Full Marks: 70                                                    Time: 3 Hours

(Figures in the right margin indicate full marks. Answer **Four (4)** questions from each section, where question No. **1** and **6** are compulsory. Use separate answer script for each section. Split answers are strongly discouraged.)

## SECTION-A

1.  a)  Define food production, processing, preservation, and spoilage. Mention the reasons for food preservation considering food spoilage.   2
    b)  State the mode of heating and cooling during food preservation.   3

2.  a)  What do you mean by food rheology? Mention the instruments to measure rheological properties of fluid food products.   2
    b)  Describe the fundamentals of drying with schematic representation of drying rate curves.   3
    c)  Compare the shear-stress rate of shear relationship for Newtonian and non-newtonian fluid with schematic illustration.   5

3.  a)  Why does shrinkage occur during drying of foods? Suggest the ways of overcoming this problem.   2
    b)  Differentiate between food quality control and assurance. Describe various quality characteristics of food in tabular form.   4
    c)  Briefly describe the major modes of deterioration in food products. How can you control the deterioration of food?   4

4.  a)  "Metabolism, a function of temperature"- Justify the statement.   2
    b)  Enumerate plant product storage system. Illustrate the climacteric pattern of respiration and associated changes in fruit ripening.   4
    c)  Briefly describe the changes in food product during freezing, cold storage, and thawing.   4

5.  a)  Discuss the methods of food irradiation. What changes are occurred in food during irradiation?   3
    b)  Illustrate a schematic diagram of a fluidized bed dryer. Enumerate the influence of dehydration on nutritive value of food.   3
    c)  Consider a potato sample weighed 385.6g after peeling has been dried and the moisture content was 78% (wb)   4
        a) What weight of totally dry potato flakes would be obtained?
        b) What weight of product would be obtained if the potato flakes contained 5.84% moisture on a wet basis?

## SECTION-B

6.  a)  Outline the thermal and non-thermal preservation methods of food.   2
    b)  "Food irradiation can replace conventional preservation methods of food"- Justify your opinion.   3

7.  a)  What is pulse electric field processing? Illustrate a schematic diagram of a pulse electric field operation.   2
    b)  How can you measure the visco-elastic parameters of food? Enumerate the properties of solid foods representing Maxwell and Kelvin model.   4
    c)  Compare the arithmetic surface and volumetric surface mean diameter for particles in a dry food product with the following distribution of sizes.   4

| Number (N) | Size (macron) |
|------------|---------------|
| 1          | 40            |
| 4          | 30            |
| 25         | 20            |
| 20         | 15            |
| 10         | 10            |
| 4          | 5             |

8.  a)  Define i) Hurdle technology ii) D-value iii) Z-value iv) F-value                2
    b)  Define ultrasound? Explain the methods and application of ultrasound in food.   3
    c)  Write down the principle of canning. Describe the components of double seam of   5
        a tin can with a schematic diagram.

9.  a)  Discuss the basic phenomena of encapsulated flavour release.                    3
    b)  Explain animal product storage system. How does liquid nitrogen works in        3
        cryogenic freezing method?
    c)  How can you calculate the refrigeration requirements in freezing food?          4

10. a)  Define fermentation. State the basic reasons of considering fermentation as a   2
        method of food preservation.
    b)  Categorize the widely used antimicrobial preservatives. Briefly describe the    3
        terms: food preservation by sugar, food enzymes, rancidity of food.
    c)  Briefly describe the guidelines for use of food additives. Enumerate the        5
        functional chemical additives application in food product.

## Chattogram Veterinary and Animal Sciences University
### Faculty of Food Science and Technology
BFST 2nd year 1st Semester Final Examination, 2023
### Course Title: Organic Chemistry (Theory)
### Course Code: OCM-201 (T)

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

(Figures in the right margin indicate full marks. Answer **Four (4)** questions from each section, where question No. **1** and **6** are compulsory. Use separate answer script for each section. Split answers are strongly discouraged.)

