Chattogram Veterinary and Animal Sciences University
Faculty of Food Science & Technology
BFST 2nd Year 1st Semester Final Examination, 2022
Course Title: General Microbiology (Theory)
Course Code: - GMC - 201 (T)

Full Marks: 70   **Time: 3 Hours**

(Figures in the right margin indicate full marks. Answer any Five (5) questions from each section. Use separate answer script for each section. Fractions of a question should be answered together.)

SECTION-A

1. a) What are the spore forming bacteria? Write in details the sporulation process   1+4=5
       of bacteria.
    b) Classify bacteriological media.   2

2. a) State the scopes of Microbiology.   2
    b) Illustrate with a figure the various internal and external structures of a prokaryotic   5
       cell, and also give their functions.

3. a) Define Mycology. How can you classify fungi?   1+2=3
    b) Illustrate the growth curve of bacteria.   4

4. a) State the colony characteristics of bacteria.   3
    b) How can you obtain a pure culture of bacteria?   4

5. a) What is plasmid? State the types of plasmid transferred during conjugation process.   1+4=5
    b) With the functions list the enzymes involved in DNA replication of bacteria.   2

6. a) Illustrate the process of transferring information from DNA to mRNA.   4
    b) Describe the reproduction process of fungi.   3

SECTION-B

7. a) Define bacteria and protists.   1
    b) Classify bacteria according to their basic shapes and arrangements.   3
    c) Briefly describe the structure and function of flagella in bacteria.   3

8. a) Classify bacteria based on their temperature and oxygen requirements for growth.   3
    b) Mention the principal characteristics of rickettsia. Give examples of some rickettsial   4
       pathogens.

9. a) What is the difference between sterilization and disinfection?   2
    b) Describe the usages of moist heat to kill microorganisms.   5

10. a) Differentiate between pathogenicity and virulency of a pathogen.   2
    b) Write down the roles of bacterial virulence factors in the infectious process with   5
       example.

11. a) Define bacterial mutation. What are the different types of mutation seen in bacteria?   6
    b) Define reversion.   1

12. a) Are viruses living or non-living? -- Explain   3
    b) Differentiate virus from other organisms.   4

Chattogram Veterinary and Animal Sciences University
Faculty of Food Science & Technology
BFST 2nd year 1st Semester Final Examination, 2022
Course Title: Unit Operations in Food Processing (Theory)
Course Code: - UFP-201 (T)

Full Marks: 70   **Time: 3 Hours**

(Figures in the right margin indicate full marks. Answer any four (4) questions from each section where question number 1 and 6 are compulsory. Use separate answer script for each section. Fractions of the questions must be answered together.)

SECTION-A

1. Give an overview of the law of conservation of mass and energy balance.   5

2. a) Show the relationship between diffusion coefficient and activation energy.   4
    b) A fresh extract containing 12.5% soluble solids passes through juice finishers   6
        from whom a pulpy juice and strained juice are removed as well as other
        streams which may be assumed to be negligible; Eighty percent by weight of
        the feed to the finishers passes to a vacuum evaporator. The 20% of the feed
        not passing to the evaporator is then used to dilute the concentrated juice of
        54% soluble solids to the desired final strength of 42% solids. Calculate:
        i) Wt of water to be evaporated per 100 Ibs of freshly extracted juice fed
        to the system.
        ii) The concentration of solids in each stream leaving the finisher.
        iii) The weight ratio of concentrated to unconcentrated juice in the final
        product.

3. a) Develop a usable equation for describing a thin layer drying of food.   5
    b) Define critical moisture content. A drum dryer is designed for drying a   1+4=5
        product from an initial total solids content of 12% to a moisture content of
        4%. An overall heat-transfer coefficient (U) of 300 BTU/hr ft^2°F is being
        estimated for the product. An average temperature difference between the
        roller surface and the product of 150°F will be used for design purposes.
        Determine the surface area of the roller required to provide a production rate
        of 50 lbm product/hr. Enthalpy change 1000 Btu/lbm.

4. a) List the various practical considerations required for evaporation with the   4
        basic factors which affect the rate of evaporation.
    b) Discuss the preserving action of drying, freezing, and evaporation   4
        preservation methods.
    c) State the Brunauer-Emmet-Teller (BET) adsorption theory.   2

5. a) Define water activity. Why water activity is important for food in perspective   1+3=4
        of food science?
    b) What is hysteresis? Explain the state of water in food in terms of sorption   1+2=3
        isotherms.
    c) Mention the concept of glass transition and glass transition temperature in   3
        food preservation.

