

Chittagong Veterinary and Animal Sciences University  
 Faculty of Food Science and Technology  
 BFST 2<sup>nd</sup> Year 1<sup>st</sup> Semester Final Examination, 2018  
 Subject: Basic Electrical and Electronic Engineering  
 Course Code: EEE-201(T)

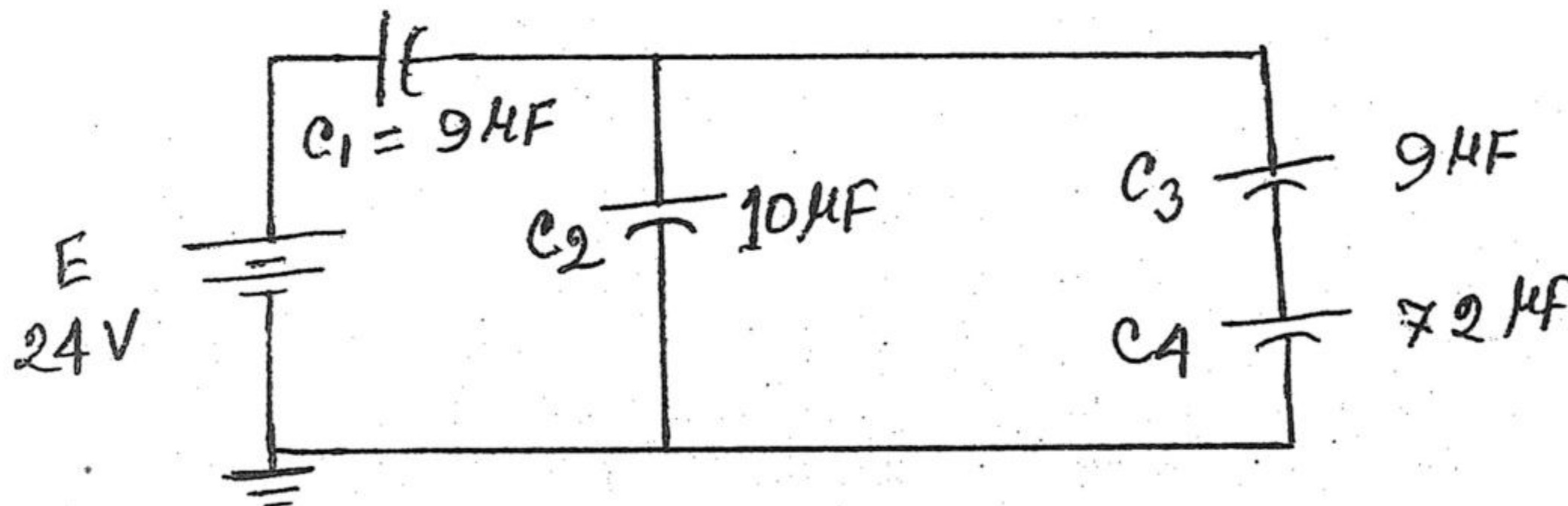
Full Marks: 70

Time: 3 hours

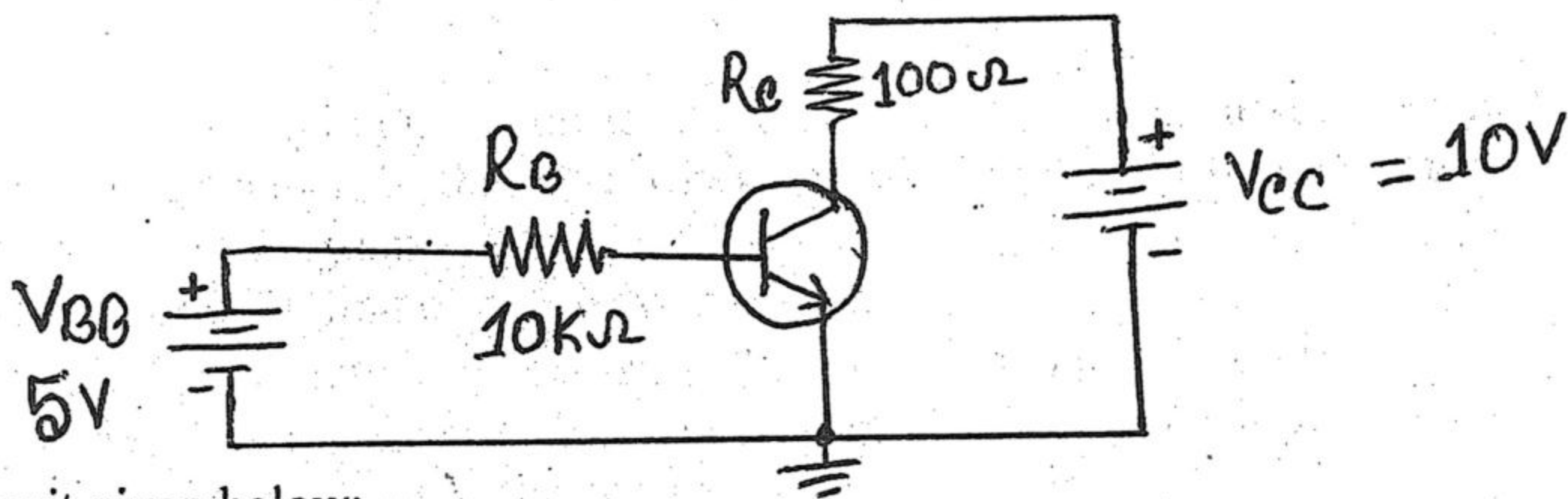
(Figures in the right margin indicate full marks. Answer Five (5) questions from each section. Use separate answer script for each section. Split answer is strongly discouraged.)

