

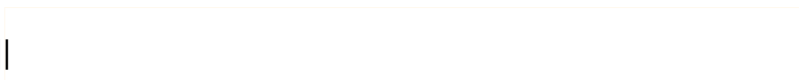
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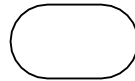
# **QUESTION BANK ON INDUSTRIAL ENGINEERING & MANAGEMENT**

(MECHANICAL ENGINEERING - 6<sup>TH</sup> SEM)



PREPARED BY  
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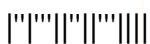


- a) Explain the importance of an industrial engineer. [3M]  
b) Differentiate between plant layout and product layout. [4M]  
c) With neat sketch briefly explain string diagram. [4M]  
d) Explain the concept of Zero defect. [3M]  
e) What do you mean by human resource management? [4M]  
f) Briefly explain supply chain management. [4M]

**PART -B**

- 2 a) Describe the nature and importance of management in modern business organization. [8M]  
b) Explain the system approach and contingency approach to management. [8M]
- 3 a) Explain the importance of plant locations. [3M]  
b) State the disadvantages of concentration of industries in few areas. [8M]  
c) State the symptoms of a bad plant layout. [5M]
- 4 a) Name the various recording techniques used in method study. Give the various symbols used in recording techniques with their meaning. [10M]  
b) Explain the objectives of time study. [8M]
- 5 a) What do you understand from process control? Explain. [8M]  
b) State the benefits and limitations of TQM. [8M]
- 6 a) Define personnel management. Enumerate its importance in business organization. Also state its characteristics. [8M]  
b) Enumerate various steps involved in job evaluation procedure. [8M]
- 7 a) Explain the procedure of value analysis. [6M]  
b) Define the following: [10M]  
i. Crash time  
ii. Normal cost  
iii. Crash cost  
iv. Normal time  
v. cost slope

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**PART -A**

- 1 a) Briefly explain the development of industrial engineering. [3M]  
 b) What are the quantitative techniques for optimal design of layouts? [4M]  
 c) What is micro motion study? Explain. [3M]  
 d) Give a brief note on quality circles. [4M]  
 e) What are the functions of personnel management? [4M]  
 f) What is the importance of value engineering? [4M]

**PART -B**

- 2 a) Name and describe the various levels of management with their functions. [8M]  
 b) Give a brief note on: [8M]  
 i. Classical theory of management ii. Scientific management
- 3 a) Describe the various factors to be considered in selecting the actual site in a particular locality. [8M]  
 b) Differentiate between process layout and product layout. [8M]
- 4 a) Explain the utility of outline process chart in method study. Differentiate between outline process chart and flow process chart. [8M]  
 b) Explain the construction of a string diagram with neat sketch. [8M]
- 5 a) Define control chart and state the objectives of X and R charts. [8M]  
 b) Describe the various elements of TQM in brief. [8M]
- 6 a) State and describe the principles of personnel management briefly. [8M]  
 b) Briefly explain the job evaluation methods with merits and demerits. [8M]
- 7 a) Explain the objectives of value engineering. [6M]  
 b) For the table given below, find [10M]  
 i. Draw the network diagram  
 ii. calculate EST, LST, EFT, LFT and floats  
 ii. Total project duration

Activity No.	0-1	1-2	0-3	2-5	3-4	4-5	5-6
Duration Days	3	5	3	2	3	6	4

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**PART -A**

- 1 a) Differentiate between production management and industrial engineering. [3M]  
 b) Give a brief note on plant maintenance. [4M]  
 c) What do you understand from work sampling? Explain briefly. [4M]  
 d) Explain Six Sigma concept. [4M]  
 e) Briefly discuss about wage incentive plans. [4M]  
 f) Briefly explain enterprise resource planning. [3M]

