Chittagong Veterinary and Animal Sciences University
Faculty of Food Science and Technology
FST 2nd Year 1st Semester Final Examination, 2011
Subject: General Microbiology (Theory)
Course Code: GMC-201

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

Figures in the right margin indicate full marks.
(Answer **THREE** questions from each section where question no. **1** and **5** are compulsory. Use **separate answer script** for each section)

Section: A
*(Answer **THREE** questions where question no. 1 is compulsory.)*

1   With labeled diagram describe the physical, chemical nature and functions of bacterial cell wall and cell membrane. With labeled diagram describe the typical bacterial capsule and its types.   **11**

2   Discuss historical background and scopes of microbiology in human civilization. Give the contributions of Louis Pasteur and Robert Koch in microbiology.   **12**

3   Define bacterial genetic recombination. How many types of genetic recombination occur in bacteria? Describe bacterial transduction.   **12**

4   a) Define toxin and toxoid. With example discuss endotoxin, exotoxin and mycotoxin.   **6**
     b) Along with the names of the producing fungi write down the different kinds of mycotoxins produced by different fungi.   **6**

Section: B
*(Answer **THREE** questions where question no. 5 is compulsory.)*

5   a) Give the differential features of virus, bacteria and fungi in a tabular form.   **5**
     b) Describe the functions of pilus, capsule and flagellum of bacteria.   **3**
     c) Describe the properties of *Chlamydophila*.   **3**

6   a) Mention the ways to obtain homogenous bacteria from contaminated field samples.   **3**
     b) Briefly illustrate the various factors that influence the growth of microorganisms.   **6**
     c) Write down the functions of "stem" and "anticodon" loops in tRNA of bacteria.   **3**

7   a) What are the initiation codons in protein synthesis of bacteria? List the basic requirements for protein synthesis in bacteria.   **4**
     b) An F- bacterial cell becomes F+ after genetic mating. –Why?   **5**
     c) Draw and label a typical growth curve of bacteria.   **3**

8   a) Differentiate between phenol co-efficient and toxicity index of a disinfectant.   **3**
     b) What is bacterial virulence? List the properties of endospores produced by bacteria.   **4**
     c) Briefly describe the animate sources of microorganisms.   **5**

Chittagong Veterinary and Animal Sciences University
Faculty of Food Science and Technology
FST 2nd Year 1st Semester Final Examination 2011
Subject: Unit operations in Food Processing
Course Code: UOP-201

Full Marks: 70   Time: 3 Hours

Figure in the right margin indicate full marks.
(Answer **FOUR** questions from each section where question no. **1** and **6** are compulsory. Use separate answer script for each section. Split answer is not allowed)

Section: A

1. a) Define food infection, food intoxication and food poisoning.   3
   b) Discuss triple point of water.   2

2. a) Describe the principle and theory of thin layer drying.   5
   b) A tunnel drier is used to dry a product from 80% m.c. (db) to 4% m.c. (db). The total drying time is 2 hrs. The product moves through the dryer is $5' \times 5'$ trays, which are carried on with 20 trays per cart, each tray contain 50 lbm product. Determine the average output / capacity in ton. If the tunnel length is 30 ft and latent heat 970 btu / lbm.   5

3. a) Derive Plank's equation for determination of freezing time.   5
   b) A tubular heat exchanger is being designed for honey. The equipment will have a 2.5 inch diameter and 11 ft length. If the heat exchanger is operated at 1100 lbm/min. Compute the film heat transformation co-efficient. Assume, k = 0.26 btu/hr-ft °F, Cp = 0.6 btu / lbm °F.   5

4. a) Give energy and mass balance equation for triple effect evaporator.   4
   b) Orange juice with 10 % total solids is being concentrated in a single effect evaporator using a feed rate of 30000 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 temperature is 250°F. The desired concentration of the product is 50% total solids. Compute the surface area of the evaporator.   6
   Assume: C_{PF} = 0.91 btu/lbm°F, C_{PP} = 0.8 btu/lbm°F
          H_S = 1164.1 btu/lbm, C_{PC} = 1 btu/lbm°F
          H_V = 1130 btu/lbm, H_C = 219 btu/lbm°F
          U = 300 btu/hr-ft^2 °F