### SECTION-A

1. a) What is Huckel rule? Write the structure of two compounds that follow this rule. 　1+2=3
   b) Outline the classification of organic compounds. 　2

2. a) Illustrate different types of carbon present in alkane. 　3
   b) How will you produce alkane from carboxylic acid and grignard reagent? 　4
   c) Explain with example cis and trans isomerism showed by alkenes. 　3

3. a) Reproduce the mechanism of nucleophilic addition reaction of carbonyl group. How do acids and bases catalyse this reaction? 　5
   b) Explain the acidity of $\alpha$-hydrogen present in carbonyl compounds. 　2
   c) How will you identify the presence of aldehyde group in a compound? 　3

4. a) Why does benzene undergo electrophilic substitution reactions whereas alkenes undergo addition reactions? 　3
   b) How will you produce alkyl benzene from benzene? Illustrate with mechanism. 　3
   c) "Benzene is not a straight chain compound rather a cyclic compound"- Justify your answer. 　4

5. a) How do primary, secondary and tertiary alcohols differ in their behaviours towards oxidation? 　3
   b) What happens when ethyl alcohol is treated with concentrated sulphuric acid under different conditions? 　3
   c) What is absolute alcohol? How can it be prepared from common alcohol in industry? 　1+3=4

### SECTION-B

6. a) What is aromaticity? 　1
   b) Express the criteria for aromaticity with suitable example. 　4

7. a) Illustrate the peroxide effect of alkenes with mechanism. 　4
   b) What happens when alkenes are treated with hot and cold $KMnO_4$ solution? 　4
   c) Why do alcohols show higher boiling points than corresponding alkanes? 　2

8. a) Why do phenols show acidic nature? Recall effects of electron withdrawing and releasing substituents on phenol's acidity. 　6
   b) How will you produce phenol from cumene and benzene diazonium salt? 　4

9. a) How will you distinguish between 1-alkynes and other alkynes? Write down the related reactions. 　3
   b) What are vicinal dihalides? How will you produce alkynes from vicinal dihalides? Explain with suitable example. 　4
   c) Predict what happens when carboxylic acid is reduced and treated with ammonia. 　3

10. Write short notes on- 　2.5×4=10
   a) Hofmann's degradation of amines
   b) Catalytic Cracking of alkanes
   c) Cannizzaro reaction
   d) Ozonolysis of benzene

Chattogram Veterinary and Animal Sciences University
Faculty of Food Science and Technology
BFST 2<sup>nd</sup> year 1<sup>st</sup> Semester Final Examination, 2023
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 Use separate answer script for each section. Split answers are strongly discouraged.)

## SECTION-A

1.  a)  Write down the contributions of the following scientists in the microbiology          4.0
        I. Hippocrates      II. Louis Pasteur
        III. Robert Koch    IV. Alexander Fleming

    b)  How do pH and temperature influence the growth of bacteria?                            3.0

2.  a)  Show the difference between cell wall of gram positive and gram negative               4.0
        bacteria.
    b)  Classify bacteria on the basis of location of endospore.                               3.0

3   a)  Establish major nutritional categories of all microorganisms.                          2.0
    b)  Classify bacteria and the basis of flagellar distribution.                             3.0
    c)  Compare flagella and pili.                                                             2.0

4.  a)  Describe some important fungal toxin.                                                  4
    b)  Describe Koch's postulate.                                                             3

5.  a)  Mention the characteristics of an ideal disinfectant.                                  4.0
    b)  Describe difference between fungi and bacteria                                         3.0

6.  a)  Classify bacteria on the basis of their $O_2$ requirement.                             3.0
    b)  Describe exponential phase of bacterial growth.                                        2.0
    c)  What do you mean by generation time?                                                   2.0

## SECTION-B

7.  a)  Define genome, codon and anticodon.                                                    3.0
    b)  Briefly describe the process of translation.                                           4.0

8.  a)  List enzymes involved in DNA replication of bacteria with their function.              2.0
    b)  What is plasmid and conjugation? Draw and label the molecular structure of a           2+3
        tRNA.

9   a)  Mention the kinds of genetic recombination occur in bacteria.                          2.0
    b)  What do you mean by mutagens? What are the different types of mutation seen             2+3
        in bacteria?

10. a)  Write down the basis steps of recombinant DNA technology.                              2.0
    b)  Describe the mechanism of protein synthesis in bacteria.                               5.0

11  a)  Classify bacteriological media on the basis of purpose.                                4.0
    b)  Mention the portals of entry the organism to host body.                                3.0

12  a)  How you can obtain a pure culture of bacteria?                                          4.0
    b)  compare exotoxin from endotoxin.                                                        3.0

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

(Figures in the right margin indicate full marks. Answer **Four (4)** questions from each section, where question No. **1** and **6** are compulsory. Use separate answer script for each section. Split answers are strongly discouraged.)

