Khulna University of Engineering & Technology
B. Sc. Engineering 1st Year 2nd Term Examination, 2019
Department of Biomedical Engineering

BME 1201

Biochemistry

Time: 3 hours **Full Marks: 210**

N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

Section A

(Answer **ANY THREE** questions from this section in **Answer Script A**)

1. a) Mention the aldehyde and keton group in carbohydrate with example. How monosaccharide are classified according to the number of carbon atom? (08)

b) Complete the following chemical reactions: (08)
i) $C_6H_{12}O_6 + H_2SO_4 \longrightarrow ?$
ii) Glucose + Fructose $\longrightarrow$?
iii) Glucose + Galactose $\longrightarrow$?
iv) Glucose + Glucose $\longrightarrow$?

c) Write down some physical properties of carbohydrate. (07)

d) Write short notes on: (12)
i) Glucose metabolism in liver;
ii) Polysaccharide;
iii) Oxidative Phosphorylation.

2. a) What is Cori cycle? List the sources and functions of protein. (10)

b) Describe the protein detection method in human excretion (urine). What is Glycogenesis? (10)

c) What is peptide bond? Briefly describe classification of amino acids based on nutritional importance. (10)

d) Write down the nature of protein found in the hemoglobin with short description. (05)

3. a) What is buffer? Draw and label the titration curve of alanine with brief description. (12)

b) What is gel electrophoresis? List the differences between Agarose and Polyacrylamide gel electrophoresis. (13)

c) What are the clinical application of electrophoresis? (05)

d) List the nutritional value of Lipid, Protein and Carbohydrate. How much KCal you gain from 3g lipid, 2g protein and 5g carbohydrate in total? (05)

4. a) How cholesterol is formed in human body? Why cholesterol is needed for us? List the bad effect of cholesterol. (10)

b) Enumerate the example of simple lipid and complex lipid with short description. (08)

c) Describe the properties of unsaturated fatty acids? Classify fatty acid according to saturation. (07)

d) What is glycolipid? List the functions of glycolipid. (10)

Section B

(Answer **ANY THREE** questions from this section in **Answer Script B**)

5. a) Write down the criteria of living organism. (05)

   b) What is Biomolecules? Why carbon is necessary for living organism? Draw and label the geometry of Carbon bonding. (12)

   c) What is ATP? Describe the basic process of ATP production. (13)

   d) What is Chemiosmotic theory? (05)

6. a) What is Co-factor? Write down the properties of enzyme. (10)

   b) Classify enzyme with examples. (10)

   c) Describe Michaelis-Menten kinetics with the equation. (10)

   d) Enumerate some properties of enzymes. (05)

7. a) What is Spectrophotometry? How can we measure enzyme activity through spectrophotometric technique? (15)

   b) Write down the factors on which enzyme activity depends. (05)

   c) What is Colorimetry? Enumerate the differences between Colorimeter and Spectrophotometer? (10)

   d) Write short notes on Absorbance and Transmittance. (05)

8. a) What is PCR? Write down basic steps of PCR and mention some medical significance of PCR. (12)

   b) Write down the basic principles of DNA recombination technology. (13)

   c) What are the components of Nucleotides? List the differences between Nucleosides and Nucleotides. (05)

   d) Draw and label the structure of DNA. (05)

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CSE 1215

Computer Programming

Time: 3 hours **Full Marks: 210**

N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

Section A

(Answer **ANY THREE** questions from this section in **Answer Script A**)

1. a) Draw the structure of a C program and explain each parts of it. (10)

b) Briefly describe Assembly language with appropriate examples. (10)

c) What is library function? Draw the process of computing and running C program. (10)

d) State the rules for defining variable. (05)

2. a) What is enumeration? Categorize data types of C with example. (10)

b) Develop a program to print following pyramid: (10)

```
        *
      * *
    * * *
  * * * *
* * * * *
```

c) Differentiate between (with example) (10)
(i) Entry controlled and exit controlled loop.
(ii) Counter Controlled and sentinel Controlled loop.

