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ME-401

B. TECH.

FOURTH SEMESTER EXAMINATION, 2002-2003

INDUSTRIAL ENGINEERING

Time : 3 Hours *Total Marks : 100*

Note : (1) Attempt **ALL** the five questions.

(2) ALL questions **do not carry equal weightage.** It is advised to schedule the Answering of the Questions after thoroughly reading to all the 5 QUESTIONS. However, the sum of marks allotted to All the Five Questions equals 100 (ONE HUNDRED) marks.

(3) Assume data if missing, however, justify such assumption.

1. Answer any FOUR of the following :— **(6×4=24)**

(*a*) Explain the term "PERFORMANCE RATING". Correlate, with the help of a suitable example, the terms "Performance Rating" and "Production Rating".

(*b*) Illustrate, with example, the following :—

(*i*) Methods Planning

(*ii*) Routing

(*iii*) Expediting

Describe the communication links among product, process, schedule and layout design.

(*c*) The First Cost of Ordinary Lathe Machine is Rs. 55,000 only (Rupees Fifty-five thousand only). Its life is estimated as 10 years while

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the salvage value at the end of the life is estimated as Rs. 5,000 only (Rupees Five Thousand only). If the money earns an annual interest of 12%, find the Book-value of the Machine at the end of its useful life.

(*d*) Why is a Normal Distribution Curve normally considered in "Statistical Quality Control" ? Explain. Discuss the objectives of $\bar{X}$ and R Charts.

(*e*) Differentiate between "Cost Accounting" and "Cost Estimating". What does factory cost consist of ? Discuss.

(*f*) How does a 'p-chart' differ from a 'c-chart' ? Explain, in detail, citing their characteristics with suitable examples.

2. Answer any FOUR of the following :— (6×4=24)

(*a*) A small machine shop has five existing location machines located at coordinate locations P_1=(8,20), P_2 (10,10), P_3=(16,30), P_4 (30,10) and P_5=(40,20). Two new machines are to be located in the shop. Item movement is to be rectilinear. It is anticipated that there will be four trips per day between the new machines. The number of trips per day between each new machine and each existing machine is :

$$W = \begin{pmatrix} 8 & 6 & 5 & 4 & 3 \\ 2 & 3 & 4 & 6 & 7 \end{pmatrix}$$

Determine the optimum locations for the new machines.

(*b*) Sketch a Gantt Chart for assembly of components "X" and "Y" consisting of the

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following activities with average time for each activity mentioned against it :—

Activities	Time (Weeks)
preparing a pattern for casting	4
preparing a mould	2
casting a cleansing operation of "X"	1
heat treatment of "X"	2
obtaining and Installation of machine "M"	7
machining component "Y"	5
assembling components "X" and "Y"	3
preparing the test rig	4
testing the assembly	2
packaging for dispatch	1

(*c*) What is meant by the Replacement of Machines ? Explain. Differentiate between the Annual Cost Method and Present Worth Method of Replacement Analysis. Discuss the advantages and disadvantages of using Present Worth Method of analyzing replacement of a machine.

(*d*) What is meant by the "Human Resource Development" ? Explain. Enumerate the objectives of the "human resource development".

(*e*) Explain the salient features of "Linear Programming". Formulate an objective function of a Linear Programming Problem. Differentiate between "Maximization" and the "Minimization" objective functions in Linear Programming.

(*f*) Differentiate between the terms, "LOCK-OUT" and CLOSURE". Discuss the basic objectives of Industrial Disputes Act.

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3. Answer any THREE of the following : — (8 × 3 = 24)

(*a*) Differentiate between the terms, "Production" and "Productivity". The Price index for years 2001 and 2002 are given in the table below. The year 2000 is the base year for which index is 100. Calculate different productivity measures for a factory whose financial statement is given below :— (8)

ITEM	2002		2001	
	Current (Rs.thousands)	Price Index	Current (Rs.thousands)	Price Index
Net Sales	1500	107	2200	130
Labour	200	108	380	135
Material	800	105	1200	140
Services	300	106	370	120
Depreciation	90	—	120	—

(*b*) What is meant by "Wage Incentives" ? Explain. (2)

Write notes on the following :— (6)

(*i*) Rowan Plan

(*ii*) Piece rate with a guaranteed base

(*iii*) Bedaux Plan

(*c*) Derive an expression for Economic Batch Size in Production in terms of Cost of Production, Set-up, Annual Requirement, Daily Requirement and Daily Production. (5)

A company produces 4800 parts per day and sells them at approximately half of the rate. The Set-up cost is Rs. 1000. The carrying

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costs are Rs. 5 per unit. The Annual demand is 4,80,000 units. Find Optimal Lot Size. (3)

(*d*) Enumerate the various Principles of Organization. Discuss, in brief, the "Principle of Span of Control". (4)

Sketch a Line and Staff type of Organization Chart for a Foundry employing 100 workers at the lowest echelon. (4)

(*e*) What is, 'Memorandum of Association' according to the Company Act 1956, ? (8)

4. Answer any THREE of the following :— (4×3=12)

(*a*) Define the term, "Job Evaluation" as per International Labour Organization. Describe, in brief, the "Objective" and "Pre-requisite" of Job Evaluation. Discuss, in brief, the limitations of Job Evaluation.

(*b*) Explain the MRP system. Discuss different inputs and outputs of MRP.

(*c*) Explain, with the help of a diagram, the term, "Break-even Point". Explain, only graphically, the various methods used to lower the Break-even Point.

(*d*) Define any *four* of the following :—

(*i*) Factory Act 1948

(*ii*) Industry

(*iii*) Industrial Dispute

(*iv*) Strike

(*v*) Trade Union

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5. Write short notes on any FOUR of the following :— (4×4=16)

(*a*) Therbligs

(*b*) Principles of Material Handling

(*c*) Acceptance Sampling

(*d*) Private Limited Company V/s Public Limited Company

(*e*) Independent Float

(*f*) First Cost V/s Trade in Value

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