## SECTION-A

1. Define dietary diversity and its importance for children. Discuss the factors that influence dietary diversity in children living in refugee camps.  05

2. a) What is food security? Provide its definition.  02
   b) Explain the three dimensions of food security: availability, access, and utilization.  04
   c) Assess the impact of climate change on food security in a specific region like coastal area.  04

3. a) What do you mean by nutrition transition?  02
   b) How does nutrition transition affect the well-being of mass people? Summarize your opinions addressing this issue.  05
   c) Point out the importance of gender issues in the nutrition area.  03

4. a) Identify the indirect methods of nutritional assessment.  02
   b) Describe how household food consumption surveys can indicate nutritional status.  04
   c) Differentiate the different forms of Protein Energy Malnutrition.  04

5. a) Why micronutrient deficiency is also called hidden hunger? Mention the clinical signs and symptoms of Anemia and Beriberi of a patient.  1+4=05
   b) Define nutritional emergency. Chalk out the causes and effects of nutritional emergencies arising in any country.  2+3=05

## SECTION-B

6. Suppose, a 14 months' child suffering from severe malnutrition in a Refugee Camp. In this case, write down the guidelines of the therapeutic feeding program for the nutritional management of this child.  05

7. a) What are the objectives and types of running supplementary feeding programs during a nutritional emergency?  06
   b) Mention the different food items used to mitigate nutritional emergencies and when you will close down a supplementary feeding program.  04

8. a) State the definition of nutrition communication. Discuss in brief the components of nutrition communication strategies in the dissemination of nutrition education among community people.  1+5=06
   b) "Currently food based approaches are carried out to combat nutritional problems in our country"_Justify the statement.  04

9. a) How do you formulate and test a nutritional message?  04
   b) What is behavioural change communication?  02
   c) Briefly describe the PEN model of health and nutrition communication.  04

10. Write down short notes (any four) from the following:  2.5×4=10
    a) Evil cycle of malnutrition
    b) General mass feeding program
    c) Food balance sheet
    d) Hidden hunger
    e) CED and its consequences on child health

Chattogram Veterinary and Animal Sciences University
Faculty of Food Science and Technology
BFST 2$^{nd}$ year 1$^{st}$ Semester Final Examination, 2023
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 **Four (4)** questions from each section, where question No. 1 and 6 are compulsory. Use separate answer script for each section. Split answers are strongly discouraged.)

## SECTION-A

1. a) Give an overview of unit operations in food processing.    5

2. a) Enumerate the principle and theory of thin layer drying with graphical representation.    3
   b) Develop thin layer drying equation and mention its limitation.    3
   c) Find out the value of K (permeability of water with respect to vapor transport) of freeze drying process when the amount of water evaporated from the product is 0.145kg, drying time is 5 hour 50 minute, vapor pressure at 47.3°C is 82.14 mm of Hg, total pressure of the drying chamber is 0.15mm of Hg and the thickness of the freeze dried product is 25mm.    4

3. a) Explain constant rate drying period and falling rate drying period with graphical representation.    3
   b) Illustrate performance curves for tube axial or vane axial fans widely used in food industry.    3
   c) In a plant, deodorizing crude vegetable oil was preheated in a counter current flow tubular heat exchanger. The heating medium is hot water obtain from waste stream in the plant. The mass rate flow of water through the heat exchanger is 5000lbs/hr. If the hot water enter the system at 212°F and leaves at 110°F. The crude oil is flowing at the rate of 10000lbs/hr. If the crude oil enters the heat exchangers at 70°F, what will be the outlet temperature?    4

4. a) Diagrammatically explain the freezing point depression and boiling point evaluation.    3
   b) Write down the Brunauer-Emmet-Teller (BET) adsorption theory.    3
   c) An IQF tunnel is being used for strawberries the product conveyor is 5ft wide and 20ft long. The air used as a freezing medium is at -30°F and moves through the product bed at a velocity which produces a surface heat transfer co-efficient of 50 Btu/hr ft$^2$°F. If the strawberries enter the tunnel at 40°F and frozen to 0°F, compute the conveyor velocity and estimate the capacity of the freezer.    4