SECTION-B

6. Show the arrangement of the freeze-drying process with its working   5
    mechanism.

7. a) Shortly brief the following terms: 2x3=6
        i) Hygroscopic and Hygroemissive products,
        ii) Sorption Isotherm,
        iii) Sorption Hysteresis
    b) Explain the relations between water activity and deteriorative reactions in   4
        dried foods.

8. a) Write short notes on any three of the following: 3x2=6
        i) Cabinet dryer, ii) Air blast freezer, iii) Types of heat exchangers,
        iv) Optimum moisture content.
    b) A fan-spray nozzle is being used to generate an aerosol of tomato juice into a   4
        spray dryer. The Flow Number (FN) has been established as 0.8, the surface
        tension (γ) is 50 dyne/cm, the spray angle (Θ_T) is 120° and the pressure
        gradient (ΔP) is 100 lbf/in^2. Compute the Sauter mean diameter (SMD) of the
        atomized droplets. Here assume: Discharge co-efficient, C_Q=0.4, Nozzle
        number=2, constant B_1=43, Liquid density, ρ_L=60 lbm/ft^3 and air density,
        ρ_g=0.065 lbm/ft^3.

9. a) How evaporation is differentiating from distillation and drying? Describe a   4
        rising film evaporation system with a neat diagram.
    b) Develop a relationship between moisture content weight basis and moisture   2
        content dry basis.
    c) Compare the heat transfer coefficients through condensation films on vertical   4
        and horizontal tubes. Saturated steam at 30 lbf/in^2 absolute pressure (250°F)
        is being utilized as a heating medium in the evaporator. The tube length is 10
        ft with 2-inch diameter and the evaporator temperature is 170°F. Assume,
        Latent heat of vapourization, Lv=945.3BTU/lbm, Thermal conductivity,
        K_f=0.395 BTU/hrft°F, Acceleration due to gravity, g=32.2 ft/sec^2, Density,
        ρ_f=59.9 lbm/ft^3, Viscosity, μ_f =0.18x10^{-3} lbm/ftsec.

10. a) Differentiate between overall heat transfer coefficient and thermal   2+4=6
        conductivity. Derive a mathematical expression for conduction modes of heat
        transfer.
    b) A wall has an overall heat transfer coefficient of 1.5 Kcal/mi-hr°C. The   4
        inside air temperature is 22°C and the outside air temperature -30°C, The sun
        conductance's are hi=7.5 Kcal/ m^2-hr°C and ho=30 Kcal/ m^2-hr°C. Find out
        the inside and outside wall temperature.

**Full Marks: 70**   **Time: 3 Hours**

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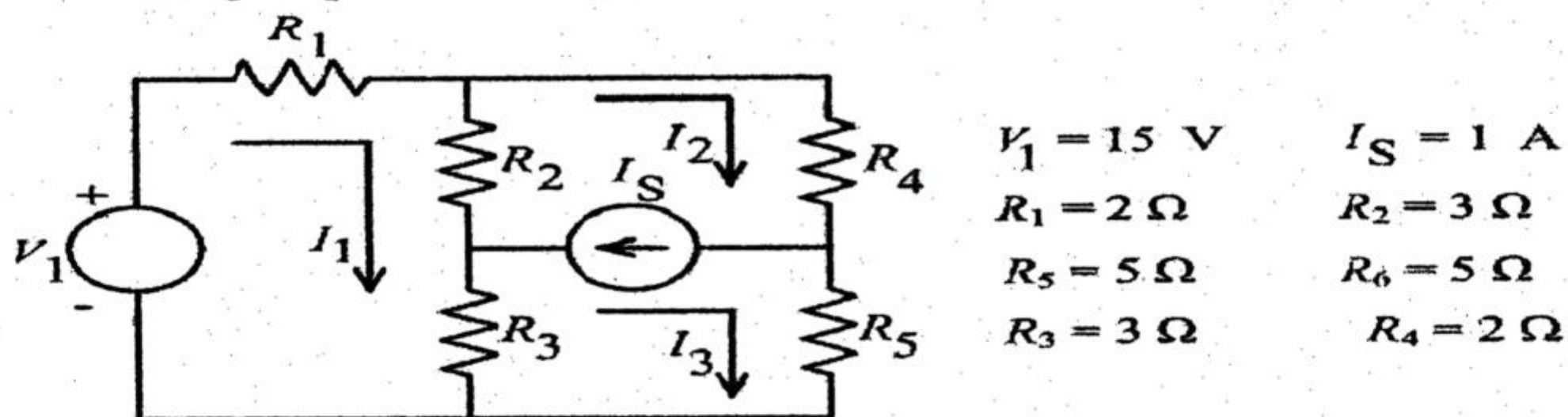
SECTION-A

