

Department of Statistics and Operations Research
College of Science
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OR 122

Mid term Examination-I
First Semester, 1432/33 H

- Q.1** (a) What are the various **applications** of OR?
(b) Write down the **techniques/tools** used in OR?

- Q.2** Answer the following with true (T) or false (F):

- (i). Dynamic programming is an application of OR.
- (ii). OR came into existence during World War I.
- (iii). Linear programming has two basic parts.
- (iv). Any feasible solution of LPP can be an optimal solution.
- (v). Optimal solution of an LPP always satisfies the constraints.
- (vi). Any feasible solution of an LPP always satisfies the constraints.
- (vii). The solution of an LPP is called unbounded if there is no common feasible region in the graph.
- (viii). If there are more than two feasible points giving same value of objective function then this case belongs to multiple optimal solutions.
- (ix). Graphical solution method is used only for two variables LPP.
- (x). Optimal point lies only inside the common feasible region of an LPP.

- Q.3** A call centre has the following minimum daily requirement for operators:

Period	Clock time	Minimum operators required
1	8 am - 12 noon	7
2	12 noon - 4 pm	10
3	4 pm - 8 pm	12
4	8 pm - 12 am	8
5	12 am - 4 am	23
6	4 am - 8 am	5

Operators report to the centre at the beginning of each period and work for 12 consecutive hours. The centre wishes to determine the minimum number of operators to be employed so that there will be sufficient number of them available for each period. **Formulate** this problem as an LPP.

- Q.4** Solve the following LPPs by **graphical method**

(a) $Max Z = 20x_1 + 40x_2$
s.t. $36x_1 + 6x_2 \geq 108$
 $x_1 + 4x_2 \geq 12$
 $2x_1 + x_2 \geq 10$
 $x_1, x_2 \geq 0$

(b) $Min Z = 80x_1 + 120x_2$
s.t. $x_1 + x_2 \leq 9$
 $2x_1 + 5x_2 \leq 36$
 $x_1 \geq 2$
 $x_2 \geq 3$
 $x_1, x_2 \geq 0$