5. a) Define hysteresis and steam economy. State the forms of water occur in food.    3
   b) Draw and explain material and enthalpy balance on forward feed triple effect systems.    3
   c) Orange juice with 10% total solid is being concentrated in a single-effect evaporator using a feed rate of 30,000 lbm/hr at 70°F. The evaporator is being operated at a vacuum which will allow the product to boil at 159°F while steam is being supplied at 30 lbm/inch$^2$ absolute pressure. The designed concentration in the product is 50% total solids. Compute the steam requirement and steam economy of the process surface area (the overall heat transfer co-efficient is 300 Btu/hr ft$^2$°F.    4

## SECTION-B

6.  a) State the law of conservation of mass and energy balance.  2
    b) Diagrammatically show and prove basic principle of mass and energy balance.  3

7.  a) Write about the operations that occur in the processing plant of marine fish.  3
    b) Analyse deep bed drying system. How drying rate constant is dependent on product thickness from Fick's law.  3
    c) A drum dryer is being designed for drying of a product from an initial total solids content of 25% to final moisture content 2% (db). An overall heat transfer co-efficient of 300 Btu/hrft$^2$°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 50lbm product/hour.  4

8.  a) Briefly describe the glass transition and glass transition temperature in food preservation.  3
    b) Briefly describe the different types of dryer with their mode of action.  3
    c) Skim milk is prepared by removal of some of the fat from whole milk. This skim milk is found to contain 90.5% water, 3.5% protein, 5.1% carbohydrate, 0.1% fat, and 0.8% ash. If the original milk contained 4.5% fat, calculate its composition assuming that only fat was removed to make the skim milk and there are no losses in the processing.  4

9.  a) Classify compression system of refrigerant control. How refrigeration operation is accomplished in a refrigerator?  3
    b) A block of lean beef is being frozen in a -20°F convection freezer ($h_c$=5Btu/hrft$^2$°F). The initial temperature is 40°F and the dimensions are 30inch × 25inch. Compute the time required to freeze the product to 15°F.  3
    c) Mention the importance of cryogenic freezing. Schematically illustrate the loading and unloading of product from plate freezer.  4

10. a) Explain modes of heat transfer. Derive mathematical expression for heat transfer in a volumetric element of solid.  3
    b) Find out the log mean temperature of fluid flowing through a pipe when surface temperature is 212°F and inlet bulb temperature of fluid is 100°F while the outlet bulb temperature of fluid is 150°F.  3
    c) Show the relationship between water activity and deteriorative reactions in dried foods.  4

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

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

## SECTION-A

1. a) State and explain Ohm's law. 3
   b) If the current through a 0.02 MΩ resistor is 3.6 μA, What is the voltage drop 2
      across the resistor?

2. a) State Kirchhoff's current law (KCL). Find the unknown node voltages at 5
      points $V_1$ and $V_2$ using Nodal analysis:
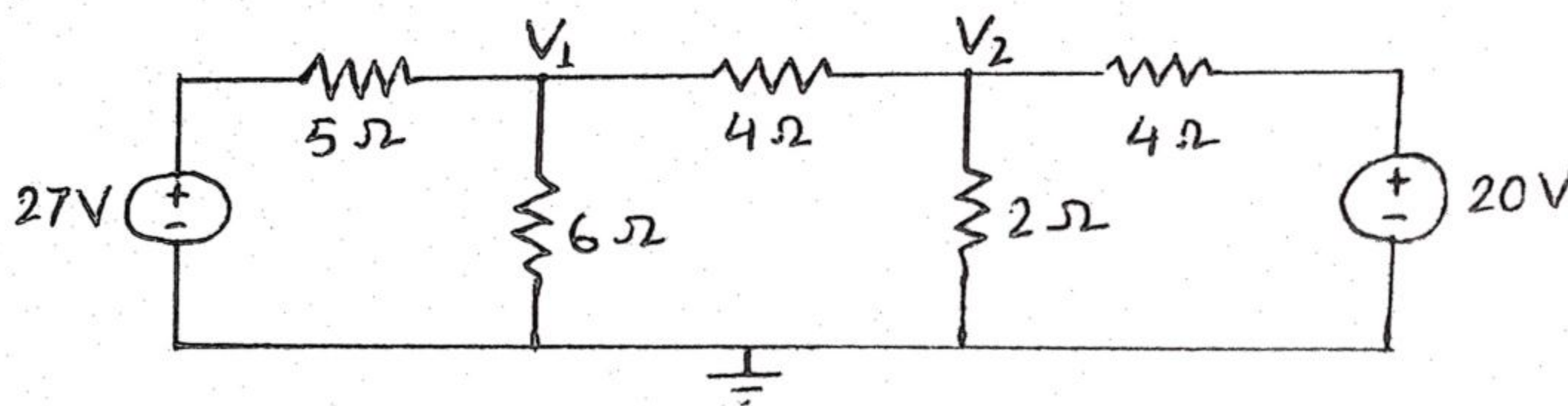
   