1. a) Define current source and voltage source. Explain the V-I characteristics   4
        of both current and voltage source graphically and hence, indentify their
        ideal and practical behaviors.

    b) Convert the voltage source in the figure below to an equivalent current   1
        source:
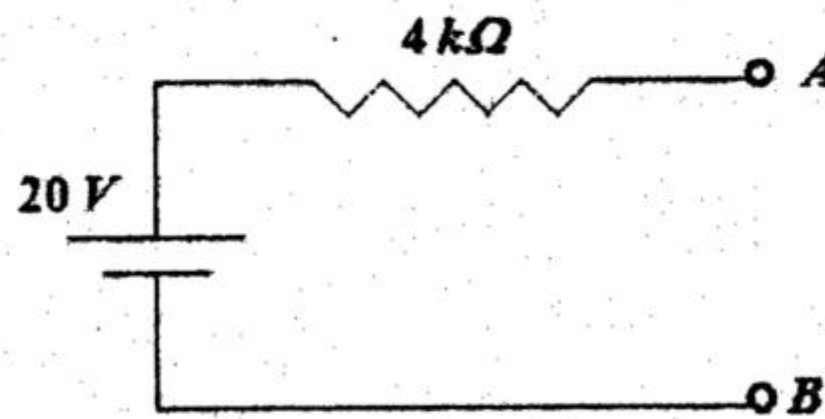
2. a) State Kirchhoff's current law (KCL). Find the unknown node voltages at   5
   points V_1 and V_2 using Nodal analysis:
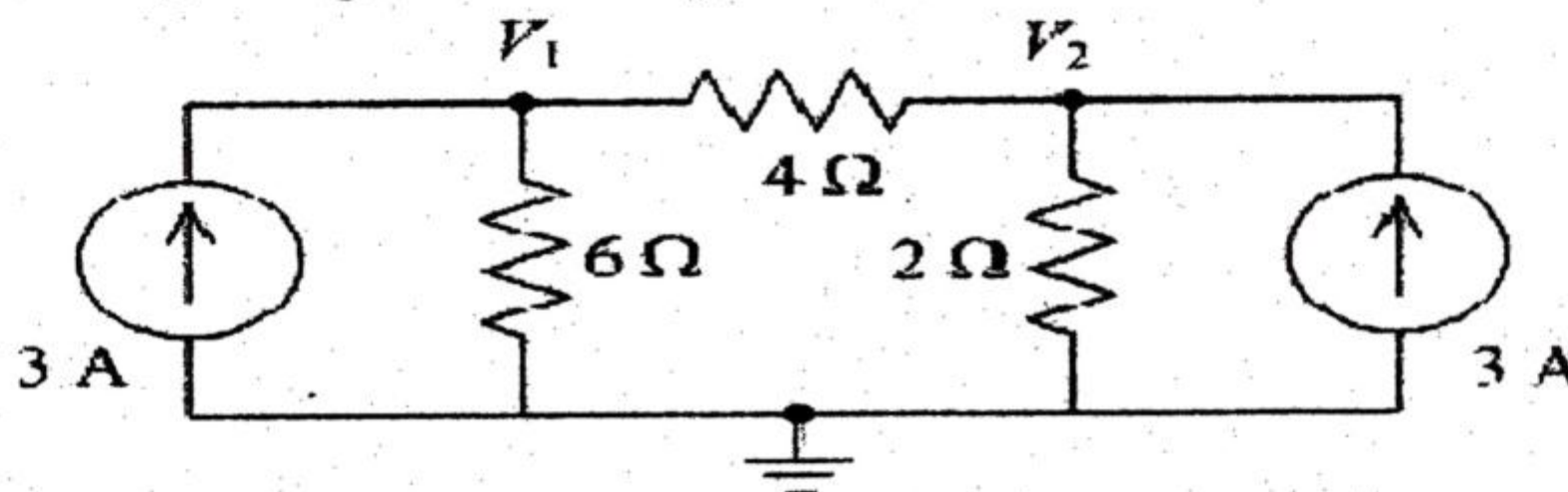
    b) State Kirchhoff's voltage law (KVL). Find the unknown mesh currents I_1,   5
        I_2 and I_3 using Supermesh analysis:

$V_1 = 15$ V $I_S = 1$ A
$R_1 = 2\,\Omega$ $R_2 = 3\,\Omega$
$R_5 = 5\,\Omega$ $R_6 = 5\,\Omega$
$R_3 = 3\,\Omega$ $R_4 = 2\,\Omega$

3. a) State Superposition theorem and justify this theorem for a relevant   5
        network.

    b) Using the superposition theorem, determine the voltage drop and current   5
        across the resistor 3.3K as shown in circuit below.
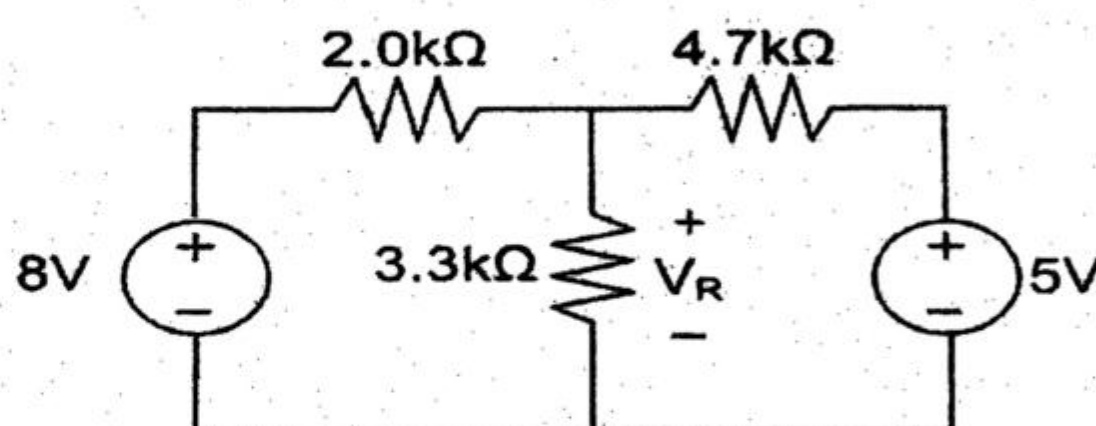
4. a) For the figure below, find the current through the 1.375 Ω resistor and   5
   hence, verify the reciprocity theorem.
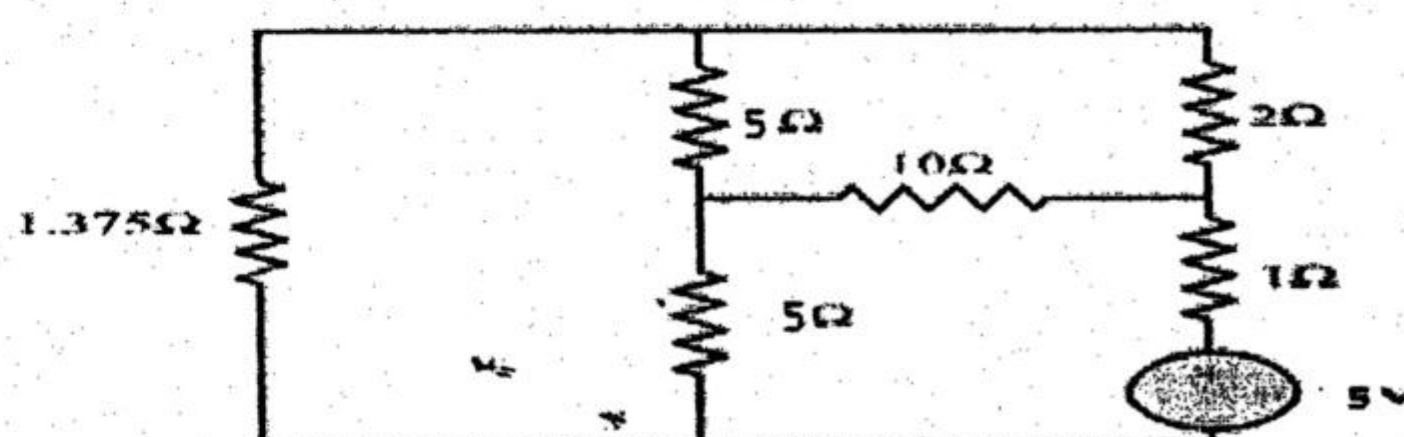
b) Determine the phase relationship between the following sets: 5