Section-A

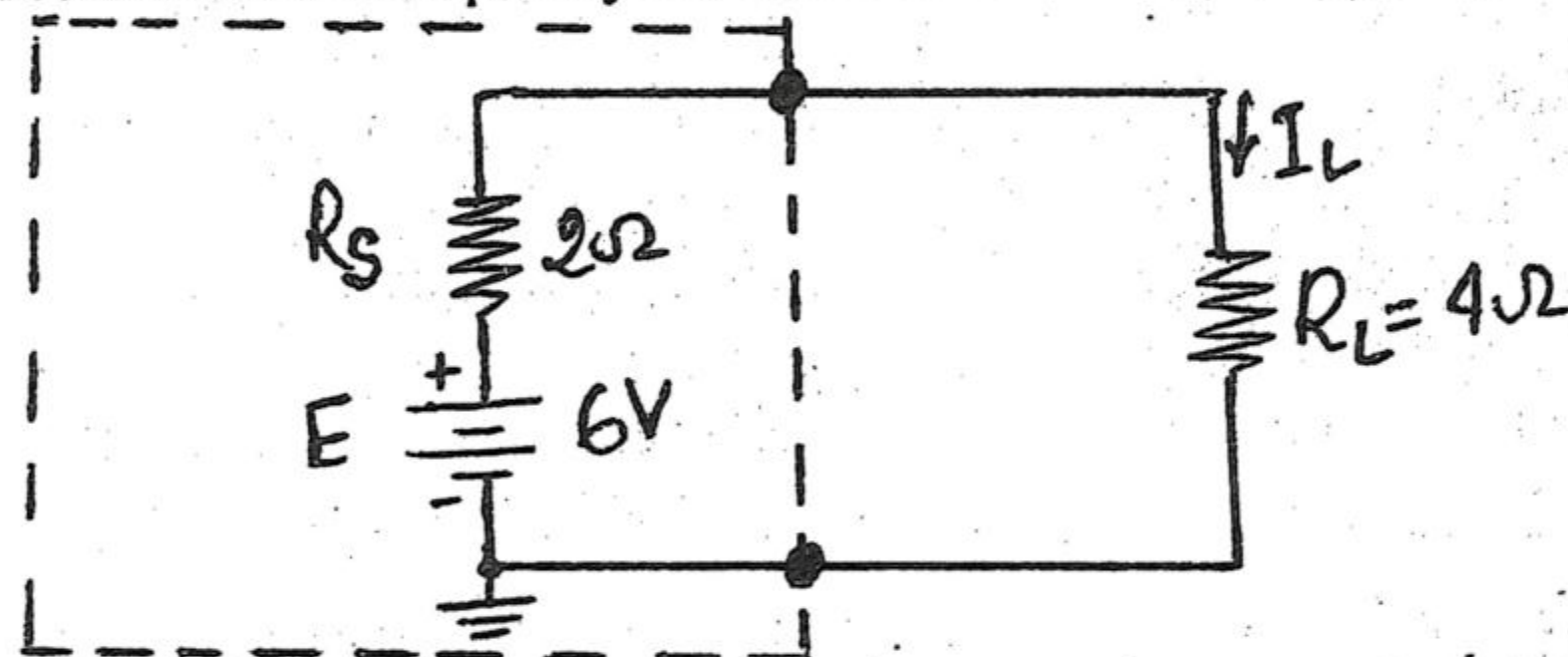
1. a) Suppose you have to maintain a constant voltage to a load from a source which varies within some voltage range. In that case what step would you take? - Explain the operation with necessary circuit diagram. 4
- b) Briefly describe the operation of half wave rectifier. 3
2. a) Discuss basic BJT operation with necessary diagrams showing electron flow. 4
- b) Define Capacitance and dielectric. For the configuration of given figure, determine the voltage across each capacitor and the charge on each capacitor. 3