   b) State Kirchhoff's voltage law (KVL). Find the unknown mesh currents $I_1$, 5
      $I_2$ and $I_3$ using Supermesh analysis:
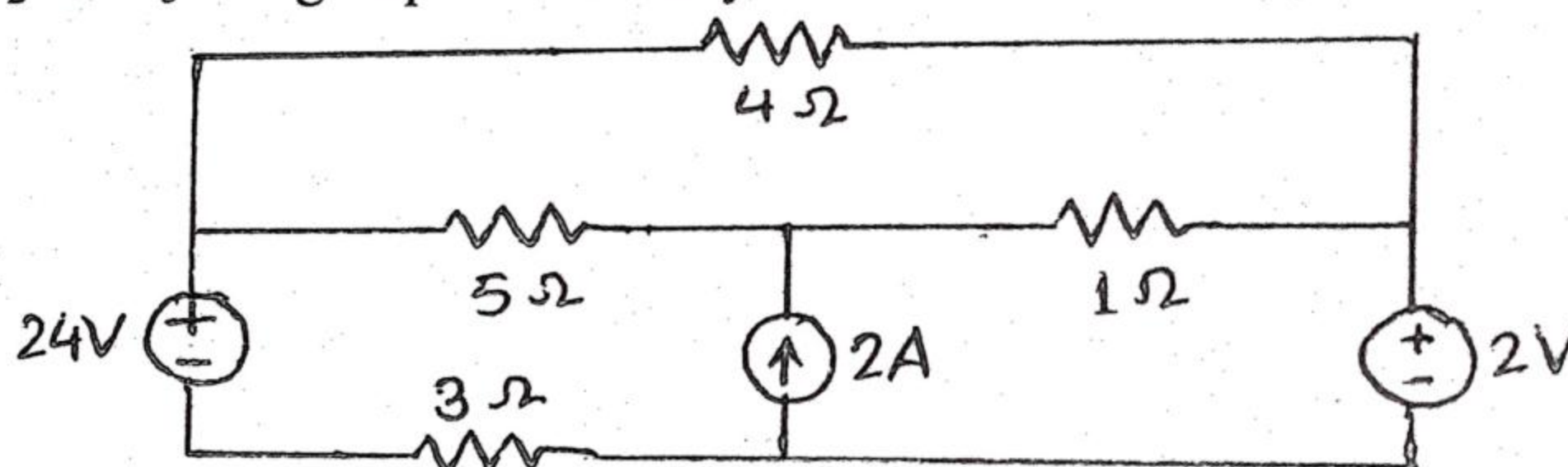
   