i)
$$v = 10\cos(\omega t - 30°)$$
$$i = 10\cos(\omega t + 30°)$$

ii)
$$v = -\sin(\omega t + 30°)$$
$$i = -10\cos(\omega t - 30°)$$

5. a) Discuss the formation mechanism of the depletion region in a *pn* junction diode and its behavior under forward and reverse biasing condition. 5

b) Show the *V-I* characteristics of the *pn* junction diode graphically and explain the terms knee voltage and breakdown voltage. 3

c) Explain the workings of a *pn* junction diode as a rectifier. 2

SECTION-B

6. Derive the equations used to transform three terminal networks from Y-configuration to Δ-configuration and vice versa. 5

7. a) Define electronics. Write the importance of electronics. 4

b) Distinguished between metal, insulator, and semiconductor in terms of band theory of solids with necessary diagrams. 6

8. a) Derive an expression for the e.m.f equation of a transformer and hence, provide the structural concept of step-up and step-down transformer. 4

b) Establish the relationship between peak and root mean square value of AC generator for a simple electrical circuit. 3

c) Explain the hysteresis loop for ferromagnetic material graphically and explain the terms magnetic saturation, retentivity and coercivity. 3

9. a) State and explain maximum power transfer theorem for any relevant network. Show that the maximum power transferred to the load resistance is 50% of the total generated power. 6

b) Find the value of R_L for maximum power transfer and the maximum power that can be transferred in the network shown. 4
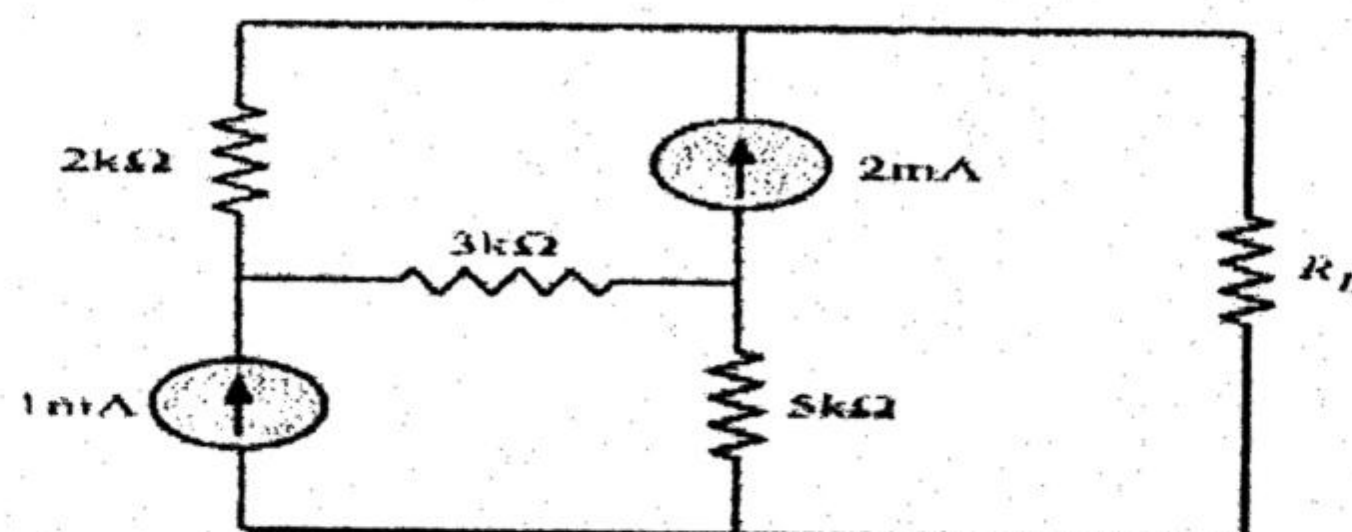
10. a) What is transistor? Discuss the common emitter configuration of both *pnp* and *npn* transistor with symbol and proper identification of current. 3

b) Explain the workings of a transistor as an amplifer. 2

c) How does the *n*-channel JFET work? Mention the differences between BJT and JFET. 5