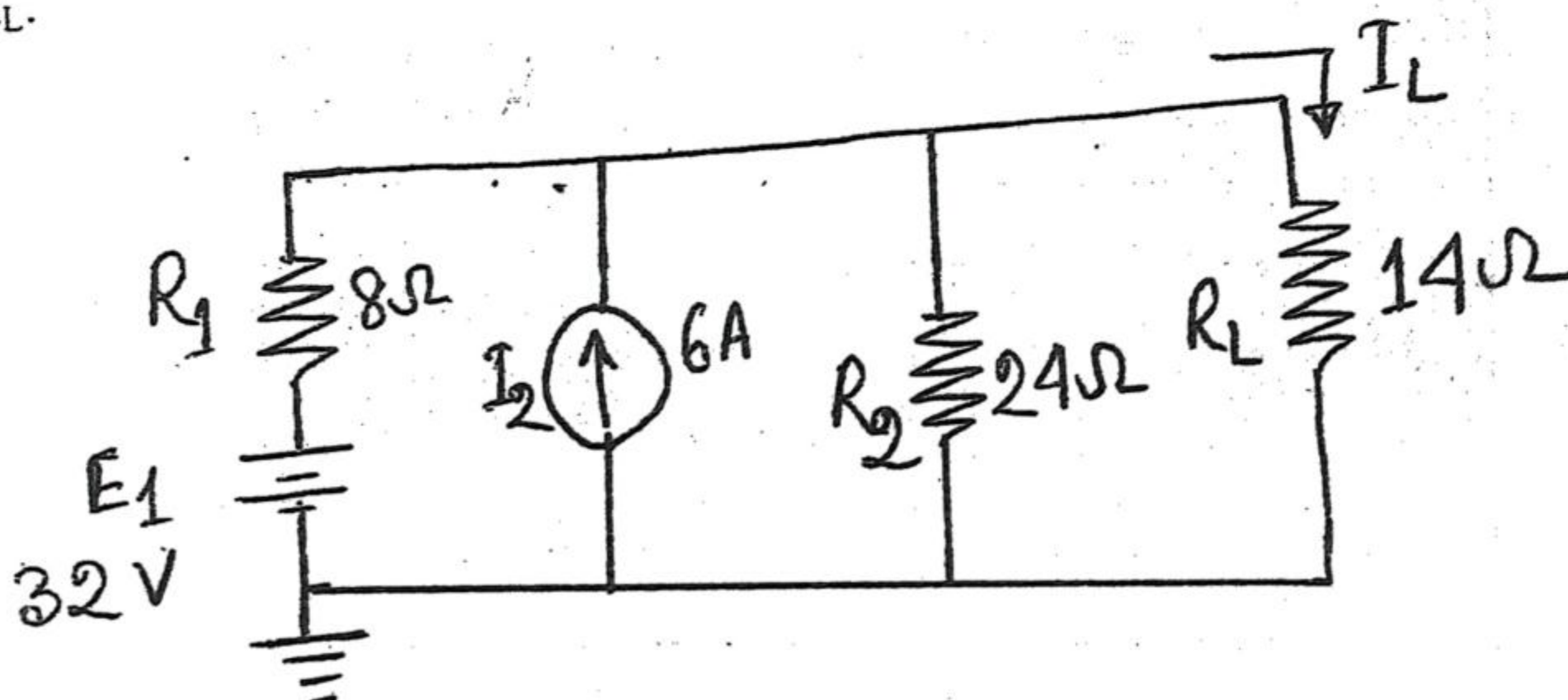
3. a) Draw JFET transfer characteristics from drain characteristics for  $V_{GS} = 0V, -1V, -2V, -3V, -4V$  and  $V_{GS(off)} = -5V, I_{DSS} = 12mA$  4
- b) What is meant by FET. Write down the differences between JFET and MOSFET. 1+2=3
4. a) Write Short note on E-MOSFET. 3
- b) Determine  $I_B, I_C, I_E, V_{BE}, V_{CE}$  and  $V_{CB}$  in the following circuit. Given  $\beta$  current gain of this circuit is 150. Also draw the load line and Q point of this circuit. 4



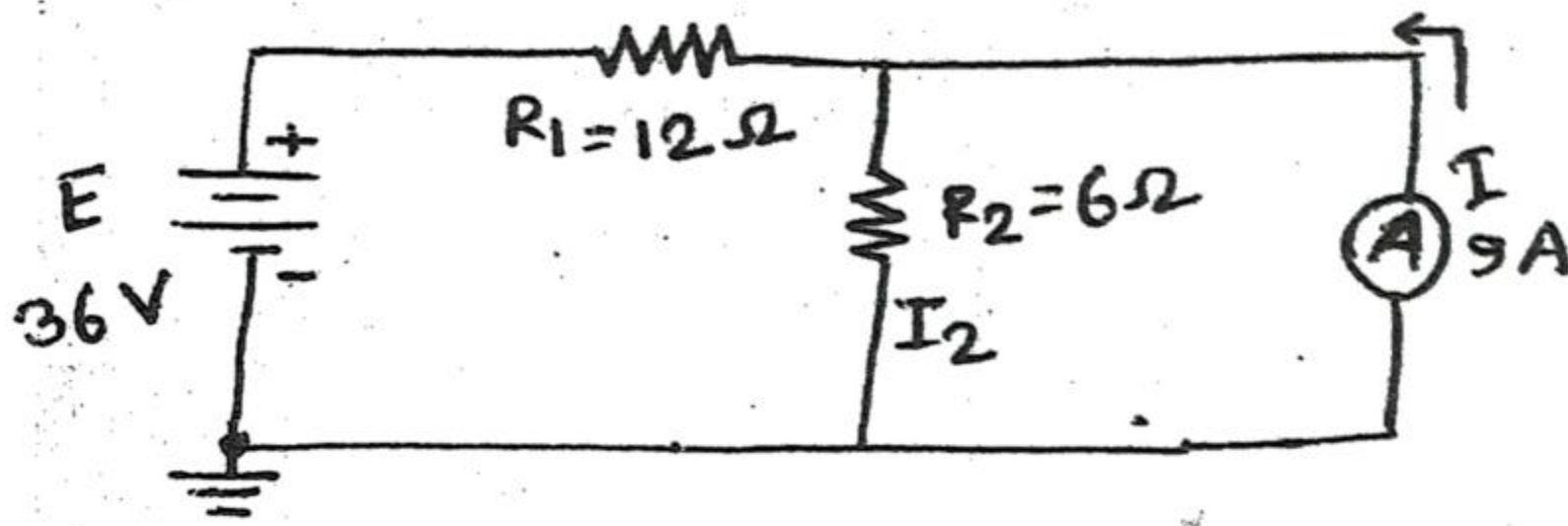
5. a) For the circuit given below: 1+1+2=4
  - i) Determine the current  $I_L$
  - ii) Convert the voltage source to a current source.
  - iii) Using the resulting current source of part (ii), Calculate the current through the load resistor and compare your answer to the resulting of part (i).



