BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MCA **SEMESTER : V**
BRANCH: MCA **SESSION : MO/18**

SUBJECT: MCA5005 OPTIMIZATION THEORY

TIME: 3 HRS. **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Describe the phases of Operation Research. [6]

Q.1(b) Consider the example of a manufacturer of animal feed who is producing feed mix for dairy cattle. [6]
In our simple example the feed mix contains two active ingredients and a filler to provide bulk. One kg of feed mix must contain a minimum quantity of each of four nutrients as below:
Nutrient A B C D
gram 90 50 20 2
The ingredients have the following nutrient values and cost

	A	B	C	D	Cost/kg
Ingredient 1 (gram/kg)	100	80	40	10	40
Ingredient 2 (gram/kg)	200	150	20	-	60

What should be the amounts of active ingredients and filler in one kg of feed mix?

Q.2(a) Differentiate in following: [2+2+2+]
(i) infeasible and unbounded (show graphically)
(ii) Constraints and basic variables
(iii) Optimal and feasible solution

Q.2(b) For an optimization problem following facts are given [6]
- Hot dog mixture in 1000-pound batches.
- Two ingredients, chicken ($3/lb) and beef ($5/lb).
- Recipe requirements:
  at least 500 pounds of “chicken”
  at least 200 pounds of “beef”
- Ratio of chicken to beef must be at least 2 to 1.
- Determine optimal mixture of ingredients that will minimize costs. Solve it graphically.

Q.3(a) Solve following LPP using simplex method [6]
Max $Z=x+1.2y$
s.t. $2x+y\leq 180$
$x+3y\leq 300$
$x,y\geq 0$

Q.3(b) Explain BIG-M method with example. [6]

Q.4(a) Show that dual of given LPP has no variables is same as no of constraints in primal. [4]
Min $Z_x=x1-3x2-2x3$
s.t. $3x1-x2+2x3<=7$
$2x1-4x2>=12$
$-4x1+3x2+8x3=10$
And $x1,x2>=0$, x3 is unrestricted

Q.4(b) Solve given LPP by dual simplex method [8]
Min $z = 2x1 + x2$
s.t. $3x1 + 2x2 \geq 3$
$2x1 + 3x2 \geq 6$
$3x 1 + 2x2 \leq 3$
$x i \geq 0$

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Q.5(a) Differentiate between pure integer programming and mixed integer programming. [4]

Q.5(b) Solve given LPP by revised simplex method [8]

Max Z=2x+y

s.t. $3x+4y \leq 6$

$6x+y \leq 3$

And $x,y \geq 0$

Q.6 Find minimum path using dynamic programming for given stage coach problem. [12]

	B	C	D
A	2	4	3

	E	F	G
B	8	7	5
C	3	2	4
D	4	1	5

	H	I
E	9	3
F	7	5
G	9	4

	J
H	3
I	8

Q.7(a) What is Quadratic programming? [6]

Q.7(b) What is separable convex programming problem and how they are different then quadratic programming? [6]

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