d) Explain how to skip statements. (05)

3. a) Write a brief discussion about basic data types of C. How could you extend the ranges of different data types? (12)

b) Write a program which will calculate the prime numbers within a given range. (12)

c) Write a program using while loop to print the digits of a number in reverse order. (11)

4. a) Print the following output using a C program (10)

```
1
2 1
3 2 1
4 3 2 1
5 4 3 2 1
4 3 2 1
3 2 1
2 1
1
```

b) A function can be categorized depending on argument and return type - Explain this with proper examples. (12)

c) Write a C program to convert a given number of days in terms of years, weeks and days. (08)

d) Write a C program to find the Fibonacci series for a given number using recursion. (05)

Section B

(Answer **ANY THREE** questions from this section in **Answer Script B**)

5. a) Declare a multi dimensional array. Write a program to generate a multiplication table. (10)

b) Find errors (if any) in the following segments: (12)

```
int A[5][4];
float B[4];
(i)   for (i=1; i<4; i++)
      scanf ("%f" ; B[i]);

(ii)  for (i=j; i<=5; i++)
      for (j=1; j<=4; j++)
      A[i][j]=0;

(iii) float result [10] = 0;

(iv)  for (i=0; i<=4; i++)
      B[i] = B[i] + i ;
```

c) Write a program to read two matrices A, B and print the following: (13)

(i) A + B

(ii) A – B

6. a) Compare and contrast the working of the following functions: (15)

(i) strcpy and strncpy

(ii) strcat and strncat

(iii) strcmp and strncmp

b) Write a program, which reads your name from the key Board and outputs a list of ASCII codes which represent your name. (10)

c) How does structure differ from an array? (05)

d) State the rules for initializing structure. (05)

7. a) Define FILE. Why do we write FILE*? Compare the file opening modes- read, write, append. Give proper examples of every modes. (10)

b) Describe the functionalities of fopen, fseek, fprintf, fscanf, fputs and fclose. (12)

c) Write a program which write some data to a file and finally the program copy all the data to another file. (08)

d) Explain why a file has to be closed after opening. (05)

8. a) Write down the differences between structure and union. (04)

b) Write short notes with examples of the following: (15)

(i) Nested structure

(ii) Array of structure

(iii) typedef with structure

(iv) Structure in function

(v) Inline function.

c) Write down the basic structure of a class and mention how to create an objection of that class. (08)

d) Define: (08)

(i) Polymorphism

(ii) Encapsulation

(iii) Inheritance.

Khulna University of Engineering & Technology
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EEE 1215

Analog Electronics

Time: 3 hours **Full Marks: 210**

N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

Section A

(Answer **ANY THREE** questions from this section in **Answer Script A**)

1. a) What is meant by intrinsic and extrinsic semiconductor? Explain the working principle of p-n junction diode. (12)

b) Why Zener diode is used as voltage stabilizer? Explain. (10)

c) Draw the symbol and write two advantages of the followings: (08)
i) Varacator diode ii) Tunnel diode iii) Photodiode iv) Schottky diode

d) Calculate the current through 48Ω resistor. Assume the diode are of silicone and forward resistance of each diode is 1Ω. (05)

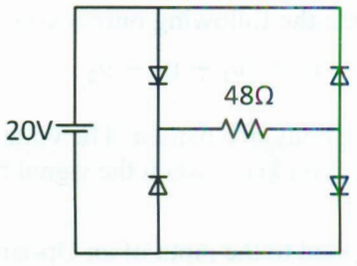

Fig: 1(d)