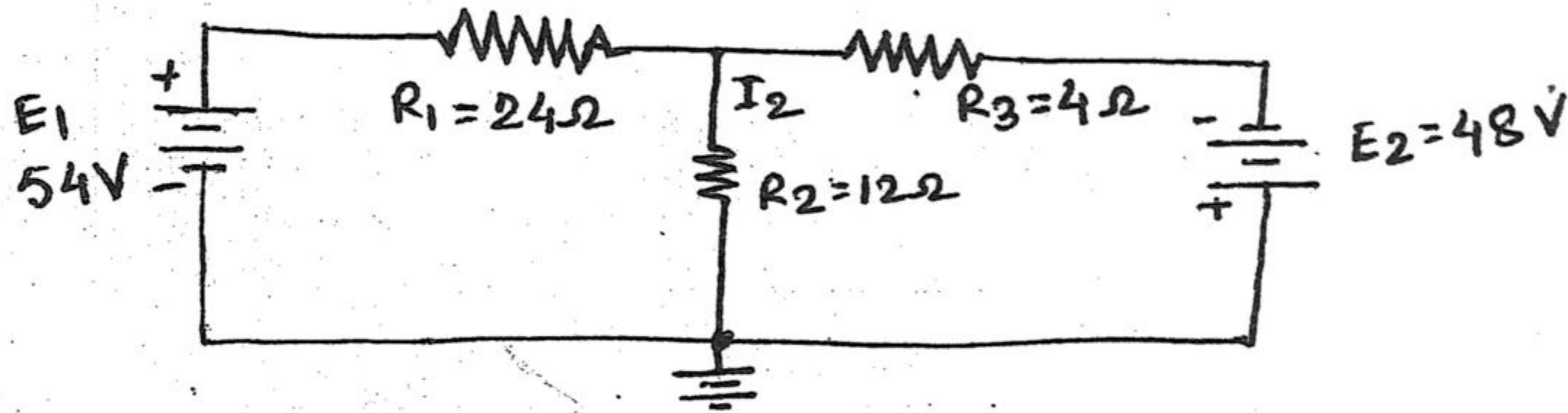
- b) Reduce the network of figure below to a single current source and calculate the current through  $R_L$ . 3



6. a) Using superposition theorem, determine the current through resistor  $R_2$  for the following figure. 3

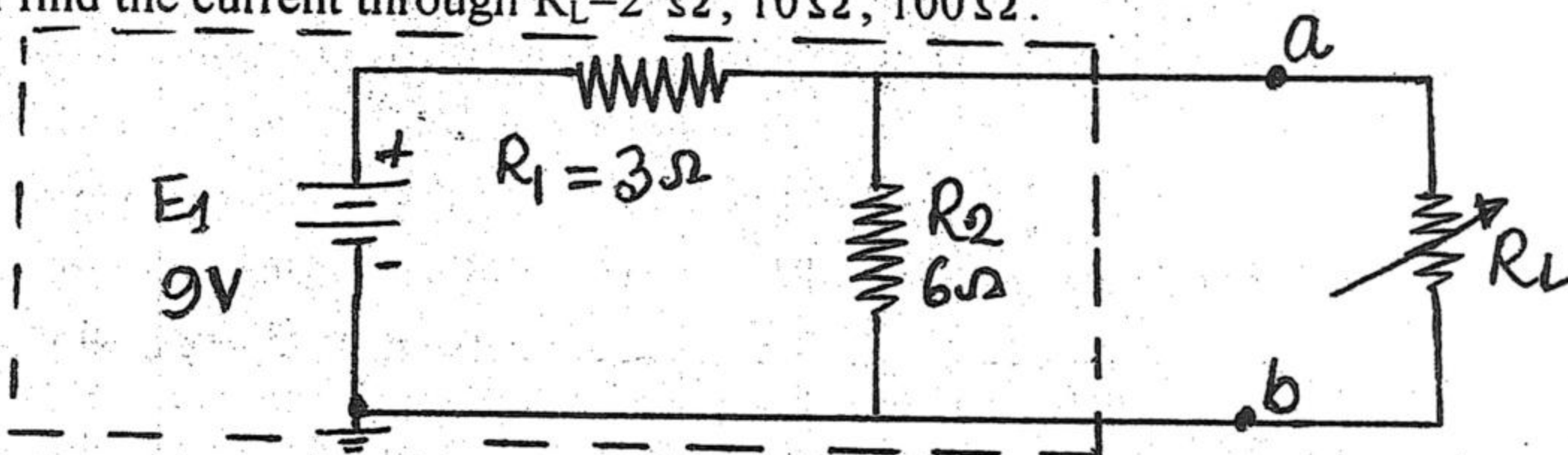


- b) Using superposition theorem, determine the current through the  $12\Omega$  resistor. 4

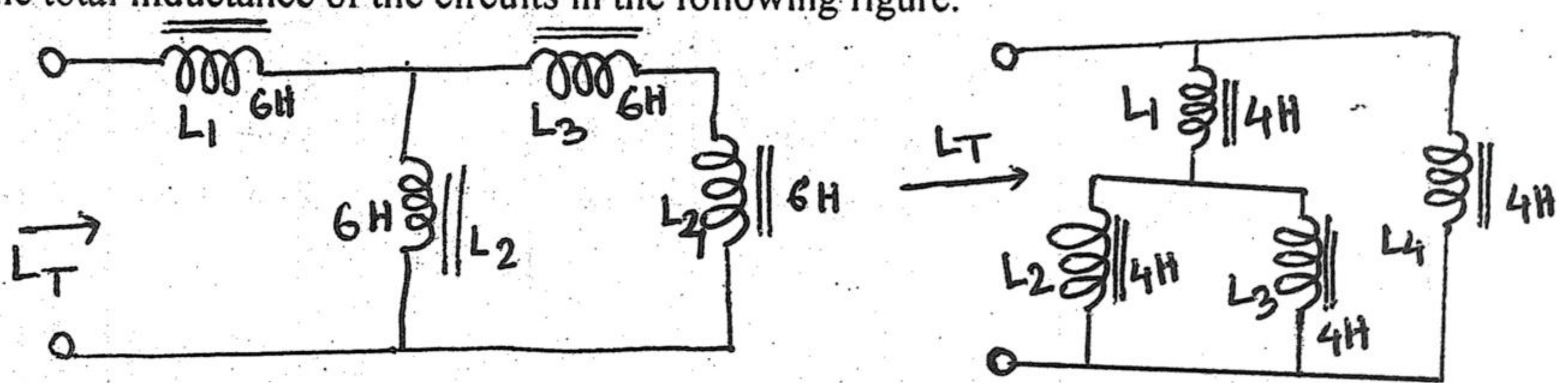


### Section-B

7. a) Explain i) Resonant frequency ii) Power factor. 2+2=4  
 b) Define Resistance, reactance and impedance. 1  
 c) If  $R=20$  ohms,  $L=0.056$  henry and  $C=50\mu F$ , Calculate the impedance of the RLC branch at 60 cycles. 2
8. a) Find the Thevenin equivalent circuit for the network in the dotted area of the given figure. Then find the current through  $R_L=2\Omega, 10\Omega, 100\Omega$ . 4