Chattogram Veterinary and Animal Sciences University
Faculty of Food Science & Technology
BFST 2nd Year 1st Semester Final Examination, 2022
Course Title: Applied nutrition (Theory)
Course Code: APN-201 (T)
Full Marks: 70   **Time: 3 Hours**

(Figures in the right margin indicate full marks. Answer any **four (4)** questions from each section where question number **1 and 6** are compulsory. Use separate answer script for each section. Fractions of the questions must be answered together.)

SECTION-A

1. Define nutritional status. A 36 months refugee child staying rohingya camp in Cox's bazar. How will you assess his nutritional status?   1+4=5

2. a) Why freeze-drying foods are inappropriate for emergency feeding?   2
   b) Distinguish between food fortification and food enrichment methods.   3
   c) Define anthropometry. Which anthropometric measurements are applicable for adults to identify nutritional status?   2+3=5

3. a) List the following information on vitamin-C and Vitamin-B2   3x2=6
      i) Chemical name ii) Deficiency disease iii) Requirement and prevention
   b) Define hidden hunger. Summarize the major micronutrient deficiencies in Bangladesh.   1+3=4

4. a) Define the term hunger, appetite, satiation and satiety using in the feeding cycle.   4
   b) List the strategies to combat micronutrient deficiencies.   2
   c) Briefly describe the approaches for fortifying complementary food.   4

5. a) "Biochemical assessments are more precise than any other assessment"-justify your answer.   3
   b) Write down the clinical sign and symptoms of VADD.   3
   c) Explain the schedule for the implementation of the selective feeding program.   4

SECTION-B

6. a) Define severe acute malnutrition (SAM). Organize a therapeutic feeding for the management Of SAM.   1+4=5

7. a) What options are available to prevent vitamin-C deficiency in an emergency?   2
   b) Illustrate the overweight and underweight situation of Bangladesh.   3
   c) What are the criteria of good nutritional message? Write down the steps of nutritional message formulation?   5

8. a) What do you mean by SFP and TFP? State the types of food aid used in SFP.   2+4=6
   b) Give an overview of Dietary assessment.   4

9. a) Differentiate between media and method.   2
   b) What is nutritional program? List the different nutritional programs available in Bangladesh.   1+2=3
   c) Define nutritional communication. Discuss on strengths and limitations of using FBS data for assessing diets.   1+4=5

10. a) Write down short notes on: i) IDD ii) Biofortificatrion iii) Vitamin-D deficiency   1.5x3=4.5
    b) List the methods of nutritional communication.   2.5
    c) What kinds of food commodities are used during nutritional emergencies?   3

Full Marks: 70   Time: 3 hours

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Section-A

1. a) Define organic chemistry. Why organic chemistry is a separate discipline?   3
    b) Write down the differences between organic and inorganic compounds.   2

2. a) Discuss about the chemical structure of alkenes.   3
    b) What is Markonikov rule? Explain the rule with mechanism.   3
    c) Why do alkenes are more reactive than alkanes? Enumerate the mechanism of addition reaction to carbon- carbon double bond.   4

3. a) Explain the acidity of carboxylic acid and the effect of electron releasing and electron withdrawing group on its acidity.   5
    b) Write down the reactions of alcohols with H_2SO_4 at different condition.   5

4. a) Describe the basicity of amines.   3
    b) Illustrate the Hinsberg test for finding whether a given amine is 1°, 2° or 3°?   4
    c) How will you convert phenol in the following compounds   3
        i) Picric acid
        ii) Benzene

5. a) What are aldehydes and ketones? Point out the structural relationship between the two types of compounds.   3
    b) How does aldehyde and ketone react with   4
        i) $NaHCO_3$
        ii) HCN
        iii) NH_3
        iv) Alcohol
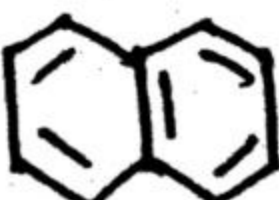   c) Describe aldol condensation reaction of alkyne group.   3