5. a) Enumerate different types of freezing equipment. Describe any one of them.   4
   b) Write short notes on any three of the following: 6
      1. Blanching
      2. Freezer burn
      3. Tubular heat exchanger
      4. Tunnel dryer
      5. Modes of heat transfer

Section B

6. State law of conservation and write down the basic principles of mass and energy balance.   5

7. a) Explain the theory of deep bed drying with reference to Hukkil's diagram.   5

   b) In a plant deodourizing vegetable oil is preheated in a counter current flow tubular heat exchanger. The heating medium is hot water obtained from waste stream in the plant. A mass rate flow of water through the heat exchanger is 5000 lbm/hr. If enters the system at 212 °F and leaves at 110°F. The crude oil is flowing at the rate of 10000 lb/hr. If the crude of enters the heat exchanger at 70°F, what will be the outlet temperature?

   Assume: C_P oil = 0.5 btu/lb°F

           C_p water = 1 btu/lb°F

8. a) What is log-mean-temperature? Differentiate 'U' and 'K' value.   4

   b) Find out the tons of refrigeration necessary to overcome the heat loss through the 4 sides walls of a room 10 × 10 × 8 ft, having the walls made of 8″ brick, 8″ cork board and ½ inch cement plaster. Inside temperature -20 °F and outside temperature 70°F. Add 25% of safety for safety factor and losses through joints.   6

   Assume: for brick, K = 4.8 btu-in/ft² hr °F

           for cork board, K = 0.33 btu-in/ft² hr °F

           for cement plaster, K = 6.0 btu-in/ft² hr °F

9. a) Show how temperature influences on drying rate constant.   3

   b) A drum dryer is being used/designed for drying of a product from an initial total solids contents of 12% to a moisture content of 4%. An overall heat transfer coefficient (U) of 300 btu/hr-ft² °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. Assume: L = 1000 btu/lbm.   7

10. a) Describe methods of freeze drying with figure.   4

    b) State Brunauer-Emmet-Teller (BET) adsorption theory.   2

    c) What is thawing? Describe about spray dryer and drum dryer.   4

Chittagong Veterinary and Animal Sciences University
Faculty of Food Science and Technology
FST 2nd Year 1st Semester Final Examination 2011
Subject: Mathematics-II
Course Code: MTH-201

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

Figure in the right margin indicate full marks.
(Answer **FOUR** questions from each section where question no. **1** and **6** are compulsory. Use separate answer script for each section)

Section: A

1. a) Define with example order and degree of a differential equation.   2
    b) Define numerical differentiation.   1
    c) Form a differential equation by eliminating arbitrary constants 'a' from the equation   2
        $(x - a)^2 + y^2 = a^2$

2. a) Solve the following differential equations(any one):   .5
        (i) $(x^2 - y^2)dx + 2xydy = 0$
        (ii) $\dfrac{dy}{dx} + \dfrac{y}{x} = \dfrac{y^2}{x^2}$
    b) Find the value of λ for which the differential equation   5
        $(xy^2 + \lambda x^2 y)dx + (x + y)x^2 dy = 0$ is exact. Solve the equation for this value of λ.

3. a) If $\vec{A} = 2x^2 \hat{i} - 3yz\hat{j} - xz^2 \hat{k}$ and $\varphi = 2z - x^3 y$ find $\vec{A}.\vec{\nabla}\varphi$ and $\vec{A} \times \vec{\nabla}\varphi$ at (1,-1, 1).   4
    b) Show that the area of a parallelogram with sides $\vec{A}, \vec{B}$ and $\vec{C}$ is $\left|\vec{A}.(\vec{B} \times \vec{C})\right|$ and hence find the   4
        volume if $\vec{A} = 2\hat{i} - 3\hat{j} + 4\hat{k}$, $\vec{B} = \hat{i} + 2\hat{j} - \hat{k}$ and $\vec{C} = 3\hat{i} - \hat{j} + 2\hat{k}$
    c) Obtain a unit normal to the surface $x^2 y + 2xz = 4$ at the point (2,-2, 3).   2

