



Faculty of Health Sciences
BSc. (Hons) Cosmetics Sciences
BCS 4153 Perfume & Colors- I
End Semester Examination -SEQ
4th Year 1st Semester
4th Batch-BCS

Date: 15th of June 2026

Time: 09.00 am – 12.00 noon - Three Hours

INSTRUCTIONS TO CANDIDATES Page

- This question paper consists of **SIX** questions in three pages.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 01

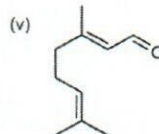
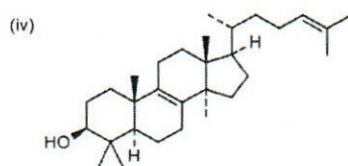
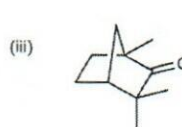
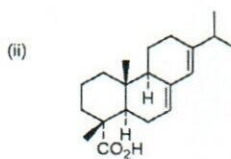
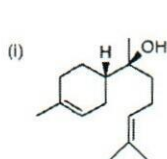
(100 marks)

- 1.1 State **three (03)** commonly used essential oils in cosmetic products. (15 marks)
- 1.2 List **three (03)** beneficial properties of essential oils in cosmetic formulations. (15 marks)
- 1.3 Evaluate the challenges when extracting essential oils. (20 marks)
- 1.4 State the differences between steam distillation and solvent extraction when extracting essential oils. (20 marks)
- 1.5 Briefly explain why supercritical CO₂ extraction is considered a modern alternative method. (30 marks)

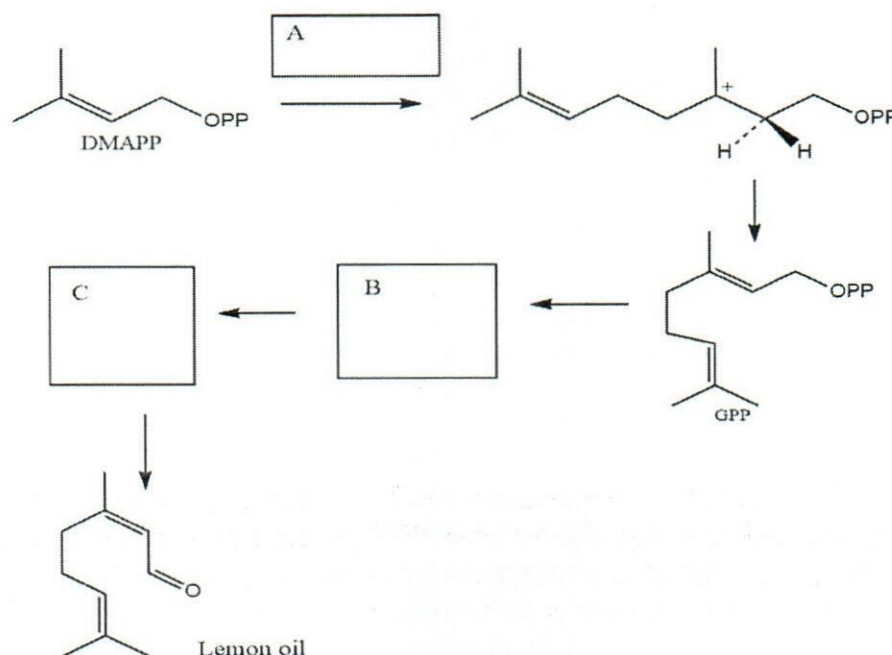
Question 02

(100 marks)

- 2.1 Draw the structural unit of terpene. (20 marks)
- 2.2 Classify terpenes based on the number of carbons used in perfumery. (20 marks)
- 2.3 State the class for each of the following terpenes/terpenoids (i-v). (30 marks)



- 2.4 Different terpenes are synthesized from activated five-carbon isoprene units that combine to form intermediates such as geranyl pyrophosphate (GPP), neryl pyrophosphate (NPP), and linalyl pyrophosphate (LPP). The biosynthesis of lemon oil takes place via the following pathway starting from dimethylallyl PP (DMAPP) (C5). Provide the structures of the intermediates A-C in the following scheme. (30 marks)



Question 03

(100 marks)

- 3.1 Write **three (03)** advantages of using synthetic substances used in developing perfumes. (15 marks)
- 3.2 Evaluate how molecular weight and volatility affect the longevity of synthetic fragrances in consumer products. (25 marks)
- 3.3 A perfume formulation contains three fragrance compounds with different evaporation rates and the initial masses and remaining masses after 5 hours are given in below table.

