

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), Nov.-Dec. 2015

B. Tech in Mechanical Engineering, Semester V

Roll No.....

ME 506: Industrial Engineering and 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 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.	The type of industry that provides the lowest capital output ratio is: (a) Steel industry (b) Small scale industry (c) Watch industry (d) Machine tool industry	
ii.	In value engineering the term 'value' refers to: (a) Market value (b) Relation between cost and efficiency (c) Relation between function and cost (d) Relation between predictability and cost	
iii.	Value analysis is particularly of interest when (a) Jobbing work economics are involved (b) Production is one large scale (c) Only few components are involved (d) Costly equipment is used	
iv.	A tie for leaving variables in simplex procedure implies: (a) Optimality (b) Cycling (c) No solution (d) Degeneracy	
v.	A linear programming problem with mixed constraints (some constraints of $\leq$ type and some of $\geq$ type) can be solved by which of the following methods? (a) Big-M method (b) Hungarian method (c) Branch and bound technique (d) Least cost method	
vi.	A variable which has no physical meaning, but is used to obtain an initial basic feasible solution to the linear programming problem is referred to as: (a) Basic variable (b) Non-basic variable (c) Artificial variable (d) Basis	
vii.	The layout suitable for the low demand and high variety product is: (a) Group layout (b) Process layout (c) Product layout (d) Static layout	
viii.	Which one of the following is NOT a work measurement technique? (a) Time study (b) Work sampling (c) Motion time data (d) Micromotion study	
ix.	The individual human variability in time studies to determine the production standards is taken care of by: (a) Personal allowances (b) Work allowances (c) Rating factor (d) None of the above	
x.	In time study, the rating factor is applied to determine (a) Standard time of a job (b) Merit rating of the worker (c) Fixation of incentive rate (d) Normal time of a job	
Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
(i)	A welding operation is time-studied during which an operator was pace-rated as 120%. The operator took, on an average, 8 minutes for producing the weld-joint. If a total of 10% allowances are allowed for this operation, the expected standard	

	production rate of the weld-joint (in units per 8 hour day) is:	
(ii)	List the common allowances given in work standard.	
(iii)	What are the advantages of value engineering?	
(iv)	The actual observed time for an operation was 1 minute per piece. If the performance rating of the operator was 120 and a 5 per cent personal time is to be provided, the standard time in minute per piece is:	
Q.3A	State the advantages and disadvantages of selecting an urban location and rural location for plant site.	05
Q.3B	Discuss various means of material handling which are commonly used in an industry.	05
Q.4A	Enlist the objectives of Method study and work measurement.	05
Q.4B	Briefly discuss "SIMO CHART" and give its applications.	05
Q.5A	Explain the various steps required to conduct method study.	05
Q.5B	Give the symbols, activity names used in method study for charting of the processes.	05
Q.6A	Solve the following L.P.P. by using its dual Maximize $Z = 5x_1 - 2x_2 + 3x_3$ Subject to $2x_1 + 2x_2 - x_3 \geq 2$ $3x_1 - 4x_2 \leq 3$ $x_2 + 3x_3 \leq 5$ $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$	15
Q.6B	Define value engineering. Discuss the various fields of application of value engineering.	10
	OR	
Q.6B	Enumerate the advantages of job evaluation.	10
Q.7A	A building project consists of 10 activities; their estimated duration is given below. Activity Duration 1 - 2 5 2 - 3 2 2 - 4 6 3 - 5 4 3 - 6 4 4 - 5 2 4 - 7 3 5 - 8 7 6 - 8 8 7 - 8 2 Draw the network and compute	15

- (i) Event times
- (ii) Activity time
- (iii) Total float
- (iv) Critical path

Q.7B	Discuss advantages and limitations of PERT and CPM Techniques.	10
	OR	
Q.7B	Explain cost analysis, crashing and updating. Also explain various types of floats.	10