**PART -B**

- 2 a) Describe the various stages of evolution of management. [8M]  
 b) State and describe the Fayol's principles of management. [8M]
- 3 a) State the reasons for the location of: [8M]  
 i) Iron and steel Industries in Bihar and Orissa  
 ii) Textile industries at Bombay and Ahmedabad  
 b) Define plant layout. State the principles of plant layout. [8M]
- 4 a) What is a flow process chart? Discuss its utility for method study engineer. [8M]  
 b) Explain the objectives of micro-motion study. [8M]
- 5 a) Describe the method of constructing X and R chart and explain how these charts help in determining lack of control. [8M]  
 b) Define TQM. State the guiding principles of TQM. [8M]
- 6 a) Describe the important functions of personnel management. [8M]  
 b) How is job analysis different from job description? What are the uses of it? [8M]
- 7 a) Describe the importance of value engineering industries. [6M]  
 b) For the table given below, find [10]  
 i. Draw the network diagram  
 ii. calculate EST, LST, EFT, LFT and floats  
 ii. Total project duration

Activity No.	0-1	1-2	0-3	2-5	3-4	4-5	5-6
Duration Days	2	4	2	1	2	5	3

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**PART -A**

- 1 a) What are the quantitative tools of Industrial engineering? [3M]
- b) Give a brief note on breakdown maintenance. [4M]
- c) What are the applications of operations management? [4M]
- d) Explain the importance of quality control. [4M]
- e) How a merit rating is given for job evaluation? [4M]
- f) Differentiate between CPM and PERT. [3M]

**PART -B**

- 2 a) State and describe the characteristics of modern management. [8M]
- b) Describe the principles of scientific management in brief. [8M]
- 3 a) State the advantages of suburban area as a site for industry. [8M]
- b) Describe the product layout with a neat sketch and state its advantages and limitations. [8M]
- 4 a) State and explain in brief the steps involved in method study procedure. [8M]
- b) "Critical examination is a motive force to develop a new method". Justify. [8M]
- 5 a) What is meant by process capability? How will you determine the same? [8M]
- b) Explain the theory underlying control charts for fraction defective. [8M]
- 6 a) Define personnel management. State its characteristics. [8M]
- b) What is job evaluation? What objectives can be served from scientific job evaluation studies? [8M]
- 7 a) Define value? State how it can be increased? Describe the various types of values. [6M]
- b) What is PERT? Define optimistic time, pessimistic time and most likely time and explain how you will estimate the expected time to complete the activity in PERT technique. [10M]



- Code No. RT32036
- R13**
- SET - 4**
- 1 a) Define management state the important characteristics of management. [4M]
  - b) List out the important factors which determine the location of an industrial plant. [4M]
  - c) Define work study. What are the advantages of work study? [4M]
  - d) What is quality control? How is it different from inspection? [3M]
  - e) What are the functions of personnel management? [4M]
  - f) Define supply chain management? [3M]

**PART -B**

- 2 a) What are the qualities required for an industrial engineer? [6M]
- b) Describe the principles of scientific management in brief. [10M]
- 3 a) What is process layout? Explain. [3M]
- b) What is plant location? Discuss the need for plant location. What are the steps involved in selecting a location? [8M]
- c) Explain in detail the various types of plant layouts? [5M]
- 4 a) What are flow process charts? Give their importance. [8M]
- b) What do you understand by work measurement and elaborate the important techniques involved in work measurement? [8M]
- 5 a) Define quality and explain the factors that influence the quality of a product. [8M]
- b) The following table gives the number of defects in a casting used for making crank case of diesel engine. [8M]

Casting No	1	2	3	4	5	6	7	8	9	10
Number of defects	15	11	25	10	12	20	15	10	17	13

Construct an appropriate control chart with the control limits and comment on the process.

- 6 a) Define HRM? Explain its elements and significance to organizational development. [8M]
  - b) What is personnel management? What are its features and functions? [8M]
  - 7 a) Calculate EST, CST, EFT LFT total float and project duration for the following project. [8M]
- |                 |     |     |     |     |     |     |     |     |     |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Activity        | 1-2 | 1-3 | 1-4 | 2-3 | 2-6 | 3-5 | 3-6 | 4-5 | 5-6 |
| Duration (days) | 3   | 4   | 14  | 10  | 5   | 4   | 6   | 1   | 1   |
- b) Discuss the functions and significance of Enterprise Resource Planning? [8M]

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. Answering the question in **Part-A** is compulsory  
3. Answer any **THREE** Questions from **Part-B**