Compound	Initial mass (g)	Remaining mass after 5 h (g)
A	12.0	2.5
B	12.0	6.8
C	12.0	10.2

- 3.3.1 Calculate the percentage mass loss of each compound. (15 marks)
- 3.3.2 Based on the calculated values, identify which compound is most suitable for top note, middle note and the base note. (30 marks)
- 3.3.3 Explain how evaporation rate affects the overall performance of perfumes. (15 marks)

Question 04**(100 marks)**

- 4.1 State the importance of fixatives in a perfume formulation. (20 marks)
- 4.2 Write **two (02)** types of fixatives used in perfume formulations. (10 marks)
- 4.3 State the properties such as low volatility and slow release of civet based on its chemical composition. (20 marks)
- 4.4 Differentiate chemical composition of musk and ambergris. (20 marks)
- 4.5 Evaluate the factors affecting perfume shelf life under different storage conditions. (30 marks)

Question 05**(100 marks)**

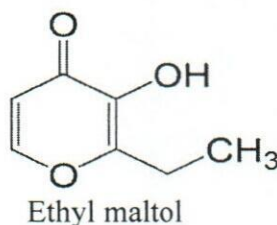
- 5.1 Describe ethanol fermentation using yeast with chemical equations. (20 marks)
- 5.2 Briefly describe the lactic acid fermentation process. (20 marks)
- 5.3 Evaluate the industrial applications of fermentation in fragrance production. (20 marks)
- 5.4 A biotechnology company uses yeast fermentation to produce bioethanol for use in perfume and cosmetic industries. The production data obtained after 48 hours are shown below.

Parameter	Value (g/L)
Initial glucose concentration	180
Final glucose concentration	35
Ethanol produced	72
Carbon dioxide produced	34

- 5.4.1 Calculate the amount of glucose consumed during fermentation. (20 marks)
- 5.4.2 Calculate the percentage conversion of glucose into ethanol. (20 marks)

Question 06**(100 marks)**

- 6.1 Explain the role of International Fragrance Association (IFRA) in fragrance safety regulation. (20 marks)
- 6.2 Write **two (02)** the sources of natural flavors and fragrances. (20 marks)
- 6.3 Describe analytical techniques used in fragrance quality control. (20 marks)
- 6.4 A flavor manufacturing company has provided ethyl maltol samples for quality evaluation. Briefly describe how you would analyze and confirm the composition and purity of ethyl maltol using suitable analytical technique. The ethyl maltol chemical structure is given below. (20 marks)



- 6.5 State the importance of natural essential oils in aromatherapy. (20 marks)

Faculty of Health Sciences
BSc. (Hons) Cosmetics Sciences
BCS 4143 Cosmetic Technology IV
End Semester Examination- SEQ
4th Year 1st Semester
4th Batch (BCS)

Date: 12th of June 2026

Time: 09.00 am – 12.00 noon - Three Hours

INSTRUCTIONS TO CANDIDATES Page

- This question paper consists of **SIX** questions in 3 pages.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 01

(100 marks)

- 1.1 State the difference between chemical sunscreens and physical sunscreens. (10 marks)
- 1.2 State the importance of broad-spectrum protection in sunscreen formulations. (10 marks)
- 1.3 Briefly explain the **two (02)** major mechanisms by which sunscreen agents protect the skin from UV radiation. (30 marks)
- 1.4 SPF (Sun Protection Factor) is a measurement that indicates the level of protection a sunscreen provides against UV rays. You have given a mixture of essential oils to determine the SPF value by using the Mansur equation given below where, CF = correction factor (=10), EE (λ) = erythral effect spectrum, I(λ) = solar intensity spectrum, and Abs = absorbance values of samples.

$$SPF = CF \times \sum_{290}^{320} EE(\lambda) \times I(\lambda) \times Abs$$

- 1.4.1 Following table shows the values of EE (λ) $\times$ I(λ) and the absorbance values for each wavelength of the essential oil mixture.

