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Sample questions for Ph.D admission entrance examination in Mathematics

Objective type questions(1 mark for each question):

(10x1=10)Marks

1. The function $f(x) = |x|$, (x is real) is
 - (a) Not differentiable at any point
 - (b) Differentiable at all points
 - (c) Differentiable only at $x=0$
 - (d) Not differentiable at $x=0$

2. If X has the variance 9 and Y has the variance 5 then $\text{Var}(2X+Y-5)$ is equal to
 - (a) 18
 - (b) 23
 - (c) 41
 - (d) 32

3. A: Every optimal solution is feasible solution in L.P.P
B: Every feasible solution is optimal solution in L.P.P
 - (a) A & B both true
 - (b) A is true
 - (c) B is true
 - (d) Both A & B false

Subjective type questions (Five Marks)

(6x5=30) Marks

1. If V is a finite dimensional vector space, with direct sum of its subspaces, U and W then show that $\dim(U+W) = \dim(U) + \dim(W)$.
2. Solve $y''' + y \cos(2x-1)$.
3. Do the Mathematical formulation of the following problem:
A Manufacturer of leather belts makes three types of belts, A, B, and C which are processed on three Machines M_1 , M_2 and M_3 . Belt A requires 2 hours on Machine M_1 and 3 hours on Machine M_3 . Belt B requires 3 hours on Machine M_1 , 2 hours on Machine M_2 and 2 hours on Machine M_3 , and Belt C requires 5 hours on Machine M_2

and 4 hours on Machine M_3 . There are 8 hours of time per day available on Machine M_1 , 10 hours of time per day available on Machine M_2 and 15 hours of time per day available on Machine M_3 . The profit gained from belt A is Rs.3 per unit, from belt B is Rs.5 per unit, from belt C is Rs.4 per unit.