

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
II Semester 2022 – 2023

Course No: MSE G512
Date: 17th March 2022
Max Marks: 50

Course Title: Manufacturing Planning & Control
Max Time: 90 min
Mid-semester Exam (Closed Book)

Q. 1. Print-for-All is a family-owned print shop that has grown from a three-press two-color operation to a full-service facility capable of performing a range of jobs from simple copying to four-color printing, scanning, binding, and more. The company is moving into a new facility and would like some help arranging its 16 processes into an efficient, yet flexible, layout. A list of the most popular jobs is shown with processing information. How would you arrange the processes to ensure an efficient *and* flexible operation? [7]

Job	Processes															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	X	X										X				
B						X	X									
C	X						X							X		
D	X	X					X							X		
E				X		X										
F						X	X			X						
G	X	X									X					
H					X				X						X	
I	X	X	X											X		
J						X				X						
K									X						X	X
L				X		X				X		X				
M		X						X			X					
N									X						X	X
O					X				X						X	X
P				X		X				X						
Q							X									

Q. 2. 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, and activity time estimates as follows: Determine the earliest and latest activity times, the expected completion time and standard deviation, and the probability that the project will be completed in 40 weeks or less. [7]

Activity	Description	Activity Predecessor	Time Estimates (Weeks)		
			a	m	b
a	Position recruiting	-	5	8	17
b	System development	-	3	12	15
c	System training	a	4	7	10
d	Equipment training	a	5	8	23
e	Manual system test	b c	1	1	1
f	Preliminary system changeover	b c	1	4	13
g	Computer-personnel interface	d e	3	6	9
h	Equipment modification	d e	1	2.5	7
i	Equipment testing	h	1	1	1
j	System debugging and installation	f g	2	2	2
k	Equipment changeover	g i	5	8	11

- Q. 3. Fans ForYou is a small, privately owned company that manufactures fans. Large variations in demand due to seasonality have contributed to high costs for the company. Fans ForYou currently uses a level production strategy because it prefers not to hire and fire employees. However, if there is enough cost justification, the company will consider alternative production plans.
- What is the cost of the current production plan?
 - How much would Fans ForYou save by using a chase demand strategy?
 - How much would Fans ForYou save by keeping a steady workforce of 20 workers and supplementing with overtime and subcontracting as needed?

Month	September	October	November	December	January	February	March	April	May	June	July	August
Demand	1500	1000	600	600	600	800	1000	1000	4000	6500	6000	4000

Beginning inventory 0, Beginning workforce 25 workers, Production rate 100 fans per worker per month, Regular production cost \$40 per fan, Overtime production cost \$60 per fan, Subcontracting cost \$70 per fan, Overtime capacity Not to exceed regular production, Subcontracting capacity Unlimited, Holding cost \$8 per fan
Hiring cost \$2000, Firing cost \$3000. Formulate the problem as a LPP [15]

- Q. 4. Today is day 4 of the planning cycle. Sequence the following jobs by FCFS, SPT, SLACK, and DDATE. Calculate the mean flow time and mean tardiness for each sequencing rule. Which rule would you recommend? [6]

Job	Processing Time(in days)	Due Date
A	3	10
B	10	12
C	2	25
D	4	8
E	5	15
F	8	18
G	7	20

- Q. 5. What are the major cost factors considered in process selection? How is a breakeven analysis used for process selection? [6]
- Q. 6. Suppose your college or university was planning to develop a new student center and athletic complex with a bookstore, theaters, meeting areas, pool, gymnasium, and weight and exercise rooms. Identify three potential sites on your campus for this facility and rank them according to location factors you can identify. [9]

*****good luck*****