4. a) Define gradient, divergence and curl.   3
    b) Show that $\vec{V}(x, y, z) = 2xyz\hat{i} + (x^2 z + 2y)\hat{j} + x^2 y\hat{k}$ is irrotational and find a scalar function   4
        u(x, y, z) such that $\vec{V} = \text{grad}(u)$.
    c) Show that the Laplace's equation $\nabla^2 \Phi = 0$ satisfies the potential $\Phi = \dfrac{1}{r}$, where   3
        $r^2 = x^2 + y^2 + z^2$

5. a) The rate at which a body cools is proportional to the difference between the temperature of the   4
        body and that of surrounding air at $25°C$ will cool from $100°C$ to $75°C$ in one minute .find
        its temperature at the end of three minutes.
    b) Find the general solution (any two)   6
        (i) $\dfrac{d^3 y}{dx^3} + y = 3 + e^{-x} + 5e^{2x}$
        (ii) $(D^2 + 5D + 4)y = 3 - 2x$
        (iii) $(D^2 - 5D + 6)y = e^x \cos 2x$

Section: B

6. a) Discuss periodic function, even function and odd function with diagram.   3
    b) Why do you use numerical methods?   2

7. a) Describe Newton- Raphson method to find a solution to find a solution of f((x)=0.   5
    b) Apply Newton-Raphson method to find an approximate solution of the equation   5
        $x^3 - 2x - 5 = 0$ correct up to four decimal places.

8. a) From the following table of values of x and f(x). determine
    (i)   f(0.23)
    (ii) f(0.29)

6

x	0.20	0.22	0.24	0.26	0.28	0.30
f(x)	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139

   b) Derive Simpson's $\frac{1}{3}$ rule for Numerical integration.

4

9. a) Find a Fourier Series to represent $x - x^2$ from $\pi \le x \le \pi$ and show that
    $$\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots\dots\dots\dots$$

6

   b) Expand the function f(x) into flourier series where $f(x) = x^2$, $\pi \le x \le \pi$

4

10. a) The following data gives corresponding values of pressure and specific volume of super heated steam.

5

V	2	4	6	8	10
P	105	42.07	25.3	16.7	13

   Find the rate of change of pressure with respect to volume when V=2

   b) Compute the vales of $I = I = \int_{0}^{1} \frac{dx}{1+x^2}$ by using trapezoidal rule and simpson's rule with 8 strips. Compare yours result with the true value.

5

Chittagong Veterinary and Animal Sciences University
Faculty of Food Science and Technology
FST 2nd Year 1st Semester Final Examination 2011
Subject: Applied Nutritional Science
Course Code: ANS-201

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

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(Answer **FOUR** questions from each section where question no. **1** and **6** are compulsory. Use separate answer script for each section)

Section: A

1. a) Sketch out the nutrition throughout life cycle.   2
    b) Define care and nutrition.   2
    c) Why colostrums is necessary for a newborn baby?   1

2. a) What are the physiological changes during pregnancy?   3
    b) Describe nutritional requirements in lactation.   3
    c) Show the nutritional comparison of human milk, cow's milk and formula milk.   4

3. a) Write the guidelines of complementary feeding for breast feeded children.   4
    b) Mention the criteria of good complementary foods.   2
    c) Define low birth weight and its consequences.   4

4. a) Write the nutritional requirements guidelines for premature infants.   4
    b) Define adolescent and puberty. Why extra demands of nutrients are needed in this   3
       stage?
    c) Briefly point out the dietary guidelines of an adolescent girl.   3

5. Write short note on
       a) General food distribution   3
       b) Physiological changes in aging   3
       c) IMR and MMR   4

Section: B

6. What do you mean by survey and surveillance? Explain scope, uses and sources of data of 5
    nutritional surveillance.

