing firm has recently completed construction of a new wing of an existing building to house four departments: A, B, C and D. The wing is 100 feet by 50 feet. The initial layout and flow matrix is given in below. Improve the initial layout using CRAFT algorithm. Assume Unit cost matrix of transportation. (one iteration is sufficient).



Initial Layout

From / To	A	B	C	D
A	-	2	7	4
B	3	-	5	5
C	6	7	-	3
D	8	2	3	-

Flow matrix

[20]
Course Outcome = 5

4) As a class project you have been asked to project the proportion of time a professor spends on various activities. You have decided to use the work-sampling method. Your initial observations are shown.

Activity Observed	Number of Times Observed
Grading	4
Administrative paperwork	6
Preparing for class	5
Teaching class	5
Meeting with student(s)	8
On the phone	2
Working on research	6
Unavailable	4
Total	**40**

You are instructed that your estimates are to be within 5 percent of the true value with 97 percent confidence ($z = 2.17$). Based on your initial observations, how many total observations are needed to estimate the proportion of time the professor spends on grading, preparing for class, teaching class, working on research, unavailable and on the phone? What is the number of observations needed to complete the work sampling study?

[10]
Course Outcome = 4

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