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W—83—2018

FACULTY OF SCIENCE/ARTS

B.Sc./B.A. (Third Year) (Fifth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2018

(CGPA Pattern)

MATHEMATICS

Paper XV (MT303A)

(Operations Research)

(MCQ+Theory)

(Friday, 19-10-2018) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Attempt any *five* of the following :

(*a*) Define feasible solution to general L.P.P.

(*b*) Define unbounded solution.

(*c*) Define optimum basic feasible solution.

(*d*) Define Net Evaluation.

(*e*) Define convex set.

(*f*) State the canonical form of the L.P.P.

2. Attempt any *two* of the following :

(*a*) State the major steps for mathematical formulation of linear programming problem.

(*b*) Write the standard form of general linear programming problem and state its characteristics.

(*c*) A company makes two kinds of leather belts. Belt A is a high quality belt and belt B is of lower quality. The respective profits are Rs. 4.00 and Rs. 3.00 per belt. Each belt of type A requires twice as much time

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as a belt of type B, and if all belts were of type B, the company could make 1000 belts per day. The supply of leather is sufficient for only 800 belts per day (both A and B combined). Belt A requires a fancy buckle and only 400 buckles per day are available. There are only 700 buckles a day available for belt B. Determine the optimal product mix.

3. Attempt any *two* of the following :

(*a*) Prove that a basic feasible solution to an L.P.P. must correspond to an extreme point of the set of all feasible solutions.

(*b*) Prove that any convex combination of K-different optimum solutions to an L.P.P. is again optimum solution to the problem.

(*c*) Obtain all the basic solutions to the following system of linear equations :

$$x_1 + 2x_2 + x_3 = 4$$

$$2x_1 + x_2 + 5x_3 = 5$$

4. Attempt any *two* of the following :

(*a*) Explain the steps in Hungarian Assignment Method.

(*b*) Write the transportation problem for an assignment given below :

	A_1	A_2	A_3
R_1	1	2	3
R_2	4	5	1
R_3	2	1	4

(*c*) A student has to select one and only one elective in each semester and the same elective should not be selected in different semesters. Due to various reasons, the expected grades in each subject, if selected in different semesters, vary and they are given below :

Semester	**Analysis**	**Statistics**	**Graph Theory**	**Algebra**
I	F	E	D	C
II	E	E	C	C
III	C	D	C	A
IV	B	A	H	H

The grade points are : H = 10, A = 9, B = 8, C = 7, D = 6, E = 5, F = 4.

How will the student select the electives in order to maximize the total expected points and what will be his maximum expected total points ?