

03 Hrs

[Total Marks 80]

N.B.:

- (1) Question No.1 is compulsory
- (2) Attempt any **three** questions out of remaining **five** questions
- (3) Figures to right indicate full marks
- (4) Assume suitable data if **necessary**.
- (5) Notations carry usual meaning.

Q.1 Write short notes on the following (Any four)

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- i) Shop floor control
- ii) Limitations of JIT
- iii) Need of Simulation
- iv) JIT and MRP-I
- v) Gantt Chart

Q.2 (A) A small project is composed of 7 activities whose time estimates are listed below

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Activity	Optimistic (Weeks)	Most likely (Weeks)	Pessimistic (Weeks)
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

- a) Draw the network diagram of activities in the project
- b) What is the expected project length
- c) What is the probability that the project will be completed at least 4 weeks earlier than expected time

(B) The following information is available regarding a product

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Regular time production capacity=2500 units per month

Inventory carrying cost=Rs.10 per unit

Backlog costs=Rs.5 per unit per month

Beginning inventory=400 units

Demand in units for four months is 4000, 3500, 2500, and 2800 respectively.

Develop a level output capacity plan that yields zero inventory at the end of the 4th month. What is the total cost that will result from this plan?

- Q.3 (A)** Three grades of coal A, B and C contain phosphorous and ash as impurities. In a particular industrial process, fuel up to 100 tons (maximum) is required which contain ash not more than 30 % and phosphorous not more than 0.03%. It is desired to maximize the profit while satisfying these conditions. There is an unlimited supply of each grade. The percentage of impurities and the profit of grades are given below: 12

Coal	Phosphorous (%)	Ash (%)	Profit (Rs./ton)
A	0.02	2.0	12
B	0.04	3.0	15
C	0.03	5.0	14

Formulate a problem as LP model and solve.

- (B)** Four buildings (B1, B2, B3 and B4) are to be constructed by four different contractors (C1, C2, C3 and C4). Each contractor has submitted the bid for the four buildings. The bid amount has been shown below. The problem is to determine which building is to be awarded to each contractor; so as to keep the cost of construction of four building optimum. 8

Building	Contractor			
	C1	C2	C3	C4
B1	48	48	50	44
B2	56	60	60	68
B3	96	94	90	85
B4	42	44	54	46

- Q.4 (A)** We have six jobs, each of which go through the machine A, B and C in the order of ABC, Processing time (in hours) are given 10

Job	1	2	3	4	5	6
Machine A	8	3	7	2	5	1
Machine B	3	4	5	2	1	6
Machine C	8	7	6	9	10	9

Determine the minimum elapsed time, idle time for machines and idle time for jobs

- (B)** Explain various functions of MPC. 05
(C) Explain the importance of duality in Linear Programming Model. 05

- Q.5 (A)** A materials manager adopts the policy to place an order for a minimum quantity of 500 of a particular item in order to avail a discount of 10%. It was found from the company record that for last year 8 orders were placed each of size 200 nos. Ordering cost is Rs. 500/- per order inventory carrying charges at 40%. Cost per unit = Rs.400/-. Is the purchase manager justified in his decision? What is the effect of this decision on company? 10

- (B)** Write a short note on (i) Capacity Planning (ii) Exponential Smoothing Method in forecasting 10

Q.6 (A) The sales of the company is given below

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Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Sales	240	280	300	330	380	410	490	560	680	800

Fit the straight line to the data and find

- 1) Forecast for the year 2013
- 2) Coefficient of correlation
- 3) Standard error of estimate
- 4) Limits of forecast for 95% confidence level

(B) Solve the following transportation problem for optimal solution

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Source	Destination				Supply
	1	2	3	4	
1	3	1	7	4	300
2	2	6	5	9	400
3	8	3	3	2	500
Demand	250	350	400	200	

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