- b) Maximum power transfer occurs when the load voltage and current are one-half their maximum possible values,- Prove. 3
9. a) Explain 'Hysteresis'. 4  
 b) Find the total inductance of the circuits in the following figure. 3



10. a) Given  $\omega = 200 \text{ rad/s}$ , determine how long it will take the sinusoidal waveform to pass through an angle of  $90^\circ$ . 2  
 b) i) Determine the angle at which the magnitude of the sinusoidal function  $v = 10 \sin 377t$  is 4V. 3  
 ii) Determine the time at which the magnitude is attained.  
 c) Sketch  $e = 10 \sin 314t$  with the abscissa 2  
 i)  $\alpha$  in degrees ii)  $\alpha$  in radians iii)  $t$  in seconds
11. a) Define mobile and immobile charge. Why does a semiconductor act as insulator at ordinary temperature? 2  
 b) Briefly describe the formation of p-type and n-type semiconductor. Hence explain hole type conductivity and electron type conductivity with necessary diagrams. 5
12. a) For a transformer with  $L_p = 200\text{mH}$ ,  $N_p = 50$  turns,  $L_s = 800\text{mH}$ ,  $N_s = 100$  turns,  $k = 0.6$  1 \times 4 = 4  
 i) Find the mutual inductance  $M$   
 ii) Find the induced voltage  $e_p$  if the flux  $\phi_p$  changes at the rate of  $450 m\omega_p / s$ .  
 iii) Find the induced voltage  $e_s$  for the same rate of change in (ii)  
 iv) Find the induced voltage  $e_p$  and  $e_s$  if the current  $i_p$  changes at the rate of  $0.2\text{A/ms}$
- b) Draw equivalent circuit diagram of iron core transformer and air core transformer. 3

**Chittagong Veterinary and Animal Sciences University**  
**Faculty of Food Science and Technology**  
**BFST 2<sup>nd</sup> year 1<sup>st</sup> Semester Final Examination 2018**  
**Subject: 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 of which question number 1 and 6 are compulsory. Use separate answer script for each section. Split answer is strongly discouraged.)

**Section-A**

1. Explain mass and energy balance equation. 5
  
2. a) State and explain first and second law of thermodynamics. 3
  
 b) Make the following conversion: 1.5+1.5=3
  - i)  $10.731 \text{ ft}^3 \cdot \text{lb}/\text{in}^2 \cdot \text{lbmol}^\circ\text{R}$  to  $\text{J}/\text{kg} \cdot \text{mol} \cdot \text{K}$ .
  - ii)  $105 \text{ Btu}/\text{hft}^2 \cdot ^\circ\text{F}$  to  $\text{KW}/\text{m}^2 \cdot ^\circ\text{C}$ .
  
- c) A membrane separation system is used to concentrate total solids (TS) in a liquid food from 10% to 30%. The concentration is accomplished in two stages with the first stage resulting in release of a low-total-solids liquid stream. The second stage separates the first concentration product from a low-total-solids stream, which is returned to the first stage. Determine the magnitude of the recycle stream when the recycle contains 2% TS, the waste stream contains 0.5% TS, and the stream between stages 1 and 2 contains 25% TS. The process should produce 100 kg/min of 30% TS. 4
  
3. a) What is meant by constant-rate drying and falling-rate drying? Why do they occur in drying process? 1+1=2
  
 b) Derive an expression for drying time prediction in constant-rate drying period. 4
  
 c) How do you describe the effect of temperature and product thickness on drying-rate constant? 4
  
4. a) Compare and contrast dehydration and drying. Explain working principles of dryer used for milk powder production from raw milk. 1+4=5
  
 b) Skim milk with 5% total solids is being spray dried to a final moisture content of 6% using  $120^\circ\text{C}$  air with 7% RH. The density of the skim milk is  $1000 \text{ kg}/\text{m}^3$  and the largest droplet diameter is  $110 \mu\text{m}$ . The critical moisture content is 42% and the diameter of the particle at the critical moisture content is  $35 \mu\text{m}$ . The equilibrium moisture content is 1.85% and the mass diffusivity for water vapor within the particle is  $5 \times 10^{-11} \text{ m}^2/\text{s}$ . Estimate the drying time for product within the spray dryer when wet bulb temperature for the heated air is  $57.1^\circ\text{C}$ , Latent heat of vaporization at  $57.1^\circ\text{C}$  is  $2354 \text{ kJ}/\text{kg}$ . Thermal conductivity of the heated air at  $120^\circ\text{C}$  is  $0.032 \text{ W}/(\text{m}^\circ\text{C})$ . 5
  
5. a) Sketch freezing diagram of pure water and food product. 2
  
 b) Classify and describe the methods of freezing. 4
  
 c) What is super cooling? Compute the size of critical-sized ice nuclei formed when water is super cooled to  $-3^\circ\text{C}$ . Specific free surface energy between solid nuclei and liquid is  $25 \text{ ergs}/\text{cm}^2$ . latent heat of fusion is  $180 \text{ cal}/\text{g}$  and density is  $0.917 \text{ g}/\text{cm}^3$ . 1+3=4

