Khulna University of Engineering & Technology
B. Sc. Engineering 1st Year 2nd Term Regular Examination, 2021
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 Script A)

1.	a)	What is Biomolecules? "Biomolecules are the compound of carbon with variety of functional group"- explain the statement with geometric bonding.	(10)
	b)	Define molecular logic of life. Draw the Phylogeny of the three domain of life.	(10)
	c)	Write down the examples of various types of human cells. Classify organisms according to their sources of energy.	(10)
	d)	Draw and level the X chromosome.	(05)
2.	a)	Define enzyme. Classify enzyme with examples.	(10)
	b)	What is Chargaff's law? Explain the process of enzyme inhibition details.	(10)
	c)	State the 1st and 2nd laws of thermodynamics. Ozone are decomposed according to the following reaction, $2O_3 \rightarrow 3O_2$ If the enthalpy change is -285.4 kj and entropy change is 137.55 j/K at 20°C, would this reaction be spontaneous or not why?	(15)
3.	a)	What is Gibs free energy? List differences between Exergonic and Endergonic reactions.	(10)
	b)	What is Michalies-Menten equation for enzyme kinetics? How is it applied for enzyme kinetic test?	(10)
	c)	What is spectrophotometer? Which principle is used in spectrophotometric measurement technique?-Explain briefly.	(09)
	d)	Write short notes on (i) Transmittance (ii) Absorbance.	(06)
4.	a)	What is PCR? Enumerate the basic steps of PCR. Write down the medical significance of PCR.	(15)
	b)	Define gene, codon, and RNA. Classify RNA with its functions.	(10)
	c)	Discuss about the methods of DNA sequencing.	(10)

Section B

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

5.	a)	Define Epimers. Classify carbohydrate bored on the number of sugar units.	(10)
	b)	What is Crabtee effect? Discuss about the regulation by glycolysis.	(10)
	c)	Define Glycogenesis. Write down the steps of Glycogenesis.	(15)
6.	a)	What is Electrophoresis? Mention the application of Electrophoresis.	(10)
	b)	Write down the mechanism of diabetic ketoacidosis.	(10)
	c)	Write short notes on (i) Isoelectric P^H of protein, (ii) Glycolipid, and (iii) Gluconeogenesis.	(15)
7.	a)	What is amino acid? Classify amino acid based on structure, polarity, and nutrition with example.	(15)
	b)	Discuss about different protein structure. Mention the properties of protein.	(15)
	c)	Write down the function of lipid.	(05)
8.	a)	Discuss in details about the different stages of Fatty acid oxidation.	(18)
	b)	Write down the stages of Cholesterol synthesis.	(12)
	c)	Write a short note on "Lipoprotein".	(05)

Khulna University of Engineering & Technology
B. Sc. Engineering 1st Year 2nd Term Examination, 2021
Department of Biomedical Engineering

Hum 1215
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 Script A)

1. a) Frame Wh questions from the following questions: (14)
i) The school team can get this work done by some people.
ii) I am looking for the word in the dictionary.
iii) Among all the boys Baby came first.
iv) A tape recorder operates mechanically.
v) He was arrested for being involved in a bank dacoity.
vi) The dead body was found in a deserted house.
vii) Everyone knows his background.

b) Make sentences using the following words as directed: (12)
Fast (as noun); Fast (as verb); Fast (as adverb); Master (as verb); Master (as adjective); Long (as adverb).

c) Change the following words as directed and make sentences with the changed words: (09)
Large (into verb); Depart (into noun); Man (into adjective); Base (into noun); Earth (into adjective); Hunger (into adverb).

2. a) Frame sentences expressing the following notions/emotions: (14)
i) Annoyance ii) Introduction iii) Regret iv) Threat v) Farewell vi) Determination vii) Approval.

b) Transform the following sentences as directed: (12)
i) Did the noise frighten you? (passive)
ii) Nobody should pay heed to rumour. (interrogative)
iii) Oh! The cuckoo sings in the spring. (assertive)
iv) Walking is not better than swimming. (positive)
v) We read newspaper so that we may get information. (compound)
vi) We read newspaper so that we may get information. (simple)

c) Make words with the following prefixes and suffixes and use them in sentences: (09)
Contra—— ; Quad—— ; Sym—— ; ——th; —— ible; —— ary.

3. a) Make sentences with the following structures: (14)
i) Sub + T.V + obj + N. complement
ii) Sub + In.T.V + adverbial
iii) Sub + T.V + obj + obj
iv) There + V + sub
v) Sub + L.V + complement
vi) Sub + T.V + infinitive as obj
vii) Sub + T.V + obj + adj complement.

b) Make sentences using the following Modals as directed: (12)
Could (past ability); Might (possibility); Would (request); Shall (offer); Should (advice); Must (obligation).

c) Make sentences using the following phrases and idioms: (09)
A dark horse; By the by; Draw the line; French leave; Out and out; Sine die.

4. a) Complete the sentences with subordinate clauses as directed: (14)
   i) ..... remains a mystery. (noun clause)
   ii) I am certain ..... (noun clause)
   iii) The house ..... is a grand one. (adjective clause)
   iv) The car ..... belongs to Mr. Rahman. (adjective clause)
   v) ..... I will give you a call. (adverb clause of time)
   vi) You can explain this ..... (adverb clause of cause)
   vii) She looks beautiful ..... (adverb clause of condition).

   b) Write a synonym and an antonym for each of the followings and use the new words in sentences: (12)
   Aversion, Counterfeit, Jocular.

   c) Supply a suitable word to fill in the gaps: (09)
   i) She is fed up ..... for me.
   ii) He refrained ..... hunting for a long time.
   iii) Let's ..... a plan.
   iv) ..... had I arrived when trouble started.
   v) It is doubtful ..... he will return.
   vi) ..... walking along the street, he met me.

Section B

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

5. a) Read the passage and answer the following questions: (20)

More and more people are becoming addicted to their mobile devices. They use them everywhere. In restaurants, on buses, in class. They are dependent on their phones.

A recent study found that, people in the UK check their phones once every 12 minutes and that increasingly, how people feel is more and more dependent on the number of 'likes' or 'followers' or 'views' they have.

Some people can suffer serious mental health problems when they are not validated on social media. Furthermore, mobile phones are a terrible distraction because often, when using phones, people are not mindful of what is happening around them.

In many countries, more people and businesses are trying to limit the amount of time people spend on mobile phones. Governments now recognise that for some people, mobile phone use is a dangerous addiction, similar to smoking and gambling. Thus Apple, Facebook, and Instagram are introducing features designed to allow mobile user to see how much time they have spent on the phones and set limits on the time they are on social media.

1. Mobile phones are a terrible distraction for students. Explain how?
2. Why do people suffer when they are not validated on social media?
3. Apple launched an app designed to see how much time you spend on phone. Do you think these apps can control internet addicts? State your opinion.
4. Name some other addicts, such as what do you call people who cannot live without work and who cannot stop shopping.

   b) Make a precis of the above passage with a title. (15)

6. a) Amplify the idea contained in of the following statement: (20)
   Eternal vigilance is the price of liberty.

   b) Write a contrast paragraph between public university and private university. (15)

7. a) Prepare your CV for the post of Lecturer in the Department of Biomedical Engineering and apply for the post. (20)

   b) Suppose your department has arranged a time management training program sponsored by the Chamber of Commerce at Hotel Castle Salam. Write a memo to inform the students of MTE about the program. (15)

8. Write a free composition on any one of the followings: (35)
   a) Corruption in Bangladesh
   b) Students and politics in Bangladesh.

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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 Script A)

1. a) Find the transformed equation of $17x^2 - 12xy + 8y^2 - 80 = 0$ when the axes are rotated by an angle $\cos^{-1}\left(\frac{1}{\sqrt{5}}\right)$. (12)

b) Find the transformed coordinates of $(-2, 1)$ with respect to $12x + 5y + 1 = 0$ and $5x - 12y + 1 = 0$ as the x-axis and y-axis respectively. (06)

c) Identify the curve $x^2 - 4xy + 4y^2 + 5y - 9 = 0$ and hence reduce it to the standard form. Find also its focus. (17)

2. a) Write down the relation between cartesian and cylindrical polar coordinates for a point. Find the cartesian coordinates for a point whose cylindrical polar coordinates are $\left(4\sqrt{5},\ \tan^{-1}\left(\frac{1}{3}\right),\ -2\right)$. (12)

b) Define direction cosines of a line. If l, m, n are direction cosines of a line, then show that $l^2 + m^2 + n^2 = 1$. (11)

c) Find the angle between any two diagonals of a cube. (12)

3. a) What is plane? Find the equation of plane that passes through the point $(2, -3, 1)$ and perpendicular to the line joining the points $(3, 4, -1)$ and $(2, -1, 5)$. (11)

b) Find the distance from the point $(-1, 2, 3)$ to the plane $x + y + z - 14 = 0$ measured parallel to the line $\frac{x-2}{2} = \frac{y+4}{1} = \frac{z-5}{-2}$. (12)

c) Test whether the four points $(1, 0, 0), (0, 0, 1), (0, 0, 2)$, and $(1, 2, 3)$ coplanar or not. If not then find the volume of a tetrahedron whose vertices are these four points. (12)

4. a) What is meant by skew lines? Find the length of shortest distance between the lines $\frac{x-1}{1} = \frac{y+1}{-1} = \frac{z-4}{0}$ and $\frac{x-1}{4} = \frac{y-2}{3} = \frac{z-36}{-6}$. (13)

b) Define great circle. Find the equation of a sphere in which the circle $x^2 + y^2 + z^2 - 7y + 2z - 2 = 0, 2x - 3y - 4z + 24 = 0$ is a great circle. (11)

c) Find the equation of the right circular cone whose vertex at $(1, 2, 3)$ and guiding curve is $y^2 + z^2 = 25, x = 5$. (11)

Section B

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

5. a) Define order and degree of the differential equation. Find the differential equation of family of the parabolas with foci at the origin and the axis along the x-axis. (12)

   b) Solve the differential equation $(3x + 2y)dx + (2x + y)dy = 0$. (12)

   c) Find the general solution of $\frac{dy}{dx} - y = xy^5$. (11)

6. a) Determine the constant A such that the equation $(Ax^2y + 2y^2)dx + (x^3 + 4xy)dy = 0$ is exact and solve the resulting exact equation. (11)

   b) Solve the differential equation $\frac{dy}{dx} + \frac{y}{3} = \frac{1}{3}(1 - 2x)y^4$ when $y(0) = 1$. (11)

   c) Solve the differential equation $(D^2 + 1)y = secx$ by using the method of variation of parameter. (13)

7. a) Solve the differential equation $(2xy^2 + y)dx + (x + 2x^2y - x^3y^3)dy = 0$. (12)

   b) Solve the differential equation $\frac{d^4y}{dx^4} - 3\frac{d^3y}{dx^3} - 2\frac{d^2y}{dx^2} + \frac{dy}{dx} + 2y = 0$. (11)

   c) Find the particular solution of $\left(y + \sqrt{x^2 + y^2}\right)dx - xdy = 0; y(1) = 0$. (12)

8. a) Solve the differential equation $\frac{dy}{dx} = 1 + \frac{y}{x}$. (09)

   b) Solve the following boundary value problem by the method of separation of variables (12)

   $$\frac{\partial u}{\partial t} = 4\frac{\partial^2 u}{\partial x^2}, u(0,t) = 0, u(\pi,t) = 0, u(x,0) = 2sin3x - 4sin5x.$$

   c) Find the solution in generalized series form about $x = 0$ of the differential equation (14)

   $3x\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$.

Khulna University of Engineering & Technology
B. Sc. Engineering 1st Year 2nd Term Examination, 2021
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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 Script A)

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

b) Write a C program to find Palindrome numbers in a given range. (09)

c) Write a program that converts a given seconds into hour, minute and seconds. (10)

d) Write a program to find the size of a variable. (06)

2. a) Write down the pseudo-code for electricity charge calculation where input is electricity unit charges and calculates total electricity bill according to the following conditions: (10)

For first 50 units, Tk 2.00/unit
For next 100 units, Tk 2.50/unit
For next 100 units, Tk 3.00/unit
For above 250 units, Tk 4.00/unit

An additional surcharge of 20% is added to the bill.

b) Write the output of the following code segment: (08)

```
void main (){
    int n;
    for (n=9; n>3/5; n--){
        printf ("n=%d\n", (n--)%3);}}
```

c) Write a C program to find number of days in a month using switch case. (07)

d) Write a C program to reverse the digits of any integers. (10)

3. a) "A function can be categorized depending on argument and return type"- Explain this term with proper examples. (09)

b) Write a code in C which will declare an array of integers holding the numbers 1, 4, 2, 6, 5, 7, 8, 10, 11, 15. Now add the even number of this array and print the sum. (08)

c) Compare call by value and call by references with necessary examples. (09)

d) What will be the output of the following code segment? (09)

(i)
```
int x=6;
do
 {
  while (x   6)
  printf ("%d", x)
  x++;
 }
 While (x<8)
```

(ii)
```
int a, b, j=5;
a=j--;
printf ("%d", a);
b  j++;
printf ("%d", b);
printf ("%d", j);
```

(iii)
```
int a=2, b=1;
if (a & b)
printf ("Inside if");
else
printf ("Inside else");
```

4. a) Write a program to open a file successfully and copy them into another file. (10)

b) Describe the functionalities of fopen, fseek, fscanf, and felose. (08)

c) Using recursion function create a program to calculate GCD of numbers. (11)

d) Define: (i) Dynamic binding (ii) Inline function. (06)

Section B

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

5. a) What is operator? Briefly discuss the following operators: (12)
   (i) Comma Separated Operator
   (ii) Conditional Operator
   (iii) Bitwise Operator

   b) Write a C program to find the first and last digit of any number. (11)

   c) Describe different modes of opening a file. (12)

6. a) Write a C program to find the total number of alphabets, digits or special characters in a string. (12)

   b) Write the output of the following code segment: (08)

```
main (){
        char *n= "Harry Potter";
        printf ("%c",*n);
        printf ("%c",*(n+6));
        printf ("%c",*(n++));
        printf ("%c",*n++); }
```

   c) Write importance of string data. (05)

   d) Which operations are not valid in string using normal operators? How can you perform these operations- explain with examples. (10)

7. a) What is the array of pointers? Write the importances of using pointers. Briefly discuss operators in pointer. (20)

   b) Write the output of the following code segment: (05)

```
int main (){
  int arr[] = {10, 20, 30, 40, 50, 90, 100};
  int*ptr = & arr[1];
    while (ptr <= &arr[5]){
          *ptr++;
          printf("%d",*ptr); }}
```

   c) Write a C program to copy one array to another using pointer. (10)

8. a) Define a structure with subject 1, subject 2, subject 3, and total. Now take marks of 3 courses for n students. Calculate total marks of each student. Also calculate total marks of each course obtained by n students. (15)

   b) Differentiate between structures and union with examples. (10)

   c) Write a function called "prime" that return 1 if its arguments is prime and return 0 otherwise. (10)

Khulna University of Engineering & Technology
B. Sc. Engineering 1st Year 2nd Term Regular Examination, 2021
Department of Biomedical Engineering

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 Script A)

1. a) Define the terms semiconductor, doping, and extensic material. Explain the formation of depletion layer in a semiconductor diode. (11)

   b) What is meant by rectifier circuit? Draw different diode rectifier circuits and their corresponding outputs. (12)

   c) Write short notes on: (i) LED and (ii) varactor diode. Differentiate between Zener breakdown and avalanche breakdown. (06)

   d) Draw v_0 for the network shown in Fig. Q1(d). (06)

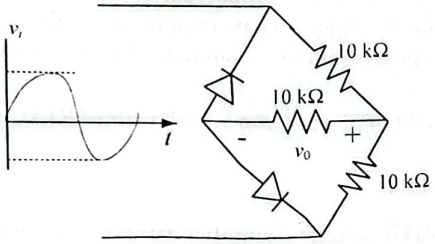

Fig. Q1(d)

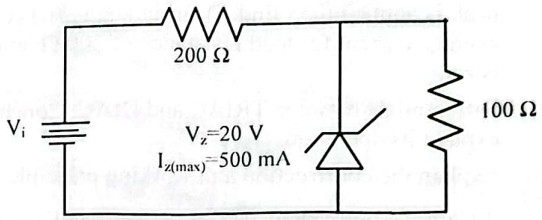

Fig. 2(b)

2. a) Briefly explain the semiconductor diode on (i) no bias, (ii) forward bias, and (iii) reverse bias conditions. (11)

   b) What is meant by Zener diode? For the circuit shown in Fig. Q2(b), determine the range of V_i to operate the Zener diode. What will happen if V_i is out of this range? (12)

   c) Explain the construction and operation of a transistor. (12)

3. a) "A transistor acts as an amplifier as well as a switch"-justify the statement with relevant diagram. (12)

   b) What do you mean by load line? Explain how different parameters are related to the load line of a transistor. (10)

   c) For the transistor amplifier shown in Fig. Q3(c), find I_{BQ}, I_{CQ}, and V_{CEQ} (13)

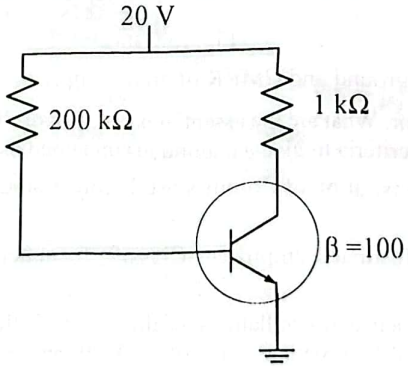

Fig. Q3(c)

4. a) What is meant by FET? What are the main differences between (i) FET and BJT (ii) D-type MOSFET and