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**PART - A**

- 1 a) List out any four functions of management? [4M]
- b) Differentiate between product layout and process layout? [4M]
- c) What is method study technique? Explain its significance. [4M]
- d) Explain the significance of statistics in quality control? [4M]
- e) Explain the job evaluation techniques? [3M]
- f) Define and explain CPM? [3M]

**PART - B**

- 2 a) Differentiate between production management and industrial engineering? [6M]
- b) Define scientific management. What are the criticisms to scientific management? Write the basic approaches to scientific management. [10M]
- 3 a) Enumerate the various factors to be considered in the design of plant layout? [8M]
- b) Product layout is better than process layout. Do you agree with this statement? Justify. [8M]
- 4 a) Explain in detail about travel chart? [8M]
- b) What is PMTS? What are the different types of PMTS? Discuss the procedure involved in PMTS. [8M]
- 5 a) In a manufacturing unit, a sample of 5 sheets is taken every one hour. The data collected from the measurement of thickness of these sheets is tabulated below: [10M]

Thickness in mm for 5 sheets

Sample number	I	II	III	IV	V
1	25	31	22	26	24
2	32	31	30	34	33
3	35	34	33	32	32
4	26	25	29	30	25
5	33	34	30	29	33
6	34	32	31	28	27

Draw the control chart for mean and range, and establish whether the process is under control?

- b) Write about ISO and explain the benefits of ISO registration? [6M]



- 6 a) Briefly explain various wage intensive schemes? [8M]  
b) Define merit rating. Discuss the objectives, advantages and disadvantages of merit rating. [8M]



- 7 a) Explain the objectives of supply chain management? [6M]  
 b) Details of project are shown in table [10M]

Activity	Normal		Crash	
	Time (days)	Cost in (Rs.)	Time (days)	Cost in Rs
1-2	6	7000	3	14500
1-3	8	4000	5	8500
2-3	4	5000	1	9000
2-4	5	8000	3	15000
3-4	5	5000	3	11000

In direct cost is Rs. 3000 per day. Determine optimal project duration and optimal cost of project.

SET - 3

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**PART - A**

- 1 a) Differentiate between production management and industrial engineering? [4M]
- b) What is breakdown maintenance? Explain. [4M]
- c) Discuss in detail about therbligs [4M]
- d) Write about quality circles. [4M]
- e) Explain job analysis techniques? [3M]
- f) Define and explain PERT? [3M]

**PART - B**

- 2 a) What is McGregor theory X and theory Y? Explain. [8M]
- b) Briefly describe the principles of management given by Henry Fayol? [8M]
- 3 a) Define and explain fixed – position layout: write their advantages, disadvantages. [8M]
- b) Discuss in detail various tools and techniques used for optimal design of layouts? [8M]
- 4 a) What is performance rating? Explain various methods of rating. [8M]
- b) Explain about “SIMO” chart and state its applications. [8M]
- 5 a) Gopal industries want to set-up a control chart for the number of defective units for its toaster production line. 25 Random samples of 400 units each inspected and the number of defective units in each sample were noted as follows. Draw suitable control for the data.

Sample No.	Number of defectives:	Sample No.	Number of defectives:	Sample No.	Number of defectives:
1	17	13	16	25	17
2	26	14	19		
3	22	15	19		
4	24	16	8		
5	30	17	8		
6	35	18	23		
7	15	19	20		
8	19	20	18		
9	23	21	18		

10  
11  
12



[8M]

Code No: RT32036

**R13**

**SET - 4**



Code No: RT32036  
Code No: RT32036

**R13**  
**R13**

**SET 3**  
**SET - 4**

- b) What is the need for ISO 9000 standards? What are the various certifications under this umbrella of ISO 9000? Explain. [8M]
- 6 a) What is the importance of industrial relations for the success of an organization? Explain. [8M]  
b) Define wage incentive plans. What are its objectives and drawbacks? [8M]
- 7 a) Write a short note on enterprise resource planning. [6M]  
b) Compute earliest start and finish times, latest start and finish times and floats for the following project. [10]

