MANIPAL INSTITUTE OF TECHNOLOGY

## MANIPAL (A constituent unit of MAHE, Manipal)

## V SEMESTER B. TECH (MECHANICAL AND INDUSTRIAL AND PRODUCTION ENGINEERING) END SEMESTER EXAMINATIONS, NOVEMBER 2019

## SUBJECT: WORK SYSTEMS ENGINEERING [MME 4038] REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

## Instructions to Candidates:

- Answer ALL the questions.
- Missing data may be suitably assumed.
- 1A. Define Method study. List the objectives of Method study. (02)
  1B. What is Rating factor? Explain any two rating methods. (03)
- 1C. Define the Basic work content. Explain the management techniques for reducing Excess work content and Ineffective time. (05)
- 2A. Explain the Cumulative and Differential methods of timing the elements in Time study. (02)
- 2B. List the principles of motion economy with regard to design of tools and equipment and arrangement of the workplace. (03)
- **2C.** The following observations were made in a Method study on an operator in charge of two identical machines X and Y:

Description of events	Time (min)
Cleaning and checking a finished job.	2
Preparing a job for machining.	4
Stopping and unloading a machine.	3
Loading and starting a machine.	5
Automatic processing by a machine.	22

Draw a Man-machine chart for the best sequence. Find the percent utilization for each resource. What will be the cost per piece if operator costs Rs 60/- per hour and each machine costs Rs 80/- per hour respectively? (0)

(05)

- **3A.** Explain the effects of noise and vibration with regard to working environment on productivity.
- **3B.** With a neat sketch explain the Outline process chart. (04)
- **3C.** Eight observations taken for an element in a Time study are as follows. Find out whether the number of observations are sufficient considering 95% confidence level and  $\pm 5\%$  accuracy.

T	ime in decimal min.	
	8	
	8	
	8	
	7	
	7	
	8	
	7	
	8	

- 4A. Explain the Questioning technique employed in the critical examination phase of Method study.
  4B. Define Work study. Explain the steps involved in performing Work study.
  4C. Distinguish between Flow diagram and String diagram.
  5A. Explain Multiple machine work and Interference allowance.
- **5B.** Define Work sampling. Explain the procedure for Work sampling. **(03)**
- **5C.** Calculate the standard time from the data given below with regard to a restricted work and represent the various components in a Pump diagram.

Elements	Average observed time	Rating (%)
	(in decimal units)	
Element A (outside work)	160	70
Element B (outside work)	90	130
Element C (inside work)	120	80

Machine controlled time = 550 decimal units.

P.N.A = 15 %, F.A. = 5 %

(1 min = 100 decimal units)

(05)

(02)

(04)