### Section-B

6. What are the various application of unit operation in food processing? Why does the need arise to find various advanced unit operation techniques in food processing. 3+2=5
7. a) Describe briefly the freeze drying system with advantages. 5  
 b) Apple is being frozen in an air-blast freezer. The initial apple temperature is  $24^{\circ}\text{C}$  and the cold air temperature is  $-40^{\circ}\text{C}$ . Apple has a 7cm diameter with density of  $1000\text{kg/m}^3$ . The initial freezing temperature is  $-1.25^{\circ}\text{C}$  thermal conductivity of the frozen apple is  $1.2\text{ W/mk}$ , Latent heat of fusion is  $250\text{kJ/kg}$ , Final center temperature is  $-18^{\circ}\text{C}$ , Density of unfrozen apple is  $950\text{ kg/m}^3$ , Specific heat of unfrozen apple is  $3.6\text{ kJ/kgK}$  and frozen product is  $1.8\text{kJ/kgK}$ , Bi of number 1.46 and convective heat transfer coefficient is  $50\text{ W/m}^2\text{K}$ . Compute freezing time with pham's method. 5
8. a) What is steam economy? Write down the concept of single and multiple effect evaporators. 1+1=2  
 b) What is Duhring's rule? Mango juice is being concentrated in a natural-circulation single-effect evaporator. At steady state conditions, dilute juice is the feed introduced at a rate of  $0.67\text{ Kg/s}$ . The concentration of the dilute juice is 11% total solids. The juice is concentrated to 75% total solids. The specific heats of dilute juice and concentrate are  $3.9$  and  $2.3\text{ kJ/(kg }^{\circ}\text{C)}$  respectively. The steam pressure is measured to be  $304.42\text{ KPa}$ . The inlet feed temperature is  $43.3^{\circ}\text{C}$ . The product inside the evaporator boils at  $62.2^{\circ}\text{C}$ . The overall heat transfer coefficient is assumed to be  $943\text{W/(m}^2\text{ }^{\circ}\text{C)}$ . Calculate steam economy. Assume negligible boiling point elevation, temperature of steam at  $304.42\text{KPa}$  is  $134^{\circ}\text{C}$ , Enthalpy for saturated vapour and liquid is (at  $134^{\circ}\text{C}$ )  $2725.9\text{ kJ/kg}$  and  $563.41\text{ kJ/kg}$  respectively, Enthalpy for saturated vapour at  $62.2^{\circ}\text{C}$  is  $2613.4\text{ kJ/kg}$ . 1+4=5  
 c) Describe a rising film evaporator system with a neat diagram. 3
9. a) Write down the concept of LMTD and thermal diffusivity. 2  
 b) A stainless steel pipe (Thermal conductivity  $17\text{W/(m }^{\circ}\text{C)}$ ) is being used to convey heated oil. The inside surface temperature is  $130^{\circ}\text{C}$ . The pipe is 2cm thick with an inside diameter of 8cm. The pipe is insulated with 0.04m thick insulation (Thermal conductivity  $0.035\text{W/(m }^{\circ}\text{C)}$ ). The outer insulation temperature is  $25^{\circ}\text{C}$ . Calculate the temperature of the interface between steel and insulation. Assume steady state condition, pipe length 1m. 5  
 c) Describe a typical shell and tube heat exchanger with a neat diagram. 3
10. a) Derive an expression for the overall heat transfer co-efficient in heating and cooling application. 4  
 b) Will Glass-transition concept be used instead of water activity to predict microbial safety? Justify your answer. 3  
 c) What is meant by Hysteresis? Describe factors affecting water activity of food. 1+2=3

Chittagong Veterinary and Animal Sciences University

Faculty of Food Science and Technology

BFST 2<sup>nd</sup> Year 1<sup>st</sup> Semester Final Examination 2018

Course Title: Organic Chemistry (Theory)

Course Code: OCM-201

Full Marks: 70

Time: 3 hours

(Figures in the right margin indicate full marks. Answer any four (4) questions from each section of which question number 1 and 6 are compulsory. Use separate answer script for each section. Split answer is strongly discouraged.)

SECTION-A

1. With suitable examples briefly classify organic compounds according to structure. 05
2. a) How will you define primary, secondary, tertiary and quaternary carbon in case of alkanes? 02  
b) Synthesize alkane from following compounds along with suitable reactions: 1.5x3=  
i) Carboxylic acid, ii) Grignard reagent, iii) Alkyl halide 4.5  
c) Write down the mechanism of chlorination of methane. 3.5
3. a) What is aromaticity? Discuss about the criteria for aromaticity. 01+03  
b) How will you convert the following compounds into benzene? 03x2=06  
i) Benzoic acid, ii) Phenol, iii) Toluene
4. a) Discuss about the structure of alkene. 2.5  
b) Explain cis and trans isomers formation in case of alkenes. 2.5  
c) What is "Markonikov Rule"? Explain with suitable examples. 01+02  
d) What does happen when alkene is treated with ozone? 02
5. Explain Why:- 2.5x4=10  
i) O-salicylic acid melts at lower temperature as compared to that of P-hydroxybenzoic acid  
ii) Nitro group in nitro benzene is deactivating and M-directing in electrophilic substitution reaction.  
iii) Benzene sulphonic acid is stronger acid than benzoic acid.  
iv) Aniline is weaker base than ethylamine.