Activity	1-2	2-3	2-4	3-5	4-5	4-6	3-6	5-6
Duration	3	2	3	3	7	5	2	6

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**PART - A**  
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SET - 4

- Code No: RT32036
- 1 a) Bring out the contrast between theory X and theory Y? [4M]
  - b) Explain process layout? [3M]
  - c) How do you estimate time by MTM method? Explain. [4M]
  - d) What is quality control? How is it different from inspection? [4M]
  - e) What are the elements of HRM? [4M]
  - f) Explain project crashing? [3M]

**PART - B**

- 2 a) What are the functions of management? [4M]
- b) List out the applications of industrial Engineering? [8M]
- c) Briefly describe productivity measurement system? [4M]
- 3 a) What is process layout? What are the advantages and disadvantages of process layout? [8M]
- b) Explain different types of maintenance systems? [8M]
- 4 a) Discuss in detail about work factor system? [6M]
- b) Write in detail about the applications and objectives of operations management? [10M]
- 5 a) Define total quality management? Describe the various elements of TQM in brief. [8M]
- b) Define control chart and state the objectives of  $\bar{X}$  and R charts [8M]
- 6 a) Describe the functions of human resource management? [8M]
- b) Differentiate personnel and industrial relations from HRM? [8M]
- 7 a) Define value analysis? State the objectives of value analysis. [6M]



b) With the help of following data ,  
Code No: BT32006

**R13**

**SET - 4**

- ii) Find project duration for the following project and  
iii) Identify the critical path.

Activity	1-2	1-3	1-4	2-4	2-5	3-4	3-7	4-6	4-7	5-6	5-7
Time(months)	4	6	12	7	11	7	8	8	13	4	4

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1 [a] Define Industrial Engineering.

Code No: RT32036

R13

SET - 4 [3M]

- b) What are the objectives of plant maintenance? [3M]  
c) Explain the term PMTS. [4M]  
d) State the importance of Quality control. [4M]  
e) What is profit sharing? [4M]  
f) State Fulkerson's rule for numbering the nodes in a network. [4M]

**PART-B**

- 2 a) Differentiate between production and productivity. [4M]  
b) Explain the contributions of Taylor for scientific management and how it leads to the concept of scientific management. [8M]  
c) State the functions of the management in an organisation. [4M]
- 3 a) What do you mean by optimal design in plant layout? [4M]  
b) Briefly discuss the factors to be considered for the selection of a location for a factory construction. [8M]  
c) Explain the importance of preventive maintenance in production management. [4M]
- 4 a) State the differences between method study and work measurement with their objectives. [8M]  
b) Explain the need and procedure for conducting work sampling study. [8M]
- 5 a) The following table gives the coded measurement obtained from 20 subgroups of 5 each: [8M]

Subgroups No.	Statistics	Subgroups No.	Statistics
1	-1,2,1,0,1	11	0,1,-3,2,1
2	2,0,1,0,1	12	2,1,-1,0,0
3	1,1,0,0,1	13	0,1,-3,2,1
4	2,1,0,-1,0	14	0,0,-1,0,1
5	1,-1,0,0,-1	15	-1,2,1,1,2
6	1,-1,2,0,2	16	1,-1,2,0,2
7	-1,-1,0,-2,1	17	2,1,-1,0,0
8	1,1,2,-1,0	18	2,0,1,0,1
9	2,1,-1,0,0	19	0,1,1,-1,1
10	-2,1,-2,2,1	20	3,-3,1,1,1

- i. Construct the  $\bar{X}$  and R charts and plot the points on the chart  
ii. What will be the control limits on  $\bar{X}$  and R charts for immediate future?  
iii. Estimate the value of  $\sigma$ .



