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Register Number:
Name of the Candidate:

B.Sc. DEGREE EXAMINATION, May 2015

(MATHEMATICS)

(THIRD YEAR)

(PART – III)

740. OPERATIONS RESEARCH

Time: Three hours Maximum: 100 marks

Answer any FIVE questions **(5 × 20 = 100)**

1. a) A company has three operational departments (weaving, processing and packing) with capacity to produce three different types of clothes namely suiting's, shirting's, and woollens yielding a profit of ₹ 2, ₹4 and ₹3 per meter respectively. One meter suiting requires 3 minutes in weaving, 2 minutes in processing and 1 minute in packing. Similarly one meter of shirting requires 4 minutes in weaving, 3 minutes in each department. In a week, total run time of each department is 60, 40 and 80 hours for weaving processing and packing department respectively. Formulate L.P.P. model.

   b) Solve the LPP graphically

   Max $Z=3x_1+2x_2$

   Subject to

   $-2x_1+x_2=1$

   $x_1 \geq 3$

   $x_1+x_2 \leq 3$

   $x_1, x_2 \geq 0$

2. Using simplex method solve the following LPP

   Max $Z=x_2-3x_3+2x_5$

   Subject to

   $3x_2-x_3+2x_5 \leq 7$

   $-2x_2+4x_3 \leq 12$

   $-4x_2+3x_3+8x_5 \leq 10$

   $x_2, x_3, x_5 \geq 0$

3. Use two-phase method to

   Maximize $Z=3x_1-x_2$

   Subject to

   $2x_1+x_2 \geq 2$

   $x_1+3x_2 \leq 2$

   $x_2 \leq 4$

   $x_1, x_2 \geq 0$

4. a) Obtain the dual of the following L.P.P.

   Maximize $Z=2x_1+x_2$

   Subject to $x_1+5x_2 \leq 10$

   $x_1+3x_2 \geq 6$

   $2x_1+2x_2 \leq 8$; $x_2 \geq 0$ and x_1 unrestricted

b) Solve the following LPP using dual simplex method

Minimize $Z=2x_1+x_2$

Subject to

$3x_1+x_2 \geq 3$

$4x_1+3x_2 \geq 6$

$x_1+2x_2 \leq 3$

$x_1, x_2 \geq 0$

5. Solve the following transportation problem by using north-west corner method

		To					
		I	II	III	IV	V	Availability
From	A	2	4	6	8	9	20
	B	2	10	1	5	8	30
	C	7	11	20	40	3	15
	D	2	1	9	14	16	13
Requirement		40	6	8	18	6	

6. Solve the following assignment problem

	1	2	3	4	5
A	8	4	2	6	1
B	0	9	5	5	4
C	3	8	9	2	6
D	4	3	1	0	3
E	9	5	8	9	5

7. Find the optimal sequences, the total minimum elapsed time and idle time for each machines

Task:	A	B	C	D	E	F	G	H	I
Machine 1:	2	5	4	9	6	8	7	5	4
Machine 2:	6	8	7	4	3	9	3	4	11

8. A contractor has to supply 10,000 bearings per day to an automobile manufacturer. He finds that when he starts a production run, he can produce 25,000 bearings per day. The cost of holding a bearing in stock for one year is ₹ 2 and the set-up cost of a production run is ₹1800. How frequently should production run be made?

9. A manufacturer is offered machines A and B. A is priced at ₹ 5000 and running costs are estimated at ₹800 for each of the first 5 years, increasing by 200 per year in the 6th and subsequent years. Machine B, which has the same capacity as A costs ₹2500 but will have running costs of ₹1200 per year for six years, increasing by ₹200 per year thereafter. If the rate of interest is 10% per year, which machine should be purchased. Assume that the machines have no resale price.

10. a) Explain about the systems with component in series and systems with parallel components.

b) The mean life of a component is equal to 20 hours. It is proposed to increase reliability by 25% for a mission time equal to 40 hours. What should be the mean life of the improved design assuming exponential failure characteristics?