Wavelength (nm)	EE (λ) $\times$ I(λ)	Absorbance
290	0.0150	0.210
295	0.0817	0.250
300	0.2874	0.280
305	0.3278	0.220
310	0.1864	0.260
315	0.0837	0.270
320	0.0180	0.290

- 1.4.1.1 Calculate the SPF value for the essential oil mixture.

(50 marks)

Question 02**(100 marks)**

- 2.1 List **two (02)** common ingredients found in cuticle removers. (20 marks)
- 2.2 Briefly explain how does a base coat differ from a top coat in terms of formulation and application? (20 marks)
- 2.3 Briefly describe the function of cuticle creams as a manicure product. (20 marks)
- 2.4 List **two (02)** potential health concerns associated with prolonged use of artificial nails. (10 marks)
- 2.5 Evaluate the plasticizers in nail polish formulations improve the performance and durability of the product. (30 marks)

Question 03**(100 marks)**

- 3.1 State how viscosity and spreadability are important in cosmetic formulations. (20 marks)
- 3.2 Compare and contrast aerosol and non-aerosol hair sprays. (20 marks)
- 3.3 State the difference between leave-in conditioners and rinse-off conditioners. (20 marks)
- 3.4 List **three (03)** tools commonly used in hair styling. (15 marks)
- 3.5 Evaluate the role of preservatives and antioxidants in cosmetic products. (25 marks)

Question 04**(100 marks)**

A moisturizing cream is a cosmetic formulation designed to hydrate, soften, and protect dry skin and you have been provided with the following cream formulation. (Formulation Y)

Aloe vera extract (w/v 2%)

Cocoa butter (w/v 6%)

Urea (w/v 3%)

Stearic acid (w/v 5%)

Propylene glycol (w/v 4%)

Methyl paraben (w/v 0.3%)

Triethanolamine (w/v 1%)

Water: Balance to 100%

- 4.1 Identify the following excipients in "Formulation Y" (20 marks)
- 4.1.1 Emollient
- 4.1.2 Humectant
- 4.1.3 Emulsifying agent
- 4.1.4 Preservative
- 4.2 Propose a compound that can be added to improve the fragrance of the cream formulation. (20 marks)
- 4.3 After adding the fragrance compound, the formulation showed phase separation. How do you explain this instability? (20 marks)
- 4.4 Propose an additional ingredient that can improve the stability of the formulation. (20 marks)
- 4.5 Give four parameters that can be used to evaluate the physical quality of the formulation. /*(20 marks)

Question 05**(100 marks)**

- 5.1 State the categories of surfactants and briefly explain the use of surfactants in shampoo formulation. (20 marks)
- 5.2 List **four (04)** basic requirements of a dentifrice. (20 marks)
- 5.3 State the fluoride release test in dentifrice. (20 marks)
- 5.4 Briefly explain the importance of scalp pH in maintaining healthy hair. (30 marks)
- 5.5 State the significance of reducing agents in hair waving process. (10 marks)

Question 06**(100 marks)**

- 6.1 State the differences between natural fragrances and synthetic fragrances based on their source and stability. (25 marks)
- 6.2 List the **three (03)** main components in hair colorant. (15 marks)
- 6.3 State the differences between temporary hair dye and the permanent hair dyes based on the mechanism. (20 marks)
- 6.4 A dye molecule exhibits a maximum absorption (λ_{max}) of 638 nm in aqueous medium. Evaluate how each of the following modifications would affect λ_{max} :
- 6.4.1 Increasing conjugation length of the system. (20 marks)
- 6.4.2 Increasing electron-donating substituents on the aromatic ring. (20 marks)



