

M.TECH. PRINTING ENGINEERING AND GRAPHIC COMMUNICATION
FIRST YEAR
SECOND SEMESTER EXAM 2019
ADVANCED COLORIMETRY
Full Marks 100

Answer any five questions:

1. a) How the parametric constants are calculated in weighting functions for value and chroma using logical regression method? b) How the discrimination ellipsoids can be expressed with three dimensional color space x, y, z ? c) Describe the tolerance distribution function of the ellipsoids. d) Describe the problems in Uniformity of the components of colour difference 1976 UCS. e) What are the surface characteristics affecting small color shift. 5+4+4+5+2=20
2. a) Briefly describe gamut boundary calculation with segment maxima method. b) Describe the gamut compression algorithm by GCUSP and sigmoidal lightness mapping and cusp knee scaling. 5+15=20
3. a) Describe the Gain, offset and gamma model for display characterization. b) Describe Beer-Bouguer model for color printer characterization. 15+5=20
4. a) Show the schematic representation of corresponding chromaticities across changes in luminance showing the Hunt effect with a curve and explain it. b) Draw the curves to show how lightness contrast changes as a function of surround relative luminance for Bartleson and Breneman effect and explain it. c) Draw the contours of constant hue in CIE 1931 chromaticity diagram for Abney effect and explain the curves. d) Draw the contours of constant brightness to luminance ratio for Helmholtz-Kohlrausch effect and describe it. 5+5+5+5=20
5. Describe black generation or black printer algorithm using additivity failure method. 20
6. Find out Hue, lightness, brightness, chroma and colorfulness with CIECAM02 for a color patch having $R=154$, $G=76$ and $B=201$. 20
- $M_{CAT02} = [0.73 \ 0.43 \ -0.16 ; -0.70 \ 1.70 \ 0.01 ; 0.01 \ 0.01 \ 0.98]$
- $M_{HPE} [0.39 \ 0.69 \ -0.07 ; -0.22 \ 1.18 \ 0.05 ; 0.00 \ 0.00 \ 1.00]$
- Assume $D=0.99$, $X_w=95.05$, $Y_w=100$, $Z_w=109$, $F=1.17$
7. write short notes on 5*4=20
- a) CIE Whiteness and Tint b) McCollough effect c) IPT Opponent space and their power function nonlinearity d) Effect of spatial filtering on contrast sensitivity function
8. Differentiate between 5*4=20
- a) System modulation transfer acutance and cascaded modulation transfer acutance b) Assymmetric matching and haploscopic matching c) Sensory mechanism and cognitive mechanism for chromatic adaptation d) Dye modeling algorithm with Look Up table with interpolation for input characterization.