7. a) Explain push factor and pull factors of migration.   3
    b) Given below the figures of population and number of deaths in town 'A" and town   5
       "B". Calculate crude death rates, age specific death rates and standardized death rates
       using both the direct and indirect methods of standardization. (Consider town "B" as
       standerd.

Age group (years)	Town A		Town B	
	Populations	Deaths	Populations	Deaths
0-10	35000	1000	15000	500
10-35	50000	800	110000	2200
35-55	80000	1200	150000	6000
55+	35000	700	70000	2100

    c) Define Age specific fertility rate (ASFR) and Total fertility rate (TFR).   2

8. a) What actions are required for the implementation of supplementary feeding program?   4
    b) What are the main functions of a nutritional programme in emergencies?   3
    c) Give a example of adequate full rations providing 2100 kcal per person per day in   3
       emergency situation.

9. a) Define nutrition education. Write down the stages of adaption in nutrition education in a community. 1+3=4

    b) What are the commonly used communication strategies in nutrition education dissemination in Bangaldesh? 3

    c) What are the advantages and limitations of audio-visual aids in nutrition education? 3

10. a) What are the services provided by NNP for pregnant women?. 3

    b) State the IYCF. How can you impove the pre-school children health status? 2+3

    c) Briefly describe the role of vitamins & minerals for elderly people. 2

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

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(Answer **FOUR** questions from each section where question no. **1** and **6** are compulsory. Use separate answer script for each section. Split answer is not allowed)

Section: A

1. a) 'Most of the food preservation methods involve a combination of two or more basic principles' – Explain the statement with a suitable example.   3

    b) 'Wastage occurs by ineffective utilization' - explain the statement.   2

2. a) Write down the causes of spoilage of foods.   3

    b) Write down the principles and methods of preservation of food.   3

    c) What are the aims of commercial preservation of food?   3

    d) What is free water and bound water?   1

3. a) Write down Osborne classification of protein and write the name of essential amino acid, why they are essential.   3

    b) What is gluten? Why wheat flour more preferable than any other cereal for producing any baked product?   3

    c) 'The enzymes are protein but proteins are not enzyme' – explain the statement. What is denaturation of protein?   4

4. a) Write down the principles of canning.   2

    b) Write down the various unit operations involved in the canning of fruits and vegetables. Briefly mention the objectives of 'Exhausting' step of the canning process.   3

    c) With neat sketch describe the major component of a double seam of a tin can.   4

    d) What do you mean by 'rancidity'?   1

5. a) Briefly describe the effects of heat treatment on the composition and quality of foods.   6

    b) Describe the factors affecting the growth of micro-organism.   4

Section: B

6.   a)   Define: Food science and Technology, Food Engineering.   2

       b)   Discuss the activities of a food scientist.   3

7.   a)   Write down the major activity and main compounds of water and fat soluble   4
            vitamin.

       b)   Describe the component of taste.   2

       c)   Describe the chief pigments of plant tissue.   3

       d)   Classify fatty acid.   1

8.   a)   What kinds of containers are normally used for canning? Write about   3
            aluminium containers.

       b)   Describe fabrication steps of tin can with figure.   4

       c)   What do you mean by D value, TDT and Z value?   3

9.   a)   Write down the classification of carbohydrate? Describe the properties of   3
            fructose.

       b)   What types of contaminants most frequently encountered in raw food materials.   3
            Write down the names of cleaning methods of raw materials.

       c)   Briefly describe the grading factors which considered during raw materials   4
            processing.

10.   a)   Define shorting and grading.   4

       b)   Write short notes on any three of the following: 6

            i.   Filtration

            ii.   Pasteurization

            iii.   Centrifugation

            iv.   Protective food

            v.   Aspiration cleaning.