3. a) State Thevenin's theorem and justify this theorem using any network. 5
   b) Using the superposition theorem, determine the current, $i_o$ through 12 kΩ 5
      resistor as shown in circuit below:
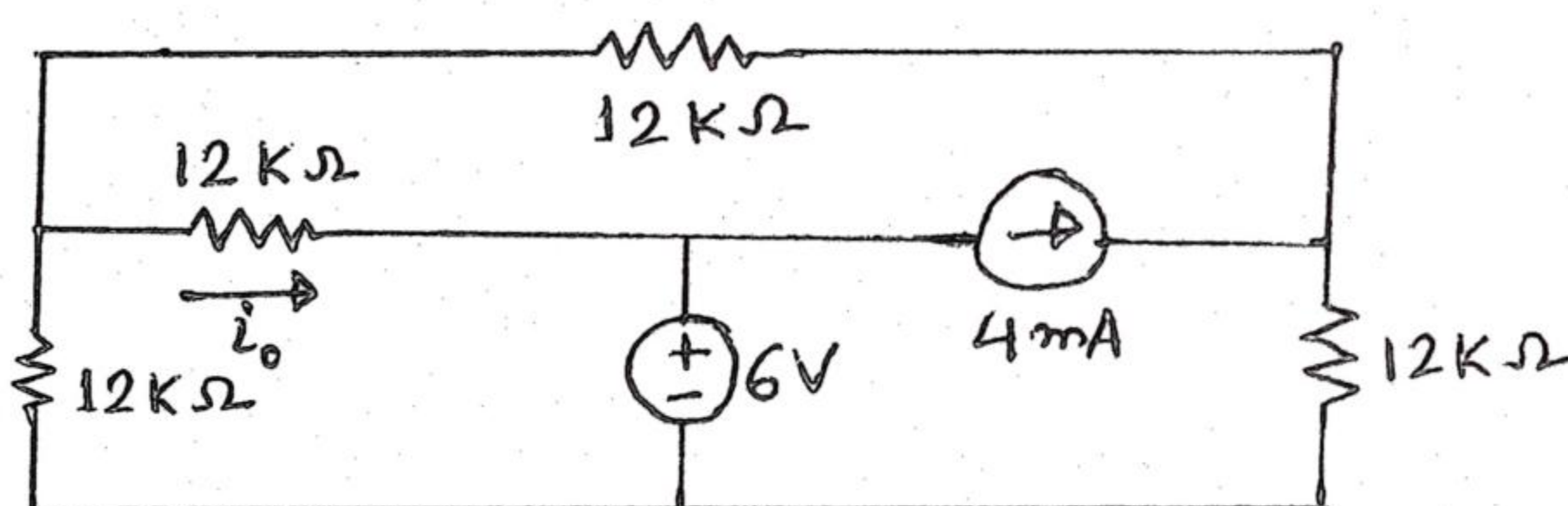
   

4. a) Briefly explain the energy band diagram. Also show the difference with 4
      energy level.
   b) Classify crystalline solids in terms of unit cell specifications. 3
   c) Define atomic packing factor. Calculate atomic packing factor for simple 3
      cubic, body centered cubic and face centered cubic structure.

5. a) Discuss the formation mechanism of the depletion region in a *pn* junction 5
      diode and its behavior under forward and reverse biasing condition.
   b) Show the *V-I* characteristics of the *pn* junction diode graphically and 3
      explain the terms knee voltage and breakdown voltage.
   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- 5
      configuration to Δ-configuration and vice versa.