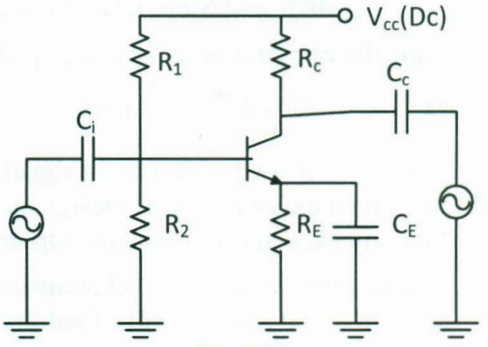

Fig: 2(c)

2. a) Define the followings: (08)
i)Ripple factor ii) PIV iii) Breakdown Voltage iv) Knee Voltage

b) What are the disadvantages of center tap full wave rectifier? "Half wave rectification is ineffective for conversion of AC to DC"- explain mathematically. (14)

c) Draw the DC and AC equivalent of the above circuit in fig 2(c). (08)

d) For the circuit shown in fig. 2(d), find i) Output voltage ii) Voltage drop across series resistance iii) Current through zener diode. (05)

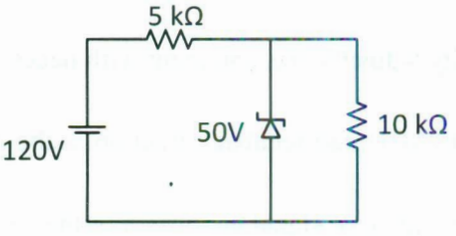

Fig: 2(d)

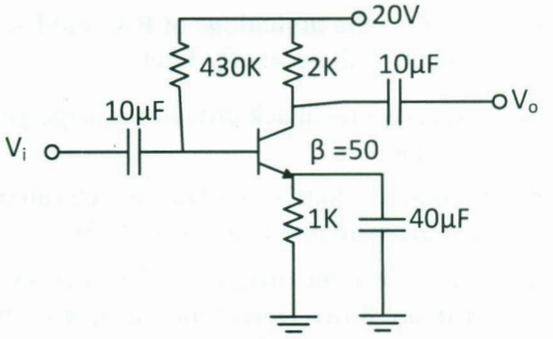

Fig: 3(d)

3. a) What is meant by operating point of a transistor? Explain cut off, saturation and active region of operation of BJT. In which region BJT acts as a switch? (10)

b) Derive the following expressions for BJT: i) $\beta = \frac{\alpha}{1-\alpha}$ ii) $\gamma = \frac{1}{1-\alpha}$ (10)

c) Why biasing needed for BJT? Which biasing system provides thermal stability to the system? (05)

d) Find I_B, I_C, V_{CE}, V_C, V_E, V_B, V_{BC} of the above circuit in fig. 3(d). (10)

4. a) What are the differences between BJT and JFET? (03)

b) Describe the working principle of n-channel MOSFET. (10)

c) Explain how CMOS can act as inverter. (10)

d) Determine- a) I_{DQ} b) V_D c) V_s d) V_{DS} e) V_{DG} of the following circuit in fig. 4(d). (12)

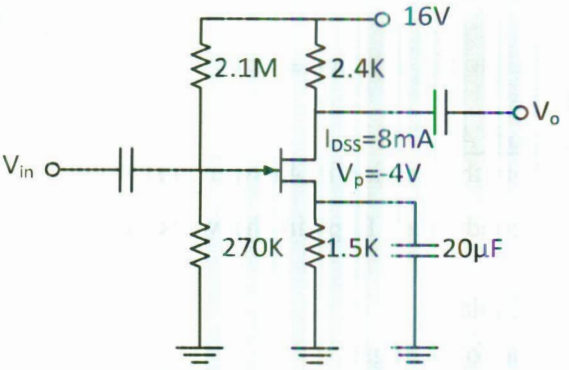

Fig: 4(d)

