



Time - 3 Hour

MM-70

Note: The Question paper has been divided in 2 sections, Section A & B. Each Section is of 35 marks.
 The question paper contains 4 printed page.

(Section A)-35 Marks

Instructions: Each question in this section carries equal (11.66) marks.

Attempt all 3 questions from this section:

Q.1. Define work study and elaborate how work study is important from pharmaceutical perspective?

Or

Following data were obtained by a work study. Man, from a study conducted by hours.

(i) Maintenance time

- (a) Get out and put away tools = 15.0 min/day
- (b) Cleaning of machine = 5.0 min/day
- (c) Oiling of machine = 5.0 min/day
- (d) Replenish coolant supply = 2.0 min/day

(ii) Interruption

- (a) Interruption by foreman = 5.0 min/day
- (b) Interruption by porter etc. = 3.0 min/day
- (iii) Delay time due to power failure etc. = 6.0 min/day
- (iv) Personal time = 25.0 min/day

Calculate total allowances, total available cycle time productive hours, considering a working day of 8 hours.

Q2. Raman is planning to start a new industry in India. For locating the Pharmaceutical plant, he tabulated the factor rating and the location rating of 2 locations Pune and Mumbai. Find the best location based on the factor rating method with the details given in below table.

Sl.no.	Location factor	Factor rating	Rating	
			Pune	Mumbai
1	Facility utilization	7	5	3
2	Total production per month	4	3	4
3	Tax advantage	7	5	4
4	Land and construction costs	5	2	1
5	Employee preferences	3	3	5
6	Climate	7	4	3
7	Power	7	3	2
8	Water	5	3	1
9	Transportation	5	1	2
10	Proximity to suppliers	6	3	2

Discuss the various factors influencing plant layout and suggest best layout for Pharmaceutical production?

Q3. Write short notes (*any 3*):

- a) 5 P's in production management
- b) Automation
- c) Performance measurement in operation
- d) ERP



(Section B) - 35 Marks

Each question in this section carries equal (17.5) marks.

Attempt any 2 questions from this section:

Q1. A pharmaceutical manufacturer is considering a new computerized production and inventory management system. The following information has been gathered regarding the installation and implementation of the system;

	Activity	Description	Immediate Predecessors	Duration (days)
Start	A	Select the computer model	-	6
	B	Design input / output system	A	12
	C	Design monitoring system	A	10
	D	Assemble the computer hardware	B	20
	E	Develop the main programmes	B	11
	F	Develop input/output routines	C	8
	G	Create Database	E	6
	H	Install the system	D,F	3
Finish	I	Test and implement	G,H	6

From the above information you are required to draw the Activity on arrow network for the project. Determine the critical path and compute the minimum time for the implementation of the computerized production and inventory management system. Also find the total float or slack of non-critical activities.

Q2. Alfred Lowenstein is the president of the research division for Pharmaceutical manufacturer. His most important project coming up is the development of a new drug to combat AIDS. He has identified 10 groups in his division which will need to carry out different phases of this research and development project. Referring to the work to be done by the respective groups as activities A, B, . . . , J, the precedence relationships for when these groups need to do their work are shown in the Table.

Table 1 : Activities with their sequential constraints

Activity	Immediate Predecessors
A	-
B	-
C	A
D	B
E	A
F	C
G	D
H	B
I	E,F
J	G,H

To beat the competition, the CEO of the company has informed Alfred that he wants the drug ready within 22 months if possible. Alfred knows very well that there is considerable uncertainty about how long each group will need to do its work. Using the three-estimate approach, the manager of each group has provided a most likely estimate, an optimistic estimate, and a pessimistic estimate of the duration of that group's activity. This has been mentioned in the table below.

Estimated Activity times			
Activity	Optimistic Estimate	Most Likely Estimate	Pessimistic Estimate
A	1.5 months	2.0 months	15 months
B	1.2 months	3.5 months	21 months
C	1.1 month	1.5 months	18 months
D	0.5 month	1.1 months	15 months
E	1.3 months	1.5 months	24 months
F	1.1 month	1.2 months	16 months
G	0.5 month	1.1 months	14 months
H	2.5 months	3.5 months	25 months
I	1.1 month	1.3 months	18 months
J	1.2 months	1.3 months	18 months



The great uncertainty in the duration of these research activities causes each pessimistic estimate to be several times larger than either the optimistic estimate or the most likely estimate.

Find the mean critical path for this project. Use this mean critical path to find the approximate probability that the project will be completed within 22 months. What should Alfred tell his CEO about the likelihood that the drug will be ready within 22 months?

You can use the following extract of Table showing Area under the Normal Curve in answering the question:

Z	0.70	0.80	0.85	0.87	0.89	0.90
Area	.2580	.2881	.3023	.3078	.3133	.3159

- Q3. The production manager of a pharmaceutical plant wishes to create a new production deptt. by redesigning a floor of the existing facility. The change involves changes in information systems, staff responsibilities, various policies, and equipments. In sum, six major tasks must be undertaken.

Activity	Immediate predecessor	Normal time (weeks)	Normal Cost, Rs. (in '000)	Compressed time (weeks)	Weekly compression cost (in '000)
A	-	3	150	1	25
B	-	1	40	1	-
C	A	2	80	1	40
D	B	5	500	3	30
E	D,C	2	140	1	90
F	B	5	450	2	70

If the profit opportunity for each week that the project is completed early is Rs 60,000 how many weeks earlier should the project be completed (how many weeks should we crash) to minimize the total costs of the project?

- Q4. What do you understand by resources (human, laboratories, animals etc) management in pharmaceutical project management?

The activities of a project in a Drug Manufacturing Company are tabulated below:

Activity	Immediate Predecessor	Activity Time (weeks)	Number of resource units
A	-	4	2
B	-	4	1
C	-	4	2
D	A	2	5
E	B	3	2
F	C	2	2
G	D	3	5
H	G	5	3

- a) Draw the resource aggregation graph using early start schedule.
b) Carry out resource smoothing and draw the best schedule and corresponding resource usage profile.

(All the Best)

