R09

Code No: D0405, D3304

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech II - Semester Examinations, March/April 2011
PRODUCTION AND OPERATIONS MANAGEMENT
(COMMON TO CAD-CAM, ADVANCED MANUFACTURING SYSTEMS)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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1. a) Define Production operations Management. Give its overview.
   b) Explain how POM is evolved historically. [12]

2 a) Explain various approaches for product development.
   b) What is concurrent engineering? Explain its importance in product design. [12]

3. a) Explain various phases of product life cycle with examples.
   b) Explain the Fast diagram with an application to improve the value of pencil. [12]

4. A Synchro Manufacturing Company (SMC) is developing a new repetitive process. The process will involve 12 tasks. The task times and precedence relationships are as follows

Task	Task time(sec)	Predecessors
A	12	-
B	8	A
C	10	-
D	16	C
E	20	B,D
F	9	-
G	15	-
H	11	E,F,G
I	8	H
J	15	I
K	8	I
L	13	J,K

a) Compute the cycle time SMC can have if it wants to produce 1100 units of product per eight hour day.
b) Compute the theoretical minimum number of work stations needed.
c) Using the Ranked Positional Weight Method; determine the minimum number of workstations showing which tasks are to be assigned to each work station.
d) Compute the efficiency and delay of the production line. [12]

Contd….2

5. A company uses overtime, inventory and subcontracting to absorb fluctuations in demand. An aggregate production plan is devised annually and updated quarterly. Cost data, expected demand, and available capacities in units for the next four quarters are given here. Demand must be satisfied in the period it occurs: that is, no backordering is allowed. Design a production plan that will satisfy demand at minimum cost.

Quarter	Expected demand	Regular capacity	Overtime capacity	Subcontract capacity
1	900	1000	100	500
2	1500	1200	150	500
3	1600	1300	200	500
4	3000	1300	200	500

Regular production cost per unit =Rs 20
Overtime production cost per unit =Rs 25
Subcontracting cost per unit = Rs 28
Inventory holding cost per unit per period =Rs 3
Beginning inventory =300 units [12]

6. A company manufactures product Z using four basic components and performing two additional machining operations and three assembly operations. Components A and C are made by the company and components B and D are purchased from vendors. The BOM for product Z is given below.

Level No	Item description	No.of required	Make/buy	Lead time
00	Product Z		Make	1 week
01	Assembly F	1	Make	1 week
02	Machined E	1	Make	2 weeks
03	Component A	1	Make	2 weeks
02	Fastener B	2	Buy	2 weeks
01	Machined G	2	Make	1 week
02	Assembly C	1	Make	3 weeks
01	Assembly H	2	Make	1 week
02	Component A	1	Make	2 weeks
02	Component D	3	Buy	4 weeks
01	Fastener B	4	Buy	2 weeks

The product is made as follows
i) a unit of component A is machined and converted into component E
ii) a unit of E is then assembled with two units of B to make F
iii) a unit of C is machined and converted into G
iv) a unit of A and three units of H and four units of B are then assembled into product
Derive the material requirements plans for product Z and components F and E using lot for lot procurement assuming the requirements for product Z from the MPS are as follows: [12]

Contd….3

7. a) Explain the various standard scheduling rules.
   b) Find the sequence that minimizes total elapsed time (in hours) required to complete the following jobs on three machines M_1, M_2 and M_3 in that order. Also calculate minimum makes pan time

Jobs

Machines	A	B	C	D	E
M_1	8	3	7	2	5
M_2	3	4	5	2	1
M_3	8	7	6	9	10

[12]

8. A small maintenance project consists of the jobs in the following table. With each job is listed its normal time and a crash time in days. The cost in rupees per day of crashing each job is also given.

Activity	Normal duration (days)	Crash duration (days)	Cost of crashing Rs/day
1-2	9	6	20
1-3	8	5	25
1-4	15	10	30
2-4	5	3	10
3-4	10	6	15
4-5	2	1	40

   a) What is the normal project length?
   b) What is the optimum length if the overhead cost is Rs. 60/day? [12]

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