SECTION-B

6. a) Write down the difference between organic and inorganic compounds. 2.5  
b) Discuss about the sources of organic compounds. 2.5
7. a) Explain molecular orbital structure of benzene. 04  
b) Why does benzene undergo electrophilic substitution reactions whereas alkenes undergo addition reactions? 03  
c) How will you explain, "Benzene does not possess straight chain structure rather a cyclic structure."? 03
8. a) Explain acidity of carboxylic acid using resonance theory. 02  
b) Discuss with mechanism how esters can be obtained from carboxylic acid. 04  
c) Write down the process reaction to convert higher alcohols to lower alcohols. 04
9. a) Why do alkynes show acidic character? 2.5  
b) What are vicinal di-halides? How will you synthesis alkyne from vicinal di-halides? 01+2.5  
c) Why do alcohols have higher boiling points than those of corresponding alkanes? 02  
d) How does oxidation of alcohols can be used to identify 1<sup>o</sup>, 2<sup>o</sup> and 3<sup>o</sup> alcohols? 03
10. Briefly discuss about the following reactions: 2.5x4=10  
i) Bayer Test  
ii) Friedel Craft Alkylation  
iii) Kolbe's Reaction  
iv) Polymerization of Alkyne.

**Chittagong Veterinary and Animal Sciences University**  
**Faculty of Food Science and Technology**  
**BFST 2<sup>nd</sup> year 1<sup>st</sup> Semester Final Examination 2018**  
**Subject: 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 of which question number 1 and 6 are compulsory. Use separate answer script for each section. Split answer is strongly discouraged.)

**Section-A**

1. Define food preservation. Briefly discuss the inactivation methods of food preservation. 1+4=5
2. a) What do you mean by ripening? Briefly describe the vital processes associated with fruit ripening. 1+4=5  
b) Give an overview about the fresh food storage techniques. 1+4=5
3. a) Briefly describe the process of dehydration of fruits and vegetables. 5  
b) Discuss the method of reconstitution of dried products. 3  
c) Enumerate the common driers types used for liquid and solid foods. 2
4. a) Explain the principles of chemical preservation of foods. 4  
b) Discuss the commonly used food preservatives and safety aspects. 3  
c) How natural preservatives preserve the food?-explain. 3
5. a) Justify the low temperature techniques as food preservation. 3  
b) Show distinction between direct and indirect freezing. 3  
c) What are the factors to be considered in connection with chilling storage?-briefly describe with example. 4

**Section-B**

6. What do you mean by food quality? What are the food quality factors? 2+3=5
7. a) Enumerate the instruments used to measure the rheological properties with assumption. Establish relationship between shear stress and pressure required to force the fluid through capillary tube. 2+4=6  
b) A dry food product with bulk density of 42 lbf/ft<sup>3</sup> is stored in a large storage container and is removed by gravity through a 4 inch diameter opening in the bottom of the container. The test for angle of repose gave a mound of product with 4 inch diameter and 5 inch height. Compute the rate at which the product will be released from the container ( Discharge Co-efficient=0.67). 4
8. a) What do you mean by ionizing? Briefly describe the scope of irradiation. 1+5=6  
b) Discuss the effect of irradiation on micro-organism and food components. 4
9. a) Illustrate the advantages of counter flow over concurrent flow in a tunnel dryer-explain with figure. 4  
b) Give an overview about the importance of quality control in food processing industry. 4  
c) Enlist the post-harvest factors affecting the quality of fruits and vegetables. 2
10. Write short notes:( any four) 2.5 x 4=10
  - i) Spray Drying,
  - ii) Properties of suspensions and concentrated products,
  - iii) IMF,
  - iv) Immersion Freezing,
  - v) Radiation source.

**Chittagong Veterinary and Animal Sciences University**  
**Faculty of Food Science and Technology**  
**BFST 2<sup>nd</sup> year 1<sup>st</sup> Semester Final Examination, 2018**  
**Subject: Applied Nutrition (Theory)**  
**Course Code: APN-201(T)**

**Full Marks: 70**

**Time: 3 hours**

(Figures in the right margin indicate full marks. Answers any Five (5) questions from each section where question no 1 and 7 are compulsory. Split answer is strongly discouraged.)

**Section-A**

1. a) Define Nutritional Assessment. 02  
b) How do you assess the nutritional status of community people? 03  
c) What do you mean by supplementary feeding program? 02
2. a) Illustrate the conceptual framework of malnutrition adopted from UNICEF. 05  
b) What are the factors affecting nutritional status of an individual? 02
3. a) State your concept about Nutritional Problem. 02  
b) Briefly discuss about the advantages and limitations of different types of methods used for assessing nutritional status of mass people. 05
4. a) Differentiate between Marasmus and Kwashiorkor. 02  
b) What is Food Balance Sheet (FBS)? Point out the criteria of FBS in context of our country. 02+03
5. a) Give the definition of Double Burden of Malnutrition. 02  
b) Summarize the concept of Hidden Hunger and its impact on economic development of Bangladesh. 05
6. a) What do you mean by Nutrition Communication? 02  
b) Elaborately discuss the different media and methods in nutrition education. 05

**Section-B**

7. a) Narrate down the effects of Chronic Energy Deficiency in children. 05  
b) What types of anthropometric indices are used to identify nutritional status of children? 02
8. Explain in details about the nutritional management of SAM children through therapeutic feeding program. 07
9. a) How does malnutrition jeopardize the nutritional status of an individual? 03  
b) What is BMI? Categorize the cut off points of BMI of an adult. 02+02
10. a) What do you mean by Nutrition Survey and Surveillance? 02  
b) Enumerate the advantages of General Food Distribution and Therapeutic Feeding Program to combat emergency situation. 05
11. a) Briefly describe the concept of gender issues in nutrition. 04  
b) How do you formulate and evaluate nutritional message? 03
12. Write down short notes on the followings ~ (Any Two) 3.5X2
  - a) Malnutrition and Infection
  - b) Socioeconomic and ecological assessment of nutritional status
  - c) Objectives of Nutrition Education

**Chittagong Veterinary and Animal Sciences University**  
**Faculty of Food Science and Technology**  
**BFST 2<sup>nd</sup> year 1<sup>st</sup> Semester Final Examination, 2018**  
**Subject: General Microbiology (Theory)**  
**Course Code: GMC-201(T)**

**Full Marks: 70**

**Time: 3 hours**

(Figures in the right margin indicate full marks. Answers any three questions from each section where question no 1 and 5 are compulsory. Split answer is strongly discouraged.)

