GANPAT UNIVERSITY

M.Tech. –ME (A.M.T.) Sem-I Regular Examination, January - 2012

3ME102 - PRODUCTION AND OPERATION MANAGEMENT

Max. Time: 3 hours **Max. Marks: 70**

Instructions:

(1) Attempt all question.
(2) Right figure indicates full marks.
(3) Assume required data if necessary.

SECTION-I

Q.1 (a) What do you understand by the following: **4**

(i) Collective opinion method.
(ii) Time series Analysis.

(b) Define sales forecasting state the various sales promotion methods. **3**

(c) The quarterly sales for last 3 years is given below. Calculate the quarterly sales of 4th year. **5**

Year	Quarter	Unit Sales ($x10^4$)
1	1	20
	2	35
	3	42
	4	29
2	1	26
	2	35
	3	50
	4	34
3	1	37
	2	47
	3	55
	4	44

OR

Q.1 (a) What is Economic Order Quantity? Derive an expression for the economic order quantity when the stock replenishment is instantaneous giving the assumptions made. **6**

(b) A hardware store produces and sells hardware items. Following information is available **6**

Expected annual sales = 8000 units
Ordering cost = Rs. 180 per order
Holding cost = 10% of average inventory value.
The item can be purchased in the following schedule:

Lot size	Unit price (Rs.)
1 - 999	22.00
1000 - 1499	20.00
1500 - 1999	19.00
2000 above	18.50

You are required to determine order size.

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Q.2 (a) Explain the steps involved in capacity planning. 4

(b) Discuss the advantages and disadvantages of various aggregate planning methods. 4

(c) Explain MPS with an example. 3

OR

Q.2 (a) What is 'Just in Time' Production? What are its aims? What is the role of automation in JIT? 4

(b) How MRP differs from inventory control system? What are the input to MRP? 4

(c) Explain the objectives of supply chain management? 3

Q.3. **Attempt Any Three** 12

(a) Explain Operation strategy techniques for organization

(b) Explain role of Capability Maturity Model (CMM) in Management Information System

(c) Explain Data flow diagram and E-R diagram for MIS

(d) Explain in briefly moving average method for forecasting

SECTION – II

Q.4 **Write following**

a) What is sensitivity analysis? Discuss the effect of (3)
i) Variation of b_i, ii) Variation of C_j.

b) Explain the benefits and limitation for CAPP (3)

c) Consider the following table which represents an optimal solution to some L.P.P : (6)

		C_j	2	4	1	3	2	0	0	0
C_B	Basis	Solution Value	X_1	X_2	X_3	X_4	X_5	S_1	S_2	S_3
2	X_1	3	1	0	0	-1	0	1/2	1/5	-1
4	X_2	1	0	1	0	2	1	-1	0	1/2
1	X_3	7	0	0	1	-1	-2	-2	-3/10	2
		Cj- Zj	0	0	0	-2	0	-2	-1/10	-2

If the additional constrain $4X1 + 3X2 - X3 + 2X4 + 4X5 \leq 5$ is annexed to the system, will there be any change in the optimal solution? Justify your answer

OR

Q.4 **Write following**

a) What are the variable associates with aggregate planning? (3)

b) A printer has one printing press, one binding machine and manuscripts of six books for publication. The durations required (in days) for printing and binding the books are given below: (3)

Book	**1**	**2**	**3**	**4**	**5**	**6**
Printing time (days)	30	120	50	20	90	110
Binding time (days)	80	100	90	60	30	10

In what order should the books be selected so as to minimize the total duration to publish all the books.

c) Given optimal solution. If product B is not to be produced, so that variable X2 is to be deleted from this table, find the optimum solution to the resulting L.P. Problem. (6)

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		C_j	4	6	2	0	0	0
C_B	Basis	Solution Value	X_1	X_2	X_3	S_1	S_2	S_3
4	X_1	5/3	1	0	0	29/18	-5/18	-1/6
6	X_2	2/3	0	1	0	-8/9	2/9	1/3
2	X_3	2/3	0	0	1	5/18	1/18	-1/6
		Cj- Zj	0	0	0	-5/3	-1/3	-1

Q.5 **Write following**

a) The following table gives the activities in a small project and other relevant information. **(6)**

Activity	Duration (days)	Masons	Labourers
1-2	2	1	2
2-3	3	2	2
2-4	4	3	2
2-5	2	1	3
3-10	4	2	2
4-6	2	3	2
4-7	4	3	3
5-9	4	5	3
6-8	2	1	2
7-9	5	1	3
8-9	3	-	4
9-11	2	1	1
10-11	3	1	2
11-12	2	1	2

Draw the network diagram for above project, and analyses the project and smoothen the requirement of the resources.

