MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH. MEDIA TECHNOLOGY

END SEMESTER EXAMINATIONS

SUBJECT: COLOR SCIENCE AND TECHNOLOGY [MED 3151]

Time: 3 Hours **MAX. MARKS: 50**

02 FEBRUARY 2021

ANSWER ALL THE QUESTIONS

1A. Create a SINGLE SCENARIO **(give reasons for what you pick)** where red ball is perceived grey, green balloon is perceived as greenish, and blue pen is perceived as bluish. For the above created scenario what color is perceived for cyan bag, yellow ribbon and magenta wall. Using spectral energy distribution curves illustrate these perceived colors for ball, balloon, pen, bag, ribbon and wall.

[04 MARKS]

1B. Discuss why brilliant colors have a high level of saturation? What happens when you dilute Pure Hues with the Complement?

[03 MARKS]

1C. Explain subtractive color system and also shed light on the practical interpretation of subtractive color system.

[03 MARKS]

2A. During their visit to Kashmir, Sneha and Shreya booked a boat house for their stay. Evening they decided to go for shopping. At one of the shops they asked shopkeeper to show them two cream colored identical traditional Kashmiri handbags to which the shopkeeper obliged and showed them 2 handbags. Both sisters tried to convince him that they are not the same color and even asked all the other people in the shop too, who agreed that the handbags were not identical in color, still the shopkeeper disagreed. However, they paid the bill and purchased those handbags. After the shopping, they returned back to their boat house. Full Moon was really looking beautiful on the sky and the light passed through the bluish roofing of the boat house and fell on the traditional Kashmiri handbags which they had purchased. To their surprise the bags were matching now and they couldn't believe their eyes. It was time to click a selfie with the new traditional Kashmiri handbags. Photo was clicked, but Sneha and Shreya were not happy, handbags in the photo were not the same color as they saw under the moon light through the bluish roof.

(a) **IDENTIFY AND EXPLAIN** the phenomena that made the shopkeeper argue about the color

(b) **IDENTIFY AND EXPLAIN** the phenomena that made Sneha and Shreya see the handbags in matching color in the boat house.

(c) **IDENTIFY AND EXPLAIN** the phenomena why the camera captured different color from what Shreya and Sneha perceived under the moon light.

(d) Explain a situation where all the above situations could be avoided.

[04 MARKS]

2B. Identify and explain the concept behind the color pattern red, yellow-red, yellow, green-yellow, green. Represent 4P 6/4 with a neat figure.

[03 MARKS]

2C. Give reasons to have two standard observers 2^0 and 10^0. Discuss the experiment which helped in classification of standard observer.

[03 MARKS]

3A. Sneha and Shreya always believed in different ENGINES when it came to color management. Sneha believed Microsoft engine was better while Shreya supported Adobe engine ever since. For the Print Award Competition, they had to print a unique color with L*a*b* value of 40,50,60, unfortunately an out of gamut color for both Sneha and Shreya.

As Shreya used adobe color engine, she had the following options available with L*a*b* values for perceptual being 43,54,54, for saturation its 37,47,62, for relative colorimetric its 45,45,58, and for absolute colorimetric its 39,58,58.

Sneha used Microsoft color engine, to get L*a*b* values for perceptual as 42,48,66 for saturation as 43,46,56, for relative colorimetric as 44,49,56, and for absolute colorimetric as 35,56,57.

[show all calculations on paper]

(a) which is the best rendering intent option for SNEHA?
(b) which is the best rendering intent option for SHREYA?
(c) which is the overall best ENGINE for this situation?
(d) which is the overall best rendering option for this unique color?

[04 MARKS]

3B. Elaborate on device limitations with respect to ‘Color Gamut’ and ‘Dynamic Range’. Shed some light on ‘Tone and Gamut Mapping’.

[03 MARKS]

3C. If the digital printer resolution is 2520 dpi and the image resolution is 280 lpi, calculate the required halftone cell matrix to illustrate the following halftones: 25%, 45%, 55% and 85%, Also, represent them with the dot gains of 15% in midtones and 10% gain in highlight and shadow areas. Assume halftone shape is square.

[03 MARKS]

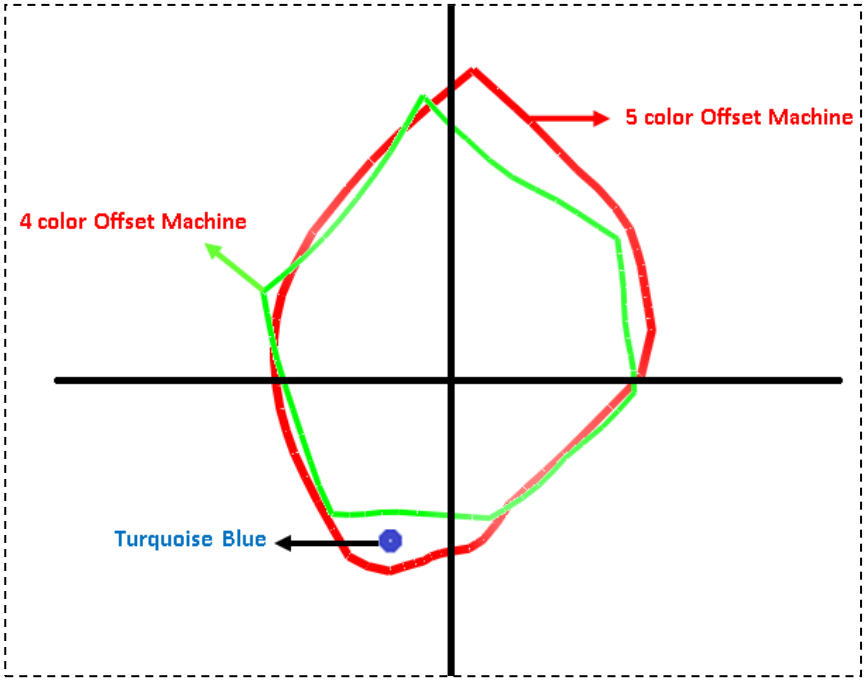
4A. Explain the three factors which are needed in the right balance to achieve a high percentage of trap. Explain the two types of inks and how the trapping is achieved in them.

[04 MARKS]

4B. Explain the concept behind selecting the screen angles for the process colors.

[03 MARKS]

4C. Turquoise Blue is the dominant color needed to be reproduced alongside 925476 color details in an image. Sneha uses 5 color offset machine which has a gamut volume of 899832 while Shreya uses 4 color offset machine with 665195 gamut volume. Dominant color location with respect to CIE L*a*b* color space and Color gamut for both machines is shown below. Since Sneha and Shreya have the same client, they need to match the dominant color to each other for color consistency.



(a) Name and give reasons to which rendering intent is to be used by Sneha and Shreya considering just the overall gamut volume of the machines.

(b) Name and give reasons to which rendering intent is to be used by Sneha and Shreya considering just the dominant color in the image.

(c) Name and give reason to which rendering intent is needed for both, considering the fact they have to match color to each other.

[03 MARKS]

5A. Explain ‘proportionality failure’ and methods to tackle it. Explain ‘additivity failure’ and give reasons for its occurrences.

[04 MARKS]

5B. Shed some light on effect of substrate & ink rheology on density. Identify and explain the concepts beneath the statement (a) Printing to a prescribed set of density and dot gain conditions (b) Setting the press up to the best printing conditions

[03 MARKS]

5C. Explain the concepts of ‘under color removal’ and ‘grey component replacement’. Differentiate between ‘mechanical dot gain’ and ‘optical dot gain’.

[03 MARKS]