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EXAM ID NUMBER:_____

COURSE NUMBER: EE 231

PROBLEM: 1

Problem 1:
An electromagnetic field, propagating a Cartesian space of coordinates (x,y,z), is characterized by three spherical waves emanating from three source points S1(0,0,-R1), S2(0,0,-R2), S3(0,0,-R3), plus one plane wave propagating along z, with wavevector k parallel to the propagation axis.
Working in paraxial approximation, answer to the following questions:

a) Assuming equal amplitude A1=A2=A3=A for the three waves, write the expression of the Intensity I=|V(x,y,z=0)|^2 in the plane z=0.
b) Assuming R1=4/pi, R2=2/pi, R3=pi, calculate the Intensity I(0,0,0) of the field in the origin of the axes.

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PROBLEM: 2

Problem 2:
A plane wave with wavevector k parallel to the propagation axis z impinges at z=0 on a grating characterized by the following transfer function T(x):

$T(x)=Exp(-x^2/2)$

At distance z1=f from the grating, there is a lens characterized by a focal length f. Answer to the following questions:

a) Draw the setup:

b) Calculate the intensity distribution I(x,z=z2) in a plane at distance z2=2*f from the grating.