Code No: RT32036

**Code No: RT32036**

**R13**

**R13**

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**SET - 1**

- b) Explain in detail about the need of ISO quality systems in an industry. [8M]
- 6 a) Why an employee must be rated? State and explain different methods of employee rating. [8M]
- b) Discuss the fundamental requirements of good financial wage incentive system. [8M]
- 7 a) What is the need for value analysis of a product? [4M]
- b) State the difference between PERT and CPM in project management. [4M]
- c) A project has the following time schedule: [8M]

Activity	Time in weeks	Activity	Time in weeks
1 – 2	2	4 – 6	3
1 – 3	2	5 – 8	1
1 – 4	1	6 – 9	5
2 – 5	4	7 – 8	4
3 – 6	8	8 – 9	3
3 – 7	5		

Construct PERT network and compute

- i.  $T_L$  and  $T_E$  for each event
- ii. Float for each activity
- iii. Critical path and its duration

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**PART -A**

- 1 a) Define scientific management. [3M]
- b) Define plant maintenance schedule. Write down the procedure for scheduling plant maintenance. [5M]
- c) Explain the importance of Ergonomics. [4M]
- d) Explain the term TQM. [3M]
- e) What is incentive? How it helps to improve production? [4M]
- f) State the modules of ERP. [3M]

**PART -B**

- 2 a) State the role of an Industrial Engineer in shop floor. [4M]
- b) Explain the tools that are used in Industrial engineering for solving managerial problems. [8M]
- c) Describe the importance of management in an Organization. [4M]
- 3 a) State the principle of plant layout. [3M]
- b) Explain various types of plant layouts with their relative advantages over other types. [8M]
- c) Explain the different types of maintenance system followed in a continuous process Industry. [5M]
- 4 a) Explain the steps followed in method study of job process. [8M]
- b) What is process Chart? Explain different types of process chart with relevant sketches. [8M]
- 5 a) Construct  $\bar{X}$  and R-charts for the following information and state whether the process is in control. For each of the following,  $\bar{X}$  has been computed from a sample of 5 units drawn at an interval of 1 hour from an ongoing manufacturing process. [8M]

S. No.	X <sub>1</sub> (10 am)	X <sub>2</sub> (11 am)	X <sub>3</sub> (12 noon)	X <sub>4</sub> (1 pm)	X <sub>5</sub> (2 pm)
1	10.02	10.15	9.85	10.02	9.97
2	9.97	9.98	9.96	9.92	10.05
3	10.08	10.02	10.1	10	10.01
4	9.92	10.12	10.08	10.02	10.05
5	10.02	10.06	10.04	9.95	9.89



Code No: RT32036

**Code No: RT32036**

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**R13**

**SET - 4**  
**SET - 2**

- b) Explain six sigma concept. How do you think that this concept would improve the productivity? [8M]
- 6 a) What are the objectives and functions of trade union? [8M]  
b) Explain Rowan plan of wage rating. [8M]
- 7 a) Explain the rules of network construction. [8M]  
b) In the following table optimistic, most likely and pessimistic times are respectively shown against each connected activity from 1 to 10 in a project. [8M]

Activity	Time	Activity	Time
1 - 2	4 , 8 , 12	2 - 3	1 , 4 , 7
2 - 4	8 , 12, 16	3 - 5	3 , 5 , 7
4 - 5	0 , 0 , 0	4 - 6	3 , 6 , 9
5 - 7	3 , 6 , 9	5 - 8	4 , 8 , 6
6 - 10	4 , 6 , 8	7 - 9	4 , 8 , 12
8 - 9	2 , 5 , 8	9 - 10	4 , 10 , 16

- i. Construct a network.
- ii. Find the critical path and its duration
- iii. The schedule completion time for the project is 48 days. Calculate the probability of finishing the project within the time.

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Code No: RT32036

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. Answering the question in **Part-A** is compulsory  
3. Answer any **THREE** Questions from **Part-B**

SET - 4

**PART -A**

- 1 a) What do you understand from the term production management? [3M]
- b) Differentiate between preventive and breakdown maintenance. [4M]
- c) Explain MTM. [4M]
- d) Define zero defect concept. [4M]
- e) State few non-financial incentives offered to the employees in a manufacturing industry. [4M]
- f) What is critical path in the network diagram? [3M]