Section-B

6. Enumerate on molecular orbital structure of benzene.   5

7. a) Which of the following compounds are aromatic or not? Give reasons for both   6

Cyclooctatetraene   Napthalene   Pyrole   Pyridine

    b) Write down the mechanism of electrophilic substitution reaction of benzene.   4

8. a) Describe method of preparation of phenol from chlorobenzene and cumene.   4
    b) Why do phenols are acidic than alcohols?   3
    c) How will you distinguish among 1°, 2° and 3° alcohols?   3

9. a) Explain the reasons of alkynes being acidic in nature.   3
    b) How many types of chemical reactions does alkane give? Illustrate the mechanism of chlorination reaction of alkanes.   4
    c) How will you produce carboxylic acids from alkynes?   3

10. Write short notes on (any four)   2.5x4=10
    a) Williamson ether synthesis
    b) Bayer test
    c) Pyrolysis of alkane
    d) Reimer-Tiemann reaction
    e) Oxidation of ozone with alkane

Chattogram Veterinary and Animal Sciences University
Faculty of Food Science & Technology
BFST 2ⁿᵈ year 1ˢᵗ Semester Final Examination, 2022
Course Title: Technology of Food Preservation (Theory)
Course Code: TFP- 201 (T)

Full Marks: 70   **Time: 3 Hours**

(Figures in the right margin indicate full marks. Answer any four (4) questions from each section where question number 1 and 6 are compulsory. Use separate answer script for each section. Fractions of the questions must be answered together.)

SECTION-A

1.   Can non-thermal food preservation methods replace conventional methods?   5
     Justify your opinion with suitable reasons and example?

2.   a)   a) What do you mean by food preservation? What are the main reasons for food   1+1+2=4
          preservation? How long a food can be preserved?
     b)   Describe the fundamentals of drying with the schematic representation of drying-   4
          rate curves.
     c)   How the mode of preservation of drying and freezing differs? Explain.   2

3.   a)   "Freezing is generally regarded as superior to dehydration in terms of quality   3
          characteristics of final product"- "to what extent do you agree/disagree?
     b)   Draw a schematic freezing diagram of water and food? Why binary mixture (i.e.,   3
          food) resembles different freezing pattern in compare to pure water?
     c)   Briefly explain the fundamental working principles of freeze drying and spray   2+2=4
          drying.

4.   a)   What is food rheology? Write down the relevance of rheological properties of   1+2=3
          foods.
     b)   What are different Newtonian and Non-Newtonian fluids? Explain the shear   1+3=4
          stress vs. shear strain relationship of different food fluids with graphical
          representation.
     c)   Briefly describe the factors effecting rheological parameter of food.   3

5.   a)   What is Fermentation? What are basic reasons of considering fermentation as a   1+1=2
          method of food preservation?
     b)   Delineate the mechanisms of oxidative rancidity.   3
     c)   What do you mean by bio-preservation? List the natural antimicrobials with   1+2+2=5
          potential application in food system. How the inhibition action of antibiotic and
          bacteriocin differs on gut microbiota?

SECTION-B

6.   "Novel foods and novel processing techniques as threats and challenges to a   5
     hypersensitive world"-Justify the statement.

7.   a)   What is ultrasound? Briefly describe the methods of application of ultrasound in   1+3=4
          food.
     b)   Briefly describe the dipping methods of coating for fruits and vegetables   2
          preservation.
     c)   Tabulate the inactivation mechanism of microorganism and enzyme during   4
          pasteurization of juice using different non-thermal methods.

8. a) What is encapsulation? What are the reasons of application of encapsulation in food industry?   3

    b) Discuss the basic phenomena of encapsulated flavor release   3

    c) What is pulse electric field (PEF) processing? What are the key components of a PEF System? Illustrate a schematic diagram of a pulse electric fields operation.   1+1+2=4

9. a) What is food irradiation? How ionizing radiation preserves food?   1+2=3

    b) What changes to food are caused by irradiation? Is irradiated food radioactive?   1+2=3

    c) What is surface treatment and edible coating in food preservation? What are the rationale for using edible coating and surface treatments in food system?   1+3=4

10. a) What is a new product? Why a food engineer should undertake new food product development initiative?   1+2=3

    b) Briefly describe the new food product development stage and gate.   4

    c) How a food engineer design a package label of newly developed food product?   3