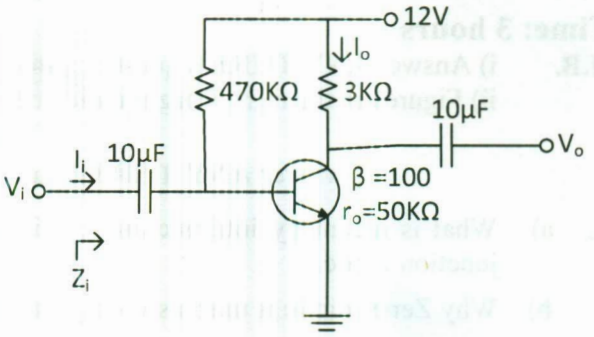

Fig: 8(a)

Section B

(Answer **ANY THREE** questions from this section in **Answer Script B**)

5. a) Define CMRR and Slew-rate. Write down their Significances. (06)

b) Draw the circuit diagrams using op-Amp which provide the following output voltage: (10)

(i) $v_0 = Ri + L\frac{di}{dt} + \frac{1}{C}\int idt$ (ii) $v_0 = v_1 - v_2 - v_3$

c) Suppose you need to monitor a signal from a part of the body of a patient. The voltage of that signal should not exceed 100mv. Design a circuit that will let you know when the signal from that part of the body exceeds 100mv using Op-amp. (09)

d) A 10mv (peak to peak), 1 KHz sinusoidal signal is applied to the input of an Op-amp integrator for which R= 150 KΩ, C= 1μF. Find the output voltage. (10)

6. a) Why germanium is not used as controlled rectifier? Draw the two transistor model of a SCR and explain the principle of operation in brief. (13)

b) How does UJT act as a relaxation oscillator? Show the characteristics curve of UJT and mention each section. (12)

c) Design a band pass filter for detecting α (7.9 ~12.7Hz) EEG signal. The available capacitor is 1μF and resistor is 10KΩ. (10)

7. a) Write down some differences between positive and negative feedback circuit. How undamped oscillation is produced? Explain with necessary illustrations. (10)

b) What are the limitations of R-C and L-C based oscillators? How can the limitations be overcome? Explain with necessary figures. (10)

c) "Negative feedback provides voltage gain stability"- Justify the statement with necessary example. (07)

d) Design a colpitt's oscillator which can operate at 2MHz and feedback fraction is about 20%. Note that the available inductor is 2mH. (08)

8. a) Write down the differences between small signal and large signal analysis. For the network shown in figure 8 (a). Determine: (a) r_e b) Find Z_i (with $r_o = \infty\Omega$) c) Calculate Z_o (with $r_o = \infty\Omega$) d) Determine A_v (with $r_o = \infty\Omega$) e) Repeat parts (c) and (d) including $r_o = 50K\Omega$ in all calculations and compare results. (15)

b) Write down the differences between Voltage Amplifier and Power Amplifier. (05)

c) Write short notes on: i) TRIAC ii) DIAC iii) Latching current iv) Holding current v) Active filter. (05)

d) Explain the performance parameters of power amplifier, also classify power amplifier based on mode of operations with appropriate diagrams. (10)

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Hum1215

Technical English

Time: 3 hours **Full Marks: 210**

N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

Section A

(Answer **ANY THREE** questions from this section in **Answer Script A**)

1. a) Make sentence with the following structures using the words given in brackets: (14)
i) Subject + verb + adv. of manner.(walk as verb)
ii) Subject + verb + object.(Eat as verb)
iii) What +subject + verb + adv. of manner + verb + adj. complement.(say and is as verb)
iv) Subject + modifier+ verb + that+ subject+ verb + adj. complement.(is and seen as verb)
v) Subject + relative pronoun+ verb + adv. of place+ verb + noun complement.(work and is as verb)
vi) Subject + verb + adv. of manner, so +verb +adv. of place. (study and succeed as verb)
vii) Not only + subject+ but also + subject+ verb + adv. of place. (attend as verb)

b) Change the following words as asked in brackets and use the changed forms in sentence: (12)
Psyche (into Adj.), Alternation (into verb), Profanity (into adj.), Awkward (into noun), Curiosity (into adj.), Provide (into noun).

c) Write a synonym and an antonym of the following words and use them in sentences: (09)
Wreck, Hard, Talent.

