COLOUR IMAGE PROCESSING
(Minor Examination)

Duration: 80 min   Total Marks: 20

ANSWER ALL THE QUESTIONS. EACH QUESTION CARRIES 5 (FIVE) MARKS

1. **ANSWER EITHER A OR B**

   A. Define the terms *intensity, luminance* and *brightness*. Which of them are independent of the human vision system?

   B. Define *hue* and *saturation*. How are they related to the notion of colour and radiation in Physics?
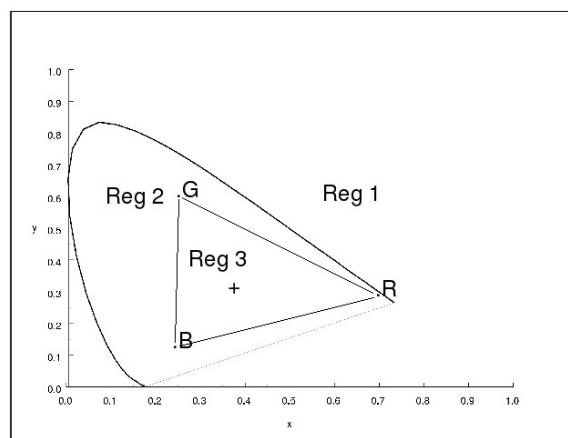
2. **ANSWER EITHER A OR B**

   A. Explain precisely the definition of Y component in the XYZ tristimulus model. How is the tristimulus model derived?

   B. Describe the differences in Physics, Human and Digital representations of colour and their impact on digital colour image processing. Be brief and limit your answer to about 10 sentences.

3. Answer the following TRUE/FALSE questions.

   (a) All the colours that can be specified in RGB colour space cannot be distinguished by the human vision system.

   (b) All the colours that can be distinguished by the human vision system cannot be specified in RGB colour space.

   (c) Human vision system is the inspiration for the trichromatic theories and models of colour.

   (d) $L^*a^*b^*$, CMY and XYZ are examples of 3D cartesian colour spaces.

   (e) $255, 0, 255$ in RGB space is equivalent to $300, 0, 255$ in HSV space.

4. Answer the following two questions based on the given *xy–chromaticity* diagram.

   (a) In which regions are (a) both XYZ and RGB positive; (b) XYZ is positive but at least one of RGB is negative; and, (c) at least one of both XYZ and RGB negative?

   (b) Suppose the colour of a pixel in an image is given by the '+' symbol in the diagram. In which direction does the colour move if (a) R component is increased, and (b) R and G components are increased?