



INDIAN INSTITUTE OF MATERIALS MANAGEMENT

June 2018

Post Graduate Diploma in Materials Management

Graduate Diploma in Materials Management

Paper No. 2

QUANTITATIVE TECHNIQUES AND OPERATIONS RESEARCH

Date: 10.06.2018

Max .Marks: 100.

Time: 2.00 to 5.00 p.m.

Duration: 3 hours

Instructions:

1. The Question Paper is in two parts- Part A (compulsory) and Part B.
2. From Part A answer all the questions. Each question carries 1 mark, total 25 marks. (Total Marks 25)
3. From Part B answer any five questions out of 7 questions .Each question carries 15 marks, total 75 marks.
4. Use of non-scientific calculator and/or mathematical tables is permitted.
5. Graph paper can be used wherever necessary.

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**PART A**  
( Compulsory)

( 25 x1 = 25 marks)

**Q.1 State True Or False**

15 marks

- a. Analysis of behaviour of a gas container developed by Markov
- b. Processing n jobs in two machines can be done by Johnson rule
- c. VAM is used in dual programming
- d. Dynamic model is representation of the behavior of real problem
- e. Moving average is used in inventory analysis
- f. To calculate floats CPM is to be applied
- g. Cost slope is starting point of crashing of activities in a net work
- h. Exponential smoothing is a forecast model
- i. At break even point fixed cost is not equal to contribution
- j. Simplex method is also known as simplex algorithm
- k. Stochastic variable is known as chance variable
- l. Two tails of normal distribution will never touch x- axis
- m. Net present value method does not recognise time value of money
- n. Queuing model does not specify by service channels
- o. A POISSON distribution is a discrete probability distribution.

**Q.2 Fill up the blanks**

5 marks

- a. VMI stands for -----
- b. LP model solves the problem of product -----
- c. MARKOV CHAIN PROCESS is used for brand -----
- d. Two machines and N no of jobs can be scheduled by -----
- e. EOQ model is applicable when there is ----- demand

**Q.3 Abbreviate the following**

**5 marks**

- a. IRR
- b. OR
- c. NPV
- d. TPM
- e. DCF

**PART B**

**(Answer any five)**

**( 5 x15 = 75 marks )**

**Q.4** There are 4 jobs A,B,C,D can be manufactured at 4 machines 1, 2, 3, 4. One job is allocated to one machine unit production cost of the jobs on each machine centre is given in the table **15 marks**

	1	2	3	4
A	5	4	2	6
B	3	2	5	4
C	1	4	2	3
D	2	3	4	5

Find the allocation of jobs to machine centre so that total cost of process will be minimum.

**Q.5** find the project duration time and identify critical path

**15 marks**

ACTIVITY	A	B	C	D	E	F	G	H	I
DURATION	3	2	3	4	2	3	4	2	2
Interdependence	--	--	--	-B	A	D,	G	C	E H,F

**Q.6** Machine operator has to perform two operations turning, and threading on no of jobs . Time required to perform the operation in minutes are given

Determine the order in which the job is to be processed in order to minimise total time required to finish the jobs also find the idle time on the two machines **15 marks**

JOB	TIME (TURNING ) MIN	TIME (THREADING ) MIN
1	3	8
2	12	10
3	5	9
4	2	6
5	9	3
6	11	1

**Q.7** A firm uses lathes ,milling, and grinding machines to produce two parts. machine times reqd for each part is shown and max time available and profit are also shown, find the no of part each to manufacture per week to maximise the profit

- a. Formulate the linear programming model **8 marks**  
 b. Use graphical method or simplex method to solve the problem. **7marks**

TYPE OF MACHINE	TIME		MAX AV TIME PER WEEK
	M/C 1	M/C2	
LATHE	12	6	3000
MILLING	4	10	2000
GRINDING	2	3	900
PROFIT PER UNIT	RS 40	RS 100	time all in minutes

**Q8 a)** Discuss in brief NPV method **5 marks**

b) The xyz co ltd is planning for three investments A B C each requires an investment of Rs 4900 and each has economic life of 3 years and total cash inflow over that period Rs 6000. The pattern for each proposal is **10 marks**

YEAR	ANNUAL CASH IN FLOW		
	A	B	C
1	RS 1000	RS 2000	RS 3000
2	2000	2000	2000
3	3000	2000	1000

Calculate the NPV of each proposal if required rate of return 10 percent.

**Q.9** A self service store employ one cashier at the counter. 9 customers at every 5 minutes while cashier can serve 10 customer in 5 minutes **15 marks**

Assuming Poisson's distribution on arrival rate and exponential on service rate find

- 1 . Average no of customer in the system
- 2 Average queue length
- 3 AV time a customer spends in the system
- 4 AV time a customer waits before served

**Q.10 a.** What is EOQ ? **5 marks**

**b.** A firm uses 12000 units a year of a material costing Rs 1.25 per unit. Ordering cost Rs 15 per order holding cost is 5 percent per year of average inventory Find the EOQ **5 marks**

**c.** Firm follows EOQ and it operates for 300 days per year, procurement time 14 days and safety stock is 400 units. Find re order level max inventory and av inventory. **5 marks**

**Q.11** An auto rickshaw driver finds from his previous record that the cost of running an auto, whose purchase price is rs 7000 is as below **15 marks**

YEAR	1	2	3	4	5	6	7	8
RUNNING COST	1100	1300	1500	1900	2400	2900	3500	4100
RESALE PRICE	3100	1600	850	475	300	300	300	300

AT WHAT AGE IS THE REPLACEMENT DUE?

**Q. 12** What is Breakeven Analysis ? Discuss in detail. **15 marks**

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