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**B.E. / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2013
GEOINFORMATICS BRANCH**

FIFTH SEMESTER – (REGULATIONS 2008)

GI 9404 OPERATIONS RESEARCH FOR GEOINFORMATICS

Time: 3hrs

Max Marks: 100

Answer ALL Questions
Part – A (10 x 2 = 20 Marks)

1. Define Operation Research. List out various applications of OR in geoinformatics.
2. Write short note on scope of Operation Research.
3. Compare the parameters of dual and primal problems.
4. What do you mean by sensitivity analysis? Give an example
5. Write short note on dynamic programming.
6. Write short note on Bellman's optimality criteria.
7. What do you understand by the term "crashing of an activity".
8. Differentiate the various management tools such as CPM, PERT and LP.
9. Write short note on application of simulation in Geoinformatics.
10. Write short note on role of simulation in investment decisions.

Part B (5 X 16 = 80)
Answer All Questions

11. Describe different Phases involved in Operation Research modeling approach in detail 16
- 12a. Use Simplex method of algebraic approach to solve this model 16

Maximize $Z = 2x_1 + x_2$
 Subject to

$$x_2 \leq 10$$

$$2x_1 + 5x_2 \leq 60$$

$$x_1 + x_2 \leq 18$$

$$3x_1 + x_2 \leq 44$$

and

$$x_1 \geq 0, \quad x_2 \geq 0$$

What is the resulting total profit?

(OR)

- 12b. i) Explain briefly the assumptions in linear programming 6
- ii) Consider the following problem 10

Maximize $Z = 2x_1 + 3x_2$
 Subject to

$$x_1 + 2x_2 \leq 4$$

$$x_1 + x_2 = 3$$

and

$$x_1 \geq 0, \quad x_2 \geq 0$$

- i) Use graphical method to find the optimal solution.
- ii) For each CPF solution identify its adjacent CPF Solutions

(PTO)

13a. In the early days the Easy – ride stagecoach Line was operating on a marginal budget, so they were interested in finding a route between city A and city L that would maximize their profit. The profit from operating between cities is given below. Note that only certain cities can be reached directly from a given city. For example, only cities E, F, G and H can be reached directly from city B. **16**

To City →

From City ↓	B	C	D	E	F	G	H	I	J	K	L
A	5	4	2								
B				8	10	5	7				
C				6	3	8	10				
D				8	9	6	4				
E								8	4	3	
F								5	2	7	
G								4	10	6	
H								12	5	2	
I											7
J											3
K											6

- i) Draw the structure (Network) of the stagecoach problem showing the stages and states.
- ii) What route should be taken from city A to city L in order to maximize the total profit? Use dynamic programming.

(OR)

- 13b i) Explain different types of dynamic programming in detail with examples **10**
 ii) Explain the role of dynamic programming in Geoinformatics **6**

14a. Information on the activities required for a project is as follows **16**

Activity	A	B	C	D	E	F	G	H	I	J	K
Node	1-2	1-3	1-4	2-5	3-5	3-6	3-7	4-6	5-7	6-8	7-8
Duration (Days)	2	7	8	3	6	10	4	6	2	5	6

- i) Draw the arrow diagram
- ii) Find out the critical path and project completion time
- iii) Estimate ES, EF, LS and LF
- iv) Also estimate Total float, Interfering float, Free float and Independent float.

(OR)

(PTO)

- 14b. i) Explain Resource leveling and allocation in detail 4
 ii) The three time estimates t_o , t_m and t_p of each activities of the project are given below 12

Activity	t_o (Optimistic time in days)	t_m (Most likely time in days)	t_p (Pessimistic time in days)
1-2	2	5	14
1-3	3	12	21
2-4	5	14	17
3-4	2	5	8
4-5	1	4	7
3-5	6	15	30

- i) Draw the arrow diagram
 ii) Find the expected duration and variance of each activity
 iii) Determine the critical path and expected project completion time
 iv) What is the probability of completing this project in 35 days?
- 15a. i) Explain in detail the role of computer in Simulation 6
 ii) What is Queuing Theory? Explain in detail different queuing models used in simulation. 10

(OR)

- 15b. i) State and explain the assumptions underlying the basic EOQ formula. 3
- ii) A manufacturing company has determined from an analysis of its accounting and production data for a certain part that (a) its demand is 9000 units per annum and is uniformly distributed over the year, (b) its cost price is Rs 2 per unit, (c) its ordering cost is Rs 40 per order, (d) the inventory carrying charge is 9 percent of the inventory value.
 Further it is known that the lead time is uniform and equals 8 working days and that total working days in a year are 300 13

Determine

- i) The Economic Ordering Quantity (EOQ)
- ii) The optimum number of orders per annum
- iii) Total variable cost
- iv) The re-order level
- v) The number of days stock at re-order level
- vi) The length of the inventory cycle