**PART -B**

- 2 a) Explain the scope and application of Industrial Engineering. [4M]
- b) Explain Henri Fayol's principles of management thoughts. [6M]
- c) State the relationship between Management, Administration and Organization. [6M]
- 3 a) How Preventive maintenance is evaluated? [2M]
- b) State the advantages and disadvantages of selecting the plant location in an urban and a rural site. [8M]
- c) Explain the Quantitative techniques for optimal design of layouts. [6M]
- 4 a) What is time study? Describe the steps involved in time study. [8M]
- b) Explain how a high productive design of a work place layout can be made with the concept of Ergonomics motion economy [8M]
- 5 a) Construct control chart  $\bar{X} - R$  for the following data on the basis of 12 samples collected from a process, 5 data points are taken every hour. Comment on the state of control, assuming that these are the first data. What will be future control limit? [8M]

1	2	3	4	5	6	7	8	9	10	11	12
42	42	19	36	42	51	60	18	15	69	64	61
65	45	24	54	51	74	60	20	30	109	90	78
75	68	80	69	57	75	72	27	39	113	93	94
78	72	81	77	59	78	95	42	62	118	109	109
87	90	81	84	78	132	138	60	84	153	112	136

[8M]

- b) What is Quality circle? How the implementation of Quality circle enhance the Production?



- 6 a) Explain the functions of personnel management. [8M]  
 b) State the need and types of Job-evaluation. [8M]
- 7 a) Explain the concept of supply chain management and the parameters that influence the supply chain design. [8M]  
 b) The table given below shows the activity details for a construction project, with the time estimates of each activity in days. [8M]

Activity	Time estimate		
	Optimistic	Most likely	Pessimistic
1 – 2	2	5	8
2 – 3	8	11	20
3 – 4	0	0	0
2 – 4	4	7	16
2 – 5	4	9	20
4 – 6	7	10	13
5 – 6	3	7	17
3 – 7	3	5	13
6 – 7	2	3	10
7 – 8	2	4	6

- i. Construct the network
- ii. Find the critical path and the project duration
- iii. Determine the probability of completion of project in 40 days.

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**PART - A**

- 1 a) How Industrial Engineering plays an important role in an industry? [3M]
- b) List the major factors that govern the plant location for an automotive and auto component manufacturing industry. [4M]
- c) What is Therbligs? [4M]
- d) Define SQC. [3M]
- e) State the difference between merit rating and job evaluation. [4M]
- f) What is the significance of crashing in network technique? [4M]

**PART - B**

- 2 a) Define Productivity. What are the different kinds of productivity measures? [6M]
- b) Explain briefly about Douglas McGregor theory X and theory Y on motivation and management with the assumptions. [6M]
- c) Differentiate between production management and Industrial engineering. [4M]
- 3 a) To increase the productivity, what type of maintenance must be carried out in the shop floor? State its importance. [4M]
- b) Discuss Product type of layout. State the advantage and disadvantage of product type of layout over process type of layout. [8M]
- c) Explain the steps involved in designing a plant layout [4M]
- 4 a) Explain how micro-motion study is performed. [8M]
- b) Describe briefly the different technique of rating used in connection with work study of an operator's performance in a labor intensive industry. [8M]
- 5 a) The following data (two subgroup of size 4), is from two different machines which are supposed to be alike. Plot the necessary chart to show whether their product would support this assumption. If they don't, does this prove the machines are not essentially alike? [8M]



Code No: RT32036

Code No: RT32036

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SET - 4  
SET - 4

Machine 1			Machine 2		
Subgroup	Average	Range	Subgroup	Average	Range
1	2.77	0.06	1	2.53	0.12
2	2.70	0.29	2	2.67	0.30
3	2.78	0.19	3	2.66	0.17
4	2.67	0.12	4	2.57	0.25
5	2.75	0.34	5	2.60	0.24
6	2.77	0.23	6	2.60	0.05
7	2.75	0.17	7	2.70	0.30
8	2.73	0.06	8	2.56	0.04
9	2.76	0.23	9	2.70	0.19
10	2.63	0.20	10	2.67	0.08
11	2.73	0.17	11	2.60	0.11
12	2.74	0.28	12	2.63	0.14
13	2.73	0.26	13	2.71	0.24
14	2.72	0.13	14	2.63	0.31
15	2.73	0.13	15	2.75	0.17

