

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), November 2016
B. Tech/ M. Tech (as applicable) in Mechanical Engineering, Semester V

Roll No.....

ME 506: Industrial Engineering & Operation Research

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

- Q.1A Objective type multiple choice questions (10 questions @ 1 mark) 10
- i. Percent idle time for men or machines is found by- a) work sampling, b) time study c) method study d) work study
 - ii. Define Performance Rating.
 - iii. Basic motion time study gives times for basic motions in ten thousand of a) second b) minute c) hour d) day
 - iv. What is a Pneumatic Conveyor?
 - v. Process layout is employed for- a) batch production b) continuous type of product c) effective utilization of machines d) all of the above
 - vi. Work study is concerned with: a) motivation of workers b) improving production capability c) improving production planning and control d) improving present method and finding standard time
 - vii. Material handling in automobile industry is done by- a) overhead crane b) trolley c) belt conveyor d) all of them e) none of them
 - viii. In micro motion study, therblig is described by- a) symbol b) an event c) an activity d) standard symbols and color e) micro motions
 - ix. The standard time of a job is- a) total work content b) basic time + relaxation time c) total work content + delay contingency allowance d) total work content
 - x. Job evaluation is the method of determining the - a) the relative worth of job b) skills required by a worker c) contribution of a worker d) contribution of a job
- Q.2 Short answer type questions (4 questions @ 2.5 marks) 10
- i. What do you understand by a Qualified Worker?
 - ii. What are the Factors that directly affects the selection of Material Handling Equipment?
 - iii. Define Industrial Engineering and write the scope of Industrial Engineering.
 - iv. Define Performance Rating.
- Q.3A A research laboratory has two melts A and B of Copper, Nickel and Zinc alloy to make up a new alloy. The composition of metal is as follows: 05

Melt	Composition (Parts)		
	Copper	Nickel	Zinc
A	3	2	1
B	2	2	1

To make up a new alloy, at least 15 kg of Copper, 10 kg of Nickel and 6 kg of Zinc is needed. Melt A costs Rs 45 per kg and melt B costs Rs. 50 per kg.

Formulate the quantities to be used to minimize the cost

Q.3B What are the objectives and procedure for method analysis? 05

Q.4 A dairy firm has three firms located throughout a state. Daily milk production at each plant is as follows: 05+05

Plant 1- 3 million liters; Plant 2- 12 million liters; Plant 3- 8 million liters;

Each day the firm must fulfil the needs of its four distribution centers. Minimum requirement at each center is as follows:

Distribution center 1- 7 million liters; Distribution center 2- 5 million liters;

Distribution center 3- 9 million liters; Distribution center 4- 2 million liters;

Cost of shipping one million liter of the milk from each plant to each distribution center is given in the following table in hundreds of rupees.

Plants	Distribution Centers				
		1	2	3	4
1		2	3	11	7
2		12	10	6	1
3		5	8	15	9

The dairy firm wishes to decide as to how much should be the shipment from which plant to which distribution center so that the cost of shipment may be minimum. Also, find the solution using u-v method.

Q.5A A work sampling study was made of a cargo loading operation for the purpose of developing its standard time. The study was conducted for duration of minutes during which 3000, 1500 instantaneous observations were made at random intervals. The results of study indicated that the worker on the job was working 80 percent of the time and loaded 360 pieces of cargo during the study period. The work analyst rated the performance at 90 %. If the management wishes to permit a 13 % allowance for fatigue, delays and personal time, what is the standard time of this operation? 05

Q.5B Explain the concept of Facility Location Planning for Mahindra SEZ in Rajasthan 05

Q.6A Write short notes on: job rating, merit rating and financial benefits. 05

Q.6B Explain the Concept of Value Engineering and what are its applications? 05

OR

Q.6B Distinguish between micro and macro motion study techniques. 05

Q.7A What is Allowance Factor? What are Constant and Variable allowances? 05

Q.7B Write the purposes and uses of Work Measurement (WM). 05

OR

Q.7B What is plant layout? Define the various types of plant layout processes. 05

Q.8A Define Time Study. Write its objectives and Applications. 10

Q.9A A Solve the following LPP using its dual 10

$$\text{Max } Z = 5x_1 - 2x_2 + 3x_3$$

Subject to $2x_1 + 2x_2 - x_3 \geq 2$, $3x_1 - 4x_2 \leq 3$, $x_2 + 3x_3 \leq 5$
and $x_1, x_2, x_3 \geq 0$

Q.9B Explain the different Work Measurement & Time Standard Techniques with Examples. 10

OR

Q.9B What is process planning? Explain briefly the different types of process planning processes. 10