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

   c) Find the equivalent resistance, $R_{eq}$ of the network at the terminals "a" and "b" using Y-Δ and Δ-Y transformations.   **3**
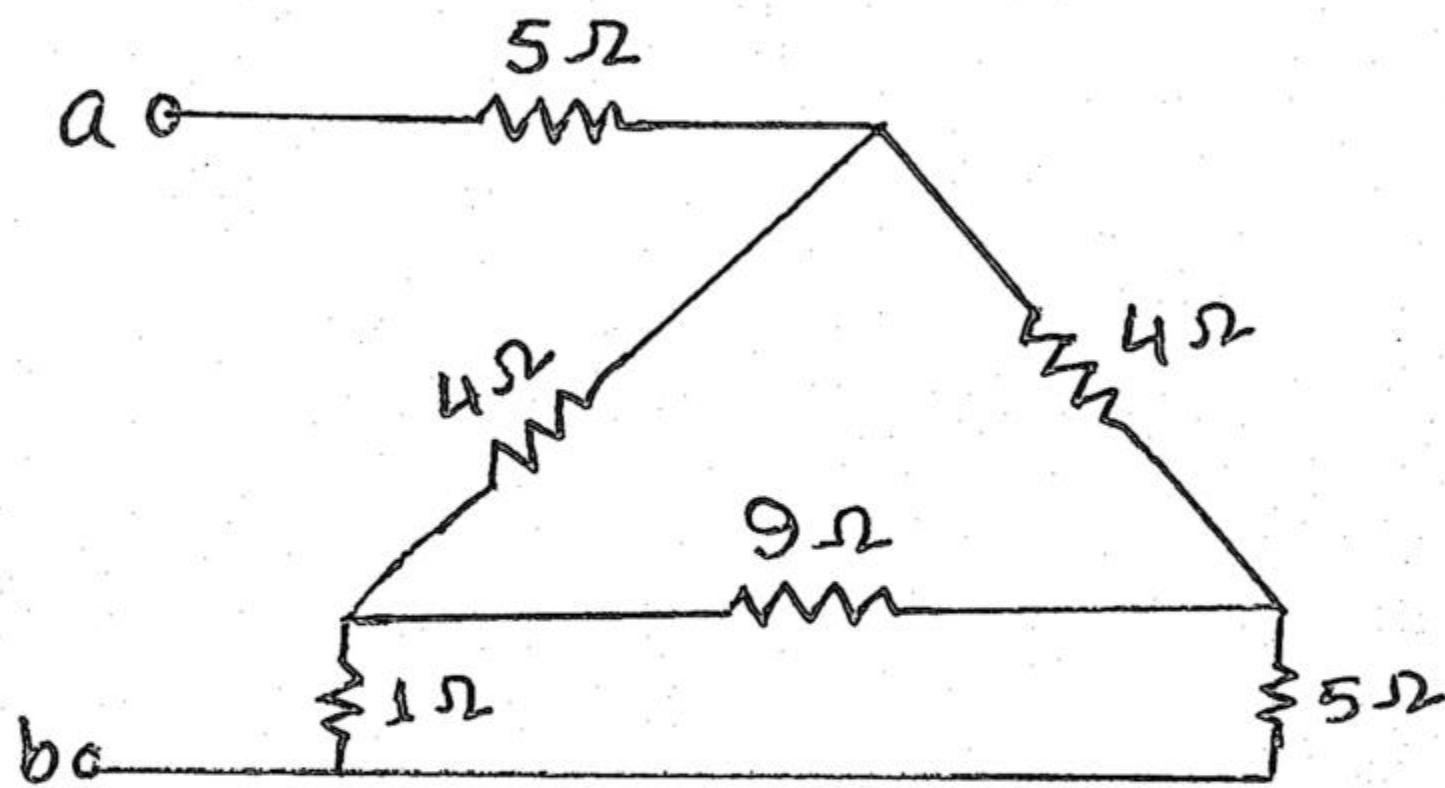


8. a) State and explain maximum power transfer theorem for any relevant network. Show that the maximum power transferred to the load resistance is 50% of the total power generated.   **6**

   b) Find the value of $R_L$ for maximum power transfer and the maximum power that can be transferred in the network shown.   **4**
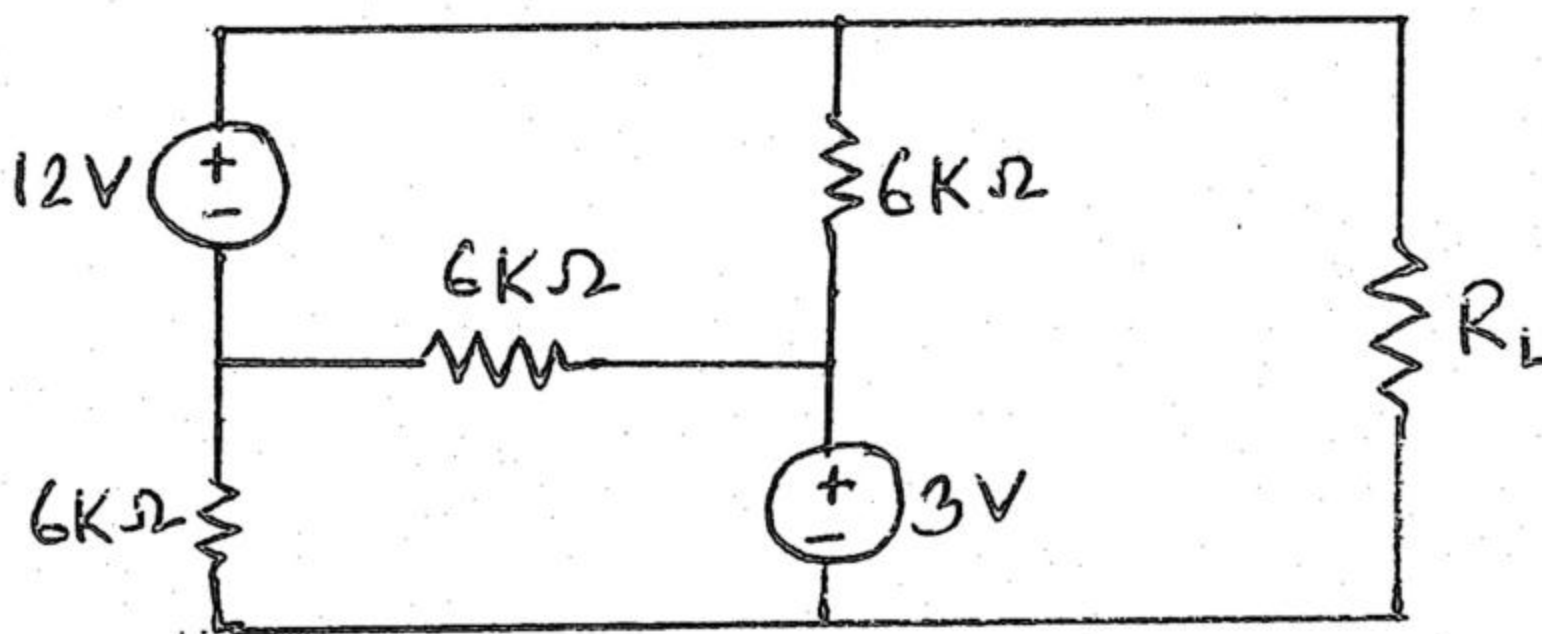