- b) Describe the key steps involved in the process of getting registered to ISO 9000 certification. [8M]
- 6 a) Why is it important to manage human resource in an organization? Discuss. [8M]  
b) Explain any one type of wage incentive plan that you think will improve the productivity of a continuous production industry. [8M]
- 7 a) What is enterprise resource planning? [3M]  
b) In what ways an organization is benefited by the implementation of ERP. [5M]



c) The following data gives the information about duration and cost of various activities in a project network

R13

SET - 4

Activity	Normal duration (weeks)	Normal cost (in Rs.)	Crash duration (weeks)	Crash cost (in Rs.)
1 – 2	4	4000	2	12000
2 – 3	5	3000	2	7500
2 – 4	7	3600	5	6000
3 – 4	4	5000	2	10000

The project overhead costs are Rs.2000 per week. Find the optimum duration and cost associated with it. Also, draw the least cost network.

1. a) What are differences between production and productivity? [3M]
- b) Briefly explain what are the principles of plant layout? [4M]
- c) What are the principles of ergonomics? [4M]
- d) Explain ISO quality systems. [4M]
- e) What are the objectives of job evaluation? [4M]
- f) Discuss the Importance of project management. [3M]

**PART - B**

**(48 Marks)**

2. a) Explain the significance of directing and coordinating in the management functions. [8M]
- b) Write the differences between McGregor theory X and McGregor theory Y. [8M]
3. a) Give a comparison between process layout and product layout. [8M]
- b) Discuss about preventive and break down maintenance. [8M]
4. a) Explain the procedure to conduct work sampling. [8M]
- b) Why allowances are taken in calculation of standard time discuss different types of allowances. [8M]
5. a) Describe the procedure in constructing X and R charts with suitable examples. [8M]
- b) Explain about zero defect concepts in Total Quality Management. [8M]
6. a) What do you understand by personnel management and explain the functions of personnel management. [8M]
- b) What is merit rating and explain quantitative methods of merit rating. [8M]



7. a) Explain the different steps in value engineering process? Explain the methodology.  
 b) A project consists of nine jobs (A,B,C,.....I) with the following precedence relations and time estimates.

Job	: A	B	C	D	E	F	G	H	I
Predecessor	: -	-	A,B	A,B	B	D,E	C,F	D,E	G,H
Time (Days)	: 15	10	10	10	5	5	18	9	15

- i) Draw the project network (ii) identify the critical path, (iii) Calculate all the Float values for all the activities.

**PART -A**

**(22 Marks)**

1. a) Mention the functions of management. [3M]
- b) Give the advantages and disadvantages of process layout. [4M]
- c) Define ergonomics. [4M]
- d) Explain the concept of quality circles. [4M]
- e) List out the functions of personnel management. [4M]
- f) What do you mean by value engineering? [3M]

**PART -B**

**(48 Marks)**

2. a) Discuss briefly about Taylor's principles of management. [8M]
- b) Explain the development of industrial engineering. [8M]
3. a) What are the factors governing the location of a plant? Explain in brief. [8M]
- b) List out various types of production layouts with their advantages, disadvantages and applications. [8M]
4. a) What are Therbligs? Explain their importance. Give their name, explanation, abbreviation and symbol. [10M]
- b) Explain the methodology of MTM. [6M]
5. The following data were obtained over a 5-day period to indicate X and R chart for a quality characteristic of a certain manufacturing product that had required a substantial amount of rework. All the figures apply to the product made on a single machine by a single operator. The sample size was 4. Two samples were taken per day. Comment on the process using X and R charts. [16M]

Sample number	Observations			
	1	2	3	4
1	11	12	13	10
2	6	10	10	11
3	11	12	9	12
4	14	10	8	13
5	12	11	11	10
6	11	10	10	12
7	10	12	13	13
8	10	11	11	10
9	12	13	11	12
10	11	13	9	9



# INDUSTRIAL ENGINEERING AND MANAGEMENT

Code No: RT32036

**R13**

**SET - 1**

6. a) Explain the difference between job evaluation and merit rating. [8M]  
b) What are the principles of human resource management? Explain. [8M]
7. a) State and explain the principles of supply chain management. [8M]  
b) Discuss the phases involved in conducting a value engineering study. [8M]