2. a) Make WH question for each of the following underlined word/words in the following sentences: (14)
i) Nasima says that she knows the fact.
ii) Simu met us yesterday.
iii) They come here only to listen to our idea.
iv) Declare your identity.
v) The room is spacious enough.
vi) They will have complete the task by 10th Dec.
vii) They try to probe the matter with caution.

b) Make sentences with the following words as directed; enough (noun), all (pronoun), for(conj.), near (preposition),since (conj.), one (adj.). (12)

c) Make new words with the following prefixes and suffixes and use the new words in sentence. (09)
Ante——, Bio ——, Co——, ——ness, ——ism, ——ing.

3. a) Transform the following sentences as asked in the brackets: (14)
i) Honesty is the best policy. (Complex)
ii) What you write reflects patriotism. (Simple)
iii) He walks fast to reach class in time. (Complex)
iv) The poem, written in love, is nice to enjoy. (Complex)
v) The play is over and we came back hall. (Simple)
vi) He labors hard, but succeeds little. (Simple)
vii) He works hard till our coming back. (Complex)

b) Express the following notions/attitudes in sentences: agreement, suggestion, approval, sympathy, honesty, praise. (12)

c) Make sentence with each of the following phrases and idioms: Bear in mind, End in smoke, Give a way, Joke of the town, Gala day, Leap in the dark. (09)

4. a) Correct the following sentences: (14)
   i) Sunshine dries the dews.
   ii) President is supposed to come today in Khulna.
   iii) You what do impresses all of our friends.
   iv) The teacher lives in the college quarter.
   v) We tried to make amend of the loss.
   vi) His sprit goes out of control frequently.
   vii) Cattle is grazing in the field.

   b) Make use of the following modals in sentence as asked in the brackets: (12)
   i) Shall. (To express a proposal to somebody else)
   ii) Will. (To express a gentle request)
   iii) Would. (To express a polite request)
   iv) Dare. (To express indulgence)
   v) Should + have + past participle of verb. (To express past duty which was not implemented)
   vi) Can. (To express approval for someone else)

   c) Define present participle, gerund and infinitive with two example for each of the definitions. (09)

Section B

(Answer **ANY THREE** questions from this section in **Answer Script B**)

5. a) Read the passage and Answer the question: (20)

It is hard to be a farmer. Cold weather can kill your crops. Bugs can eat your crops. Weeds can hurt your crops. Your crops may need more rain than they get. Fruits and vegetables can grow bad before they are sold. Some people say farmers can fix all these with GM food.

What is GM food? All living things have DNA. DNA tells living things how to grow. These days, people can change the DNA that tells food how to grow. When people change the DNA of food, it is called GM food.

Some GM food can grow in cold weather. GM food can stop bugs from eating it. GM fruits and vegetables can stay good longer. One day, GM food may be able to grow in dryland in Africa. It will feed people who do not have much food.

But there is a lot we don't know about GM food. These have not been many tests on GM food. Do you think farmer should grow GM food?

   i) What is DNA?
   ii) What is something that GM food cannot do?
   iii) What is the main reason we do not know enough about GM food?
   iv) What is writer's purpose for writing about GM food?

   b) Make a precis of the above passage? (15)

6. a) Write a paragraph on women empowerment. (15)

   b) Amplify the idea contained in the statement: Adversity and loss make a man wise. (20)

7. a) Suppose there is a post of lecturer vacant in your department. Prepare your CV and apply for the post. (20)

   b) Suppose you are the head of BME department. Write a memo to inform everybody in department about a seminar on artificial intelligence. (15)

8. a) Write a free composition on one of the followings: (35)
   i) Future of Biomedical Engineering in Bangladesh.
   ii) Prosperity of a country and corruption.