9. a) State Reciprocity theorem. Find current through the 2 Ω resistor and hence, verify the reciprocity theorem for the circuit below.   **6**
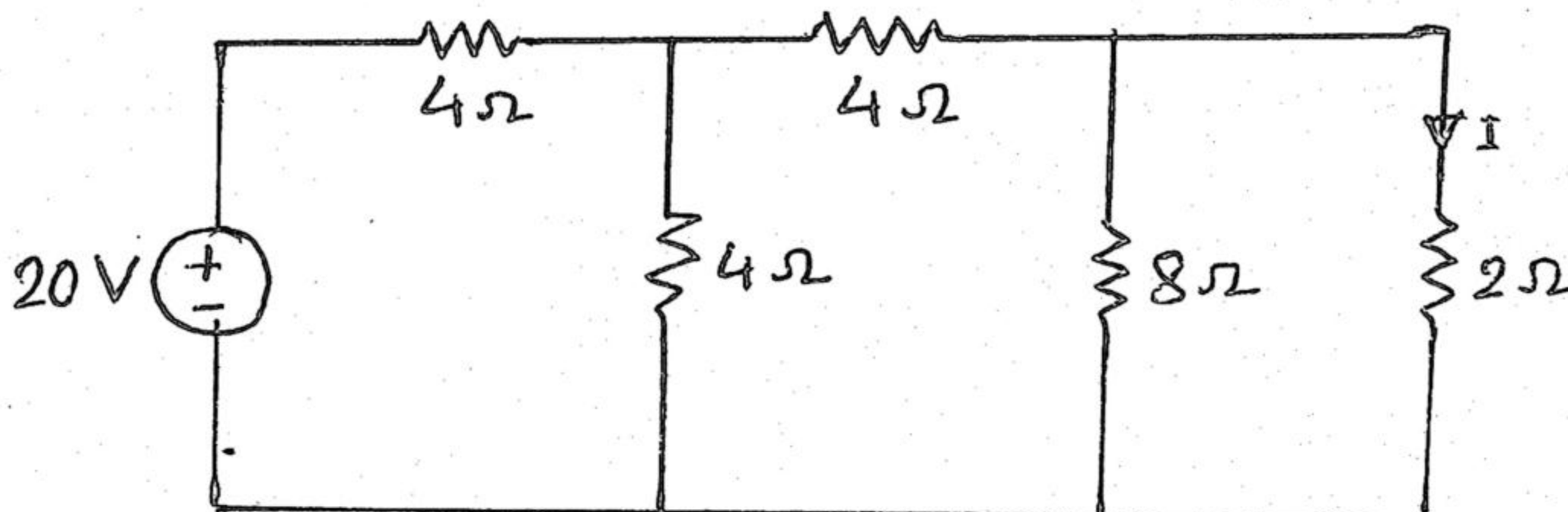


   b) Establish the relationship between peak and root mean square value of AC generator for a simple electrical circuit.   **4**

10. a) Define 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.   **3**

   c) Mention the differences between Bipolar transistor (BJT) and Junction field effect transistor (JFET).   **4**