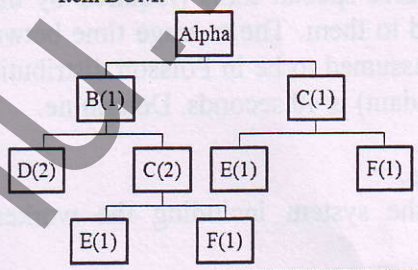
b) The cost of new machine is Rs. 5,000. The maintenance cost during the nth year is given by Mn = Rs. 500 (n-1), where n = 1, 2, 3,…. If the discount rate per year is 0.05, after how many years will it be economical to replace the machine by a new one? **(5)**

OR

Q.5 **Write following**

a) Prepare the MRP Schedule for given product structure. **(6)**

Item BOM:



Item	Lead Time	Current Inv. Pos.
Alpha	1	10
B	2	20
C	3	0
D	1	100
E	1	10
F	1	50

Gross Reqs for Alpha								
Period	6	7	8	9	10	11	12	13
Gross Reqs.			50			50		100

b) Philips India is engaged in manufacturing different types of equipments by various consumers. The company has two assembly lines to produce its product. The processing time for each of the assembly lines is regarded as a random variable and is described by the following distributions: **(5)**

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Processing time (min.)	Assembly X	Assembly Y
40	0.10	0.20
42	0.15	0.40
44	0.40	0.20
46	0.10	0.15
48	0.25	0.05

Using the following random numbers, generate data on the processing times for 10 units of the item and compute the expected processing time for the product:
4236, 7573, 4943, 1283, 2014, 3604, 9344, 5316, 7606, 0089.
For the purpose, read the number horizontally, taking the first two digits for the processing time on assembly X and the last two digits for processing time on assembly Y.

Q.6 **Write following (any Three)** **(12)**

a) Master Production Schedule is to drive the entire production system. Identify the MPS functions.

b) The task timings and precedence relationships are given below.

Activity	Precedence task	Duration(min.)
A	-	10
B	-	24
C	A	17
D	A	49
E	C	12
F	C	14
G	B	27
H	E	9
I	F, G	20
J	D, H, I	23
K	I	36
L	J, K	18

i) Draw the precedence diagram
ii) How many work station required.
iii) What is line efficiency? And balance delay.

c) Worker come to tool storage room to receive special tools (required by them) for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time (of the tool room attendant) is 40 seconds. Determine.

i) Average queue length.
ii) Average length of non-empty queues.
iii) Average number of workers in the system including the worker being attended.
iv) Mean waiting time of an arrival.
v) Average waiting time of an arrival (worker) who waits, and
vi) The type of policy to be established. In other words, determine whether to go in for an additional tool storage room attendant who will minimize the combined cost of attendant's idle time and the soct of worker's waiting time. Assume the charges of a skilled worker Rs. 4 per hour and that of tool store room attendant Rs. 0.75 per hour.

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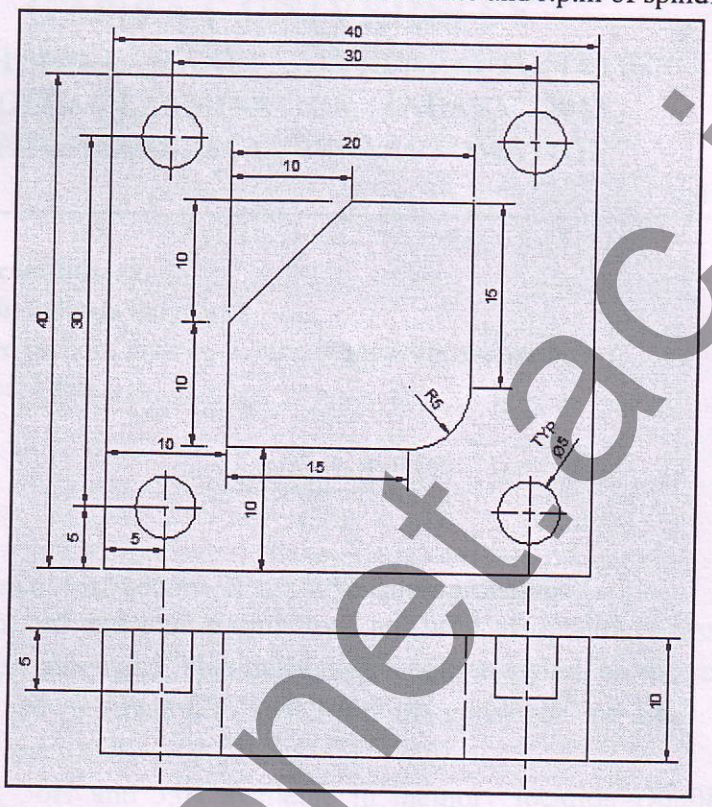
d) Prepare the detail process sheet for given components. And raw material size is Raw Material Size: 100 X 100 X 25 mm. Assume feed rate and r.p.m of spindle.



Best Luck

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