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Math 1215

Coordinate Geometry and Differential Equations

Time: 3 hours **Full Marks: 210**

N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

Section A

(Answer **ANY THREE** questions from this section in **Answer Script A**)

1. a) Solve $y^2dx + (3xy + y^2 - 1)dy = 0$ (12)

b) Solve $(x^2y + y^3)dx - (x^3 + 2xy^2)dy = 0$ (12)

c) Solve $(1 - x^2)\frac{dy}{dx} + xy = xy^2$ (11)

2. a) Define order and degree of a differential equation. Find the differential equation for which $xy = Ae^x + Be^{-x} + x^2$ is a solution, where A and B are arbitrary constants. (10)

b) Solve, $x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} - 4y = \sin(2lnx)$ (12)

c) Solve $\frac{\partial^2 u}{\partial t^2} = 4\frac{\partial^2 u}{\partial x^2}$ subject to the boundary conditions $u(x,0) = 0; u(x,\pi) = 0;$ $u_x(0,t) = 0$ and $u(0,t) = -3sin2t$. (13)

3. a) Solve $D^2 + 3D + 2)y = e^{2x}sinx + x^2$. (11)

b) Solve the following $y'' - 3y' + 2y = \frac{e^{3x}}{1+e^x}$. (12)

c) Solve the following partial differential equation $\frac{\partial u}{\partial t} = 2\frac{\partial u}{\partial x}, u(x,0) = 8e^{-x}$. (12)

4. a) Find a particular solution of $y'' + 2y' + 3y = e^{-x}$ when $y(0) = 1$ and $y'(0) = 3$. (15)

b) Define ordinary point and regular singular point with examples. Solve, $2x^2y'' + xy' + (x^2 - 1)y = 0$ by the method of Frobenius. (20)

Section B

(Answer **ANY THREE** questions from this section in **Answer Script B**)

5. a) Reduce the following equation to the form and find its any two properties. $4x^2 - 4xy + y^2 - 8x - 6y + 5 = 0$ (10)

b) Transform the equation $11x^2 + 24xy + 4y^2 - 20x - 40y - 5 = 0$ to rectangular axes through the point $(2,-1)$ and inclined at an angle $tan^{-1}(4/3)$. (11)

c) Transform the equation $17x^2 + 18xy - 7y^2 - 16x - 32y - 18 = 0$ to one in which there is no term involving x, y and xy, both set of axes being rectangular. (14)

6. a) Find the coordinates of $(-3,-5,7)$ in cylindrical and spherical polar coordinates. (10)

b) Define direction cosines and direction ratios of a line. Find the angle between the lines whose direction cosines are given by $l - 2m + 3n = 0$ and $l^2 - 4m^2 - 9n^2 = 0$. (13)

c) Find the coordinate and ratio in which the line joining the points $(2,4,5); (3,5,-4)$ is divided by the YZ-plane. (12)

7. a) Find the magnitude and the equations of the line of shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$; $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$. (13)

b) Find the two tangent planes to the sphere $x^2 + y^2 + z^2 - 4x + 2y - 6z + 5 = 0$ which are parallel to the plane $2x + 2y = z$. (10)

c) Find the equation of the right circular cone with vertex $(1, -2, -1)$; semi-vertical angle $60°$ and the line $\frac{x-1}{3} = \frac{y+2}{-4} = \frac{z+1}{5}$ as its axis. (12)

8. a) Find the angle between the plane $5x - 4y + 3z - 5 = 0$ and the straight line $2x + 4y - 2z + 3 = 0 = 4x - 2y + 6z + 5$. (10)

b) Find the equation of the spheres through the circle $x^2 + y^2 + z^2 = 1$, $2x + 4y + 5z = 6$ and touching the plane $z = 0$. (12)

c) Find the equation of the sphere whose center is $(2,1,-3)$ and tangent to the plane $2x - 4y + 5z = 0$. (13)