**Section-A**

- |   |   |     |
|---|---|-----|
| 1 | a. Explain Koch's Postulate.  | 3.0 |
|   | b. Name the chemical composition of capsule, cytoplasmic membrane and pili of bacteria. | 4.0 |
|   | c. Classify bacteria on the basis of nutritional requirement                            | 4.0 |
| 2 | a. Describe different measures that are helpful in keeping microbes assay.              | 5.0 |
|   | b. Classify bacteria on the basis of flagellar distribution.                            | 3.0 |
|   | c. List the general characteristics of mycoplasma and rickettsia.                       | 4.0 |
| 3 | a. With a labeled diagram describe a typical growth curve of bacteria.                  | 6.0 |
|   | b. Describe asexual and sexual reproduction of fungi.                                   | 3.0 |
|   | c. Explain pheno co-efficient of a disinfectant.  | 3.0 |
| 4 | a. Compare endotoxin from exotoxin.   | 5.0 |
|   | b. Mention the characteristics of an ideal disinfectant.                                | 4.0 |
|   | c. <del>Explain pheno co-efficient of a disinfectant.</del>                             | 3.0 |

*categorywise bacteriological media on the basis of purpose.*

**Section B**

- |   |  |     |
|---|--|-----|
| 5 | a. Write down the characteristics of exotoxin produced by bacteria. Name some extracellular enzymes produced by different bacteria.              | 2+2 |
|   | b. List the pathways of carbohydrate metabolism. Write down the industrial uses of different types of fermentation.                              | 2+2 |
|   | c. How does DNA replicate?   | 3.0 |
| 6 | a. Define mycotoxin. Write down the characteristics of mycotoxin.  | 1+3 |
|   | b. What is meant by the generation time? Briefly describe the structure and function of bacterial cell wall.                                     | 1+4 |
|   | c. Describe the process of transcription.  | 3.0 |
| 7 | a. Define mutation. Explain different types of mutation.   | 1+5 |
|   | b. What is genetic recombination? Describe the conjugation process occur in bacteria.  | 1+5 |
| 8 | a. Enumerate the factors those influence the growth of microorganisms. Name different types of bacteria based on their temperature preference.   | 2+2 |
|   | b. Write down the chemical composition of the outer membrane of bacteria and list the functions of the outer membrane of gram negative bacteria. | 4.0 |
|   | c. Classify bacteria based on carbon source and O <sub>2</sub> requirements.   | 4.0 |



**Chittagong Veterinary and Animal Sciences University**  
**Faculty of Food Science and Technology**  
**BFST 3<sup>rd</sup> year 1<sup>st</sup> Semester Final Examination 2018**  
**Subject: Fish and Sea Food Technology (Theory)**  
**Course Code: FSF-201 (T)**

**Full Marks: 70**

**Time: 3 hours**

(Figures in the right margin indicate full marks. Answer any four (4) questions from each section of which question number 1 and 6 are compulsory. Use separate answer script for each section. Split answer is strongly discouraged.)

**Section-A**

- |    |  |       |
|----|--|-------|
| 1. | Define sea food. Briefly describe the ISSCAAP classification of sea food by FAO.                                     | 1+4=5 |
| 2. | a) Define rigor mortis. Describe the process of rigor mortis.  | 1+4=5 |
|    | b) Appraise the role of protein and fat in fish quality and process ability.   | 5     |
| 3. | a) Name some value added sea food, those are being exported from Bangladesh.   | 2     |
|    | b) Describe the process of biochemical assessment for determination of freshness of fish.                            | 6     |
|    | c) How does fish go rotten? How can we delay rotting of fish?  | 1+1=2 |
| 4. | a) Define fishing techniques. Shortly describe the use of modern technology in fishing.                              | 1+4=5 |
|    | b) Outline the conveniences of eating sea food. Discuss the Mercury Shield in fish.                                  | 3+2=5 |
| 5. | a) Give an overview about the control measures against sea food pathogens.   | 2.5   |
|    | b) Tabulate growth and heat inactivation characteristics of food poisoning bacteria monument in sea food processing. | 2.5   |
|    | c) Define marine toxin and fresh water toxin. Write down the onenesses between marine toxin and fresh water toxins.  | 2+3=5 |

**Section-B**

- |     |  |           |
|-----|--|-----------|
| 6.  | Describe the scope of sea food and its processing in contest of Bangladesh.  | 5         |
| 7.  | a) How does salt preserve fish? How should fish be prepared for salting?   | 2.5+2.5=5 |
|     | b) Differentiate cold smoking and smoking of fish. Discuss the haddock making process.                                   | 3+2=5     |
| 8.  | a) Write down the principle of fish drying. Briefly narrate the improved process of fish drying.                         | 3+3=6     |
|     | b) Briefly describe the processing and preservation of crabs.  | 4         |
| 9.  | a) Compare between bulk and IQF shrimp freezing process.   | 3         |
|     | b) Define cooked marinades. How will you prepare products in which the original fish are reduced to the form of a sauce? | 1+3=4     |
|     | c) Discuss the characteristics of dried fish prepared from fresh on rotten raw material.                                 | 3         |
| 10. | a) Analyze the drawbacks that lead to the deterioration in the quality of the fish marketed.                             | 6         |
|     | b) Define additives. Discuss about the types of packaging materials for frozen fish.                                     | 4         |