Faculty of Health Sciences
B. Sc. (Hons) in Cosmetics Sciences
BCS 4113
Beauty Culture- II
4th Year 1st Semester
End Semester SEQ Examination
4th BCS Batch

Date : 8th June 2026
Time : 9.00 a.m. – 12.00 a.m. (Three hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions in **TWO** pages.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 1 **(100 marks)**

- 1.1 Review importance of human nail. (30 marks)
- 1.2 Analyze the different categories of cosmetic products associated with human nail care and their functions. (30 marks)
- 1.3 Name **five (05)** tools and equipment that are used for nail enhancement. (20 marks)
- 1.4 List **five (05)** factors affecting the appearance of the nails. (20 marks)

Question 2 **(100 marks)**

- 2.1 Elaborate on the importance of pedicure and manicure. (30 marks)
- 2.2 Compare and contrast pedicure and manicure (30 marks)
- 2.3 Write short notes on following massage techniques in manicure and pedicure service.
 - 2.3.1 Tapotement (20 marks)
 - 2.3.2 Petrissage (20 marks)

Question 3 **(100 marks)**

- 3.1 Compare and contrast waxing and threading in beauty culture. (30 marks)
- 3.2 List **two (02)** advantages of waxing. (20 marks)
- 3.3 List **two (02)** disadvantages of waxing. (20 marks)
- 3.4 Elaborate alternative methods of hair removal other than to waxing and threading. (30 marks)

Question 4 **(100 marks)**

- 4.1 Discuss the importance of eyebrow shaping. (30 marks)
- 4.2 List **four (04)** the factors affecting for eyebrow shaping. (20 marks)
- 4.3 Explain the method help to determine the correct length and arch of eyebrows. (30 marks)
- 4.4 List **two (02)** importance of eyebrow tinting. (20 marks)

Question 5**(100 marks)**

- 5.1 Compare and contrast cold waxing and hot waxing. (30 marks)
- 5.2 Analyze suitability of cold waxing and hot waxing. (30 marks)
- 5.3 Write **two (02)** possible side effects which can be occurred due to waxing. (20 marks)
- 5.4 List **two (02)** precautions of waxing. (20 marks)

Question 6**(100 marks)**

- 6.1 State main steps in fixing and removing false eye lashes. (25 marks)
- 6.2 What are the applications of bleaching in a beauty salon? (25 marks)
- 6.3 What are the cosmetic treatments for cracked hands? (25 marks)
- 6.4 Why are eye exercises important? (25 marks)



Faculty of Health Sciences
B.Sc. (Hons) Cosmetics Sciences
BCS 4153 Perfume & Colors- I
Special Repeat Examination-SEQ
5th Batch (BCS 3rd Batch)

Date: 27th of April 2026

Time: 09.00 am – 12.00 noon - Three Hours

INSTRUCTIONS TO CANDIDATES PAGE

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 01

(100 marks)

- 1.1 List **three (03)** essential oils which are widely used in cosmetic products. (15 marks)
- 1.2 Identify **three (03)** beneficial characteristics of essential oils. (15 marks)
- 1.3 Explain the principle of steam distillation for the extraction of essential oils. (20 marks)
- 1.4 List **two (02)** limitations of steam distillation when extracting essential oils from plant materials. (20 marks)
- 1.5 Compare and contrast steam distillation and simple distillation. (30 marks)

Question 02

(100 marks)

- 2.1 Illustrate the structural unit of terpene. (20 marks)
- 2.2 Indicate the number of structural units of the given taxadiene molecule (Figure 01). (20 marks)

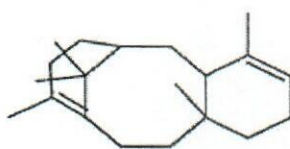


Figure 01

- 2.3 Outline the mechanism for the formation of monoterpene (C_{10}) by using structural units. (30 marks)
- 2.4 Propose a mechanism for the formation of linalyl PP (LPP) by using geraniol. The structure of the geraniol molecule is given below (Figure 02). (30 marks)

