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**B.E. / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC. 2011**  
**GEOINFORMATICS BRANCH**  
**SEVENTH SEMESTER – (REGULATIONS 2008)**  
**GI9404 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 award winning applications of OR.
2. Write short note on nature and scope of Operation Research.
3. What do you mean by sensitivity analysis? Give an example
4. Construct the dual problem for the following linear programming model.  
 Maximize  $Z = -x_1 + 2x_2 + x_3$   
 Subject to  
 $3x_2 + x_3 \leq 120$   
 $x_1 - x_2 - 4x_3 \leq 80$   
 $-3x_1 + x_2 + 2x_3 \leq 100$   
 and  
 $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$
5. Write short note on dynamic programming
6. Write short note on Bellman's optimality criteria.
7. What do you understand by the terms Resource allocation and leveling?
8. List out and Differentiate the various management tools.
9. Write short note on application of simulation in Geoinformatics.
10. Write short note on the basic structure of Queuing model.

**Part B (5 X 16 = 80)**

**Answer All Questions**

11. Describe different Phases involved in Operation Research modeling approach 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  
 $x_1 \geq 0, x_2 \geq 0$

What is the resulting total profit?

(OR)

- 12b. i) Explain briefly the assumptions in linear programming 5
- ii) Solve the following problem by graphical method 11

Minimize  $Z = 0.4x_1 + 0.5x_2$   
 Subject to  
 $0.3x_1 + 0.1x_2 \leq 2.7$   
 $0.5x_1 + 0.5x_2 = 6$   
 $0.6x_1 + 0.4x_2 \geq 6$   
 and  $x_1 \geq 0, x_2 \geq 0$

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

(PTO)

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. A small project has the following characteristics 16

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Precedence	-	A	A	B	D	D	D	B	C,E	G	F, I, J	K	H,G	M
Duration (Days)	5	2	6	12	10	9	5	9	1	2	3	9	7	8

- i) Draw the network, ii) Find the Critical Path iii) Determine the different types of floats

(OR)

14b. i) Explain the term time cost-trade off 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 simulation in investment decisions. 8

ii) Explain in detail the role of computer in

i) Simulation 4

ii) Project Management 4

(OR)

15b. i) State and explain the assumptions underlying the basic EOQ formula. 4

ii) The annual Demand for a product is 3,600 units with an average of 12 units per day. The lead time is 10 days. The ordering cost per order is Rs 20 and the annual carrying cost is 25% of the value of the inventory. The price of the product per unit is Rs 3. The total working days in a year are 300. 12

- i) What will be the EOQ? ii) Optimum Number of orders per annum iii) Find the purchase cycle time  
 iv) Determine the Re-order level v) Number of days stock at re-order level vi) Find the total inventory cost per year