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University of Asia Pacific
Department of Civil Engineering
Final Examination Spring 2013
Program : B. Sc. Engineering (Civil)

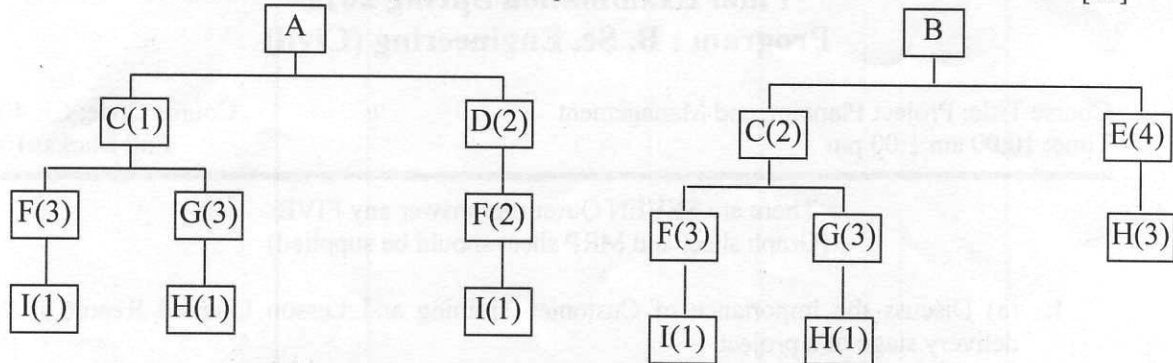
Course Title: Project Planning and Management
Time: 10:00 am 1:00 pm

Course Code: CE 401
Full Marks: 100

There are SEVEN Questions answer any FIVE
(Graph sheet and MRP sheet should be supplied)

1. (a) Discuss the importance of Customer Training and Lesson Learned Report at the delivery stage of a project. [5]
- (b) A transistor radio company manufactures models A, B, C which have profit contribution of Tk. 8, Tk. 15 and Tk. 25, respectively. The weekly minimum production requirements are 100 for model A, 150 for model B and 75 for model C. Each type of radio requires a certain amount of time for the manufacture of component parts, for assembling and for packaging. Specifically a dozen units of model A requires 3 hours for manufacturing, 4 hours for assembling and 1 hour for packaging. The corresponding figures for a dozen units of model B are 3, 5.5 and 1.5 and for a dozen units of model C are 5, 8 and 3. During the forthcoming week, the company was available for 150 hours of manufacturing, 200 hours of assembling and 60 hours of packaging time. Formulate this production scheduling problem as a Linear Programming model. [12]
- (c) What is redundant constraint in LP problem? [3]
2. (a) Objective function: [15]
- Maximize $Z = 2x_1 + 3x_2$
- Constraints:
- $-x_1 + 2x_2 \leq 16$
 $x_1 + x_2 \leq 24$
 $x_1 + 3x_2 \geq 45$
 $-4x_1 + 10x_2 \geq 20$
 $x_1, x_2 \geq 0$
- i. Find the optimum value of X_1 and X_2 by graphical method
- ii. Find maximum profit
- iii. Find the range of optimality for coefficient of X_1 and X_2 in the objective function.
- (b) Suppose MAD of your historical data is 5 and you found the forecast for the next period as 350. You have 10 units on-hand from the last period. How much do you need to produce for the next period? After the next period you again calculated the MAD with the new data and found MAD as 4 (suppose). Do you think that the demand should be higher than the forecast? Justify your answer. [5]

3. Brown and Brown Electronics manufacture a line of digital audiotape (DAT) players. While there are differences among the various products, there are a number of common parts within each player. The bill of materials, showing the number of each item required, lead times and the current inventory on hand for the parts and components, follows: [20]



Demand of products A & B and demand of spares components are shown below:

Item	Demand on 9 th week	Demand on 7 th week	On-Hand	Lead Time (Weeks)
A	700	----	30	1
B	1200	----	50	2
C	----	270	75	1
D	320	----	80	2
E	----	380	100	1
F	----	100	150	1
G	----	----	40	1
H	----	----	200	1
I	----	----	300	1

Prepare an MRP schedule to satisfy demand (Use the supplied sheet)

4. (a) There are following seven jobs and they must pass through Machine 1 and Machine 2, respectively. Operating time in weeks for both the machines are shown below for each of the job. [12]

Job	Operations Time for machine 1	Operations Time for machine 2
L	9	6
M	5	5
N	7	6
O	6	3
P	1	2
Q	2	6
R	4	6

- Schedule (job sequence and show the arrangement in diagram for machine 1 & 2) the seven jobs through two machines in sequence to minimize the flow time using Johnson's rule
- Find the job completion time
- Find the slack time or idle time for machine 1 & 2, separately.

(b) Assign the tasks to the employees such that each employee will be assigned by only one job to minimize the total cost. Find at least two multiple solutions if there is any. [8]

		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

5. (a) The Farmer's American Bank of Leesburg is planning to install a new computerized accounts system. Bank management has determined the activities required to complete the project, the precedence relationships of the activities are as follows: [10]

Activity	Description	Activity Predecessor	Time (Weeks)
A	Position recruiting	-----	4
B	System development	A	3
C	System training	A	5
D	Equipment training	A	3
E	Manual system test	B,C	5
F	Preliminary system changeover	C	6
G	Computer-personal interface	D	5
H	Equipment -modification	E	4
I	Equipment testing	F,G	5
J	System debugging and installation	H,I	7

- Draw the AON network diagram
 - Find the project completion time
 - Find the critical path
 - Find ES/EF and LS/LF for each of the activity
 - If you reduce the time required for activity D & E by 1 week each, find the project completion time and critical path as well.
- (b) What are the types of inventory and inventory cost? Explain briefly with examples. [5]
- (c) Discuss the project life cycle and different stages of a project in detail. [5]

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
 Determine the economic order quantity and the reorder point. Also find the Annual Ordering and Holding cost. State some significance of the obtained results.

(b) The following tabulations are actual sales of units for six months and a starting forecast in January. [12]

	Actual	Forecast
January	100	80
February	94	
March	106	
April	80	
May	68	
June	94	

- Calculate forecast for the remaining five months using simple exponential smoothing with $\alpha = 0.2$
 - Find forecasted value for the last three months using 3 quarter moving weighted average method (assign 2.5 times more weight for the most recent data compare to the most old data and 1.5 times more weight for the second recent data compare to the most old data)
 - Using MAD, find the appropriate forecast method among the above two. Justify your answer.
7. (a) A dairy feed company may purchase and mix one or more of the three types of grains containing different amounts of nutritional elements. The data are given in the table below. The production manager specifies that any feed mix for his livestock must meet at least minimal nutritional requirements and seeks the least costly among all such mixes. Formulate for linear programming model. [8]

	Item	One unit weight of			Minimal Requirement
		Grain-1	Grain-2	Grain-3	
Nutritional ingredients	A	2	3	7	1250
	B	1	1	0	250
	C	5	3	0	900
	D	6	25	1	1232.5
Cost/unit weight (Tk)		41	35	96	

- What are the important characteristics of a project? [3]
- What are the different assumptions of Basic Fixed Order Quantity Model? [3]
- What are the qualitative forecasting methods? Discuss them briefly. [6]