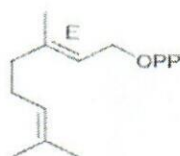


Figure 02

Question 03**(100 marks)**

- 3.1 List **three (03)** advantages of using synthetic fragrances used in developing perfumes. (25 marks)
- 3.2 Evaluate how the molecular weight can affect the longevity of synthetic fragrances in consumer products. (25 marks)
- 3.3 Compare and contrast the top note and the base note of perfumes. (25 marks)
- 3.4 State the difference between Eau de Parfum and Eau de Cologne products. (25 marks)

Question 04**(100 marks)**

- 4.1 Briefly describe the importance of fixatives in perfume formulation. (25 marks)
- 4.2 List **two (02)** types of fixatives. (25 marks)
- 4.3 Evaluate the low volatility and slow release of civet based on its chemical composition. (25 marks)
- 4.4 Compare and contrast the chemical composition of musk and ambergris. (25 marks)

Question 05**(100 marks)**

- 5.1 Define the fermentation process. (25 marks)
- 5.2 Review the alcohol fermentation process. (25 marks)
- 5.3 Explain the lactic acid fermentation process. (25 marks)
- 5.4 Identify **two (02)** importance of fermentation in perfume industry. (25 marks)

Question 06**(100 marks)**

- 6.1 List **two (02)** regulatory organizations for natural flavors and fragrances. (25 marks)
- 6.2 Identify **two (02)** the sources for natural flavors and fragrances. (25 marks)
- 6.3 List **three (03)** analysis methods of flavors. (25 marks)
- 6.4 Analyze the importance of natural essential oils in aromatherapy. (25 marks)



Faculty of Health Sciences
BSc. (Hons) Cosmetics Sciences
BCS 4153 Perfume & Colors- I
End Semester Examination -SEQ
4th Year 1st Semester
3rd Batch (BCS)

Date: 7th of February 2025

Time: 09.00 am – 12.00 pm - Three Hours

INSTRUCTIONS TO CANDIDATES Page

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 01

(100 marks)

1.1 Essential oils are highly concentrated plant extracts that capture the natural fragrance and beneficial properties of plants and widely used in perfume industry.

1.1.1 State three (03) essential oils which is widely used in cosmetic products. (15 marks)

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1.1.2 Write three (03) beneficial characteristics of essential oils. (15 marks)

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1.1.3 State the challenges when extracting essential oils. (20 marks)

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1.2 Steam distillation can be used extract essential oils involves isolating the aromatic compounds from plants to capture their fragrance and therapeutic properties.

1.2.1 State the principle of steam distillation. (20 marks)

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1.2.2 State the reason why simple distillation cannot be conducted to extract essential oils. (20 marks)

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- 1.2.3 Write two (02) limitations of steam distillation in extracting essential oils from certain plant materials. (10 marks)
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Question 02

(100 marks)

- 2.1 Terpenes are a large and diverse group of naturally occurring compounds found in many plants, especially in essential oils. They are responsible for the distinctive fragrances of plants like pine, lavender, and citrus.

- 2.1.1 Draw the structural unit of terpene. (10 marks)
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- 2.1.2 You have given taxadinen molecule (Figure 01). Draw the structure and find the number of structural units of the given molecule. (20 marks)

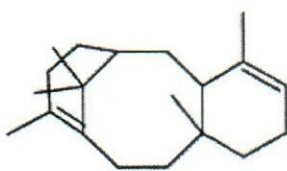


Figure 01

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- 2.1.3 Draw the mechanisms for the formation of monoterpene (C_{10}) by using structural units. (30 marks)
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- 2.2 Geranyl PP (GPP) is a naturally occurring monoterpene alcohol found in the essential oils of various plants. The structure of the geraniol is given below. (Figure 02)

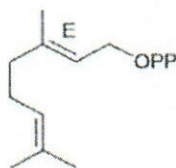
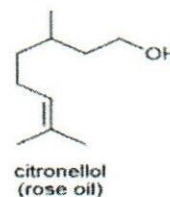
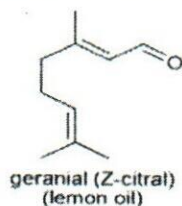


