

Pacific
Asia Pacific

University of Asia Pacific
Department of Civil Engineering
Final Examination Spring 2012
Program: B. Sc. Engineering (Civil)

Course Title: Project Planning and Management
Time: 3 hours

Course Code: CE 401
Full Marks: 100 (= 20 × 5)

There are SEVEN questions. Answer any FIVE
(Graph sheet should be supplied)

1. (a) A transistor radio company manufactures models A, B, C with the following production data. (10)

Model	Profit Contribution (Tk.)	Weekly Production Requirement	Time (Hours) for a Dozen Units		
			Manufacturing	Assembling	Packaging
A	8	100	3	3	5
B	15	150	4	5.5	8
C	25	75	1	1.5	3

During the forthcoming week, the company was available 150 hours of manufacturing, 200 hours of assembling and 60 hours of packaging time.

Formulate this production scheduling problem as a Linear Programming model.

- (b) The following table contains figures on the annual usage and unit costs for a random sample of 12 items. Develop an A-B-C classification for these items. (10)

Item Name	Annual usage	Unit cost (Tk)
1	1000	4300
2	5000	720
3	1900	500
4	1000	710
5	2500	250
6	2500	192
7	400	200
8	500	100
9	200	210
10	1000	35
11	3000	10
12	9000	3

2. (a) Solve the following problem by the Simplex Method: (16)

Maximize $Z = 100x + 200y + 50z$

Subject to $5x + 5y + 10z \leq 1000$
 $10x + 8y + 5z \leq 2000$
 $10x + 5y \leq 500$
 $x, y, z \geq 0$

- (b) Discuss different qualitative forecasting methods.

How is the Delphi Method better than the other methods? (4)

3. (a) Objective function: Maximize $Z = 2x_1 + 3x_2$ (14)

Constraints:

$$\begin{aligned}
 -x_1 + 2x_2 &\leq 16 \\
 x_1 + x_2 &\leq 24 \\
 x_1 + 3x_2 &\geq 45 \\
 -4x_1 + 10x_2 &\geq 20 \\
 x_1, x_2 &\geq 0
 \end{aligned}$$

Find the

(i) Optimum value of x_1 and x_2 by graphical method.

(ii) Maximum profit.

(iii) Range of optimality for coefficient of x_1 and x_2 in the objective function.

(b) Assign the tasks (1 to 5) to the employees (A to E) such that each employee will be assigned by only one job to minimize the total cost. (6)

Find at least two multiple solutions if there is any.

		Tasks				
		1	2	3	4	5
Employees	A	10	9	9	18	11
	B	13	9	9	18	11
	C	3	2	4	18	10
	D	18	9	12	17	11
	E	11	11	14	18	13

4. (a) Discuss the activities associated with different stages of Project life cycle. (4)

(b) Project activity status of Judy Kramer, project manager for St. John's Hospital Project, is shown below: (16)

Activity	Description	Activity Predecessor	Time (Weeks)
A	Select Admin Staff	-----	12
B	Site selection and survey	-----	9
C	Select medical equipment	A	10
D	Prepare final construction plan	B	10
E	Bring utilities to sites	B	24
F	Interview for nursing and staff	A	10
G	Purchase and deliver equipment	C	35
H	Construct hospital	D	40
I	Develop information system	A	15
J	Install medical equipment	E, G, H	4
K	Train Nurses and staff	F, I, J	6

(i) Draw the AON network diagram

(ii) Find the project completion time

(iii) Find the critical path

(iv) Find ES/EF and LS/LF for each of the activity

(v) Find the project completion time and as well as the critical path, if the time required for activity H and J are reduced by 1 week each.

5. (a) Project A and B are offering the repayment schedules shown in the following cash flow. (12)

Year	Cash flow of Project A	Cash flow of Project B
0 (investment)	1,00,000/-	1,00,000/-
1	50,000/-	20,000/-
2	30,000/-	20,000/-
3	20,000/-	20,000/-
4	10,000/-	40,000/-
5	10,000/-	50,000/-
6		60,000/-

As shown in the table above, you have 1,00,000/- for investment and can earn a total 1,20,000/- in 5 years from Project A and 2,10,000/- in 6 years from Project B.

- (i) Find the NPV, BCR and Discounted Pay Back Period for each project [Consider 10% annual interest/discount rate].

(ii) Also comment on the result with respect to investment decision.

- (b) What do you mean by money inflation? Discuss its consequences in investment decision. (4)

- (c) Discuss the relation between NPV and IRR of a project for different values of discount rate. (4)

- 6/ (a) Annual Demand = 10,000 units (8)

Days per year considered in average daily demand = 365

Cost to place an order = \$10

Holding cost per unit per month = 0.01% of cost per unit

Lead time = 3 days

Cost per unit = \$15

- (i) Determine the economic order quantity and the reorder point.

(ii) Also find the Annual Ordering and Holding cost.

(iii) State some significance of the obtained results.

- (b) A computer software firm has experienced the following demands for its "Personal Finance" software package. (8)

Month 2012	Demand (Unit)
January	56
February	61
March	55
April	70
May	66

- (i) Develop a regression analysis to forecast the demand and
 (ii) Find the forecast for the month of January, 2013 (next year).

- (c) Discuss the importance of MRP in detail. (4)

7. (a) Actual demand of a product of a certain company has been given for four quarters and forecast has been estimated by four different methods (Method1, Method2, Method3, Method4). (8)

Using MAD, find the appropriate method of forecasting among the four methods.

Quarter	Demand	Method1	Method2	Method3	Method4
1	105	100	110	120	100
2	150	120	140	140	140
3	93	125	130	125	110
4	100	110	120	120	99

- (b) The following seven jobs (A to G) must pass through Machine1 and Machine2. (10)
Table below shows the operating times for both machines for each job.

Job	Operations Time for Machine1	Operations Time for Machine2
A	9	5
B	8	5
C	7	7
D	6	3
E	1	2
F	2	6
G	4	7

- (i) Use Johnson's rule to schedule (show job sequence and arrangement in diagram for Machine1 and 2) the seven jobs through two machines in sequence to minimize flow time.
(ii) Find the job completion time.
(iii) Find the slack time or idle time for Machine1 and 2, separately.
- (c) What is safety stock? Explain. (2)