Faculty of Food Science and Technology
FST 2nd Year 1st Semester Final Examination 2014
Subject: Computer Application in Food Technology
Course Code: CSC-201

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

Figure in the right margin indicate full marks.
(Answer **FOUR** questions from each section where question no. **1** and **6** are
compulsory. Use **separate answer script** for each section)

Section: A

*(Answer **FOUR** questions where question no. 1 is compulsory.*

1   a)   How much memory require for a float type data?   1
    b)   Write down the output: 1
         int i =4;
         printf("i=%d/n", ++i); printf("i=%d/n", i++); printf("i=%d/n", i);
    c)   int i=8, j=5,k; find the value of k from the expression k=(j>0)? J:0   1
    d)   Identify the Unary operator from below   1
         = =, %, &&, size of, >
    e)   float x=2, y=3. determine the values of z, z=2*x/2*y   1

2   a)   Name and describe the four basic data types in C.   2
    b)   Name the three different classes of statements in C. Write the composition of each. 2
    c)   A C program contains the following declaration and assignments.   3
         int i=8,j=5;
         char c='c' , d='d';
         determine the value of the following expression
              i)   isdigit(c);
              ii)   toupper(d);
              iii)   strlen(CVASU);
    d)   Write a C program that converts the given temperature in Fahrenheit to Celsius using 3
         the following formula $C = \dfrac{F-32}{1.8}$

3   a)   Distinguish between 'getchar' and 'scanf' function with example.   3
    b)   State the output produced by the following statements   3
              i)   printf("\"%08.2f\"",123.4);
              ii)   printf("%d%d %d",10,20);
    c)   Write a program to read the values of three integers x, y and z and print the square of 4
         these integers in different line.

4   a)   What is Operator? Name different types of operator that are included in C.   2
    b)   Describe the two different ways to utilize the increment (++) operator.   2
    c)   Write the output that will be generated by the following C program-   3
         # include<stdio.h>
         main(){ int i=0,x=0;
         do{
         if(i%5= =0){ x++;
         printf("%d",x);}
         ++i;}
         while(i<20);}
    d)   Write a C program that will obtain length and width of a rectangle from the user and 3
         compute its Area and Perimeter.

5   a)   Describe else-if ladder with example.   4
    b)   What is purpose of 'break' statement and 'continue' statement? Show example.   3
    c)   write a C program to evaluate $y = x^n$ by using   3
              i)   FOR loop
              ii)   While loop

6 a) What is the purpose of the keyword 'void'? Where it is used?   2
   b) Name the four storage class specification included in C.   1
   c) In what way does an array differ from an ordinary Variable?   1.
   d) What is the primary advantage to using a data file?   1

7 a) What is function? What are the elements of function definition?   2
   b) What are the different categories of user defined function?   2
   c) Write the output of the following program   3
```c
# include<stdio.h>
    int funct1(int a);
    int funct1(int b);
    main(){
        int a=0,b=1,count:
        for(count=1;count<=5;count++){
            b+=funct1(a+1)+1;
            printf("%d",b);} }
    funct1(int a){
        int b;
    b= b+funct2(a+1)+1;
        return(b);}
    funct2(int a){
        return(a+1);
        }
```
   d) Write a C program that convert a lower case character to uppercase using a   3
       programmer defined function.

8 a) What are the benefits of using pointer in C programming?   3
   b) Describe the pointer declaration and pointer initialization process in C programming.   4
   c) Write a program using pointer to read an array of integers and print its elements.   3

9 a) Name and describe any four library function used in the file management in C.   3
   b) Write the output that will be generated by the follwing C program. Assume that the   4
       address of x is ABC and address of y is DEF
```c
#include<stdio.h>
    main(){
        int p=5,q,*a,*b;
        a=&p;
        q=*a;
        b=&q;
        printf ("\n%X %X%d",&p,a,*a);
        printf ("\n%d %X%d",q,b,*b);
        }
```
   c) Write a C program that will read from a file D\\FST.doc and output in the monitor   3
       until end of the file

10 a) What is structure? How does a structure differ from array?   3
   b) Define Union. What is the major distinction between Structure and Union?   3
   c) Define a structure type *student* that would contain student name, age and department.   4
       using this structure write a program to read this information for one student from the
       keyboard and then print them.