Figure 02

- 2.2.1 Propose a mechanism for the formation of linalyl PP (LPP) by using geraniol. (20 marks)
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- 2.2.2 You have given the structures of lemon oil and rose oil. Propose suitable mechanism for the formation of lemon oil and citronella oil by GPP as the starting material. (20 marks)



Question 03

(100 marks)

- 3.1 Write three (03) advantages of using synthetic substances used in developing perfumes. (15 marks)
- 3.2 State how do molecular weight and volatility affect the longevity of synthetic fragrances in consumer products. (25 marks)
- 3.3 State the difference between top note and the base note of perfumes. (20 marks)
- 3.4 State the difference between Eau de Parfum and Eau de Cologne products. (20 marks)
- 3.5 State how to evaluate an odorant performance based on the Odor Value (OV). (20 marks)

Question 04**(100 marks)**

4.1 State the importance of fixatives in a perfume formulation.

(20 marks)

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4.2 Write two (02) types of fixatives.

(10 marks)

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4.2 State the properties such as low volatility and slow release of civet based on its chemical composition.

(20 marks)

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4.3 State the difference in the chemical composition of musk and ambergris.

(20 marks)

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4.4 State how fixatives modify the evaporation rates of key fragrance components.

(30 marks)

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Question 05**(100 marks)**

5.1 State the fermentation process.

(20 marks)

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5.2 State the alcohol fermentation process.

(20 marks)

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5.3 State the lactic acid fermentation process.

(20 marks)

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5.4 Write two (02) importance of fermentation in perfume industry.

(20 marks)

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5.5 Write two (02) benefits of using fermentation to produce fermentation ingredients.

(20 marks)

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Question 06**(100 marks)**

6.1 Write two (02) regulatory organizations for natural flavors and fragrances.

(20 marks)

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6.2 Write two (02) the sources of natural flavors and fragrances.

(20 marks)

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6.3 Write three (03) analysis methods of flavors.

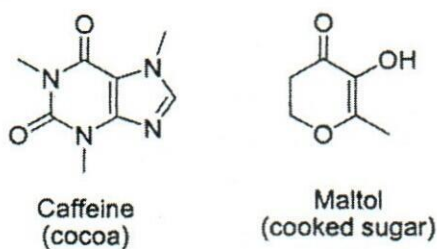
(15 marks)

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6.4 You have given caffeine and maltol (Figure 03) as flavors. Briefly describe the how would you analyze the composition of both given flavors.

(25 marks)

(Figure 03)

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6.5 State the importance of natural essential oils in aromatherapy.

(20 marks)

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Faculty of Health Sciences
BSc. (Hons) Cosmetics Sciences
BCS 4143 Cosmetic Technology IV
End Semester Examination- SEQ
4th Year 1st Semester
3rd Batch (BCS)

Date: 5th of February 2025

Time: 09.00 am – 12.00 pm - Three Hours

INSTRUCTIONS TO CANDIDATES Page

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 01

(100 marks)

1.1 Sunscreen in cosmetics refers to products that help protect the skin from harmful ultraviolet (UV) radiation from the sun.

1.1.1 Write the difference between UVA and UVB radiation. (10 marks)

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1.1.2 State the active role of UV filtering compounds in sunscreen formulations. (10 marks)

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1.1.3 Write the two main types of UV filters and briefly describe the difference. (20 marks)

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1.2 SPF (Sun Protection Factor) is a measurement that indicates the level of protection a sunscreen provides against UV rays. You have given a mixture of essential oils to determine the SPF value by using the Mansur equation given below where, CF = correction factor (=10), EE (λ) = erythral effect spectrum, I(λ) = solar intensity spectrum, and Abs = absorbance values of samples.

$$SPF = CF \times \sum_{290}^{320} EE(\lambda) \times I(\lambda) \times Abs$$

1.2.1 What is meant by Minimal Erythema Dose related to UV. (10 marks)

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- 1.2.2 Calculate the SPF value of the given essential oil (EO) mixture. The values of $EE(\lambda) \times I(\lambda)$ and the absorbance values for each wavelength of the EO mixture is given in the table 01. (40 marks)

Wavelength (nm)	$EE(\lambda) \times I(\lambda)$	Absorbance
290	0.0150	0.210
295	0.0817	0.250
300	0.2874	0.280
305	0.3278	0.220
310	0.1864	0.260
315	0.0837	0.270
320	0.0180	0.290

Table 01

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- 1.2.3 Comment on the calculated SPF value of the given EO mixture. (10 marks)

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Question 02 (100 marks)

- 2.1 Write two (02) common ingredients found in cuticle removers. (20 marks)

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- 2.2 How does a base coat differ from a top coat in terms of formulation and application? (20 marks)

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- 2.3 Briefly describe the function of nail strengtheners as manicure product. (20 marks)

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- 2.4 Write two (02) potential safety risks associated with using nail polish. (20 marks)

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- 2.5 How do the ingredients of nail strengtheners work to improve the function. (20 marks)

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Question 03**(100 marks)**

- 3.1 State how rheological properties and appropriate pH is important for cosmetic products. (20 marks)
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- 3.2 State the difference between aerosol and non-aerosol hair sprays. (20 marks)
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- 3.3 State the difference between the hair tonics and the hair conditioner. (20 marks)
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- 3.4 Write three (03) tools used in hair dressing. (15 marks)
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- 3.5 State the role of preservatives and antioxidants in cosmetic products. (25 marks)
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Question 04**(100 marks)**

- 4.1 Cosmetic foot cream is a skincare product designed to hydrate, soften, and protect the skin on the feet and you have provided a formulation of foot cream. (Formulation X)
- Menthol (1%)
Tea tree oil (1%)
Shea Butter (5%)
Salicylic acid (2%)
Cetearyl alcohol (5%)
Glycerin (4.5%)
Phenoxyethanol (0.5%)
Water: Balance to 100%
- 4.1.1 Identify the active ingredient, emollient, humectant, exfoliating agent and preservative from the above formulation. (20 marks)
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- 4.1.2 Propose a compound that can be added to adjust the pH of the foot cream formulation. (10 marks)
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4.1.3 After adding the pH adjuster, it was complained that the rheology of the formulation is poor. How do you explain this? (20 marks)

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4.1.4 Propose an additional ingredient that can adjust the rheology of the formulation. (20 marks)

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4.1.5 It is observed that after adding a suitable ingredient to adjust the viscosity, the formulation is not stable. Give four parameters to identify the instability of the formulation. (20 marks)

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4.1.6 Which parameter can be addressed by only changing the formulation technique without changing the ingredients? State the reason for your choice. (10 marks)

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Question 05

(100 marks)

5.1 State the categories of surfactants and briefly explain the use of surfactants in a shampoo formulation.

(20 marks)

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5.2 Write four (04) basic requirements of a dentifrice.

(20 marks)

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5.3 State the fluoride release test in dentifrice.

(20 marks)

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5.4 Mention the importance of pH balance in shampoo for the growth of hair.

(20 marks)

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5.5 State the significance of reducing agent in hair waving process.

(20 marks)

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Question 06**(100 marks)**

6.1 Classify the coloring agents according to their nature and solubility.

(20 marks)

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6.2 List the three (03) main components in hair colorant.

(15 marks)

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6.3 State the differences between temporary hair dye and the semi- permanent hair dyes based on the mechanism.

(20 marks)

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6.4 Coupling agents, also referred to as color couplers can react with primary intermediates in the dye mixture and they contribute to produce coloration. Indo dyes (Figure 02) are ecofriendly coupling agents can be synthesized using bacterial laccases.

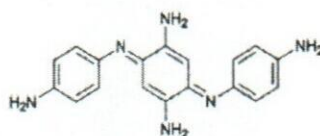


Figure 01

6.4.1 Circle chromophore of the given molecule. (Figure 01)

(20 marks)

6.4.2 Maximum UV-Vis absorption of the above dye molecule in water occurs at 638 nm. Explain how you would theoretically attempt to shift the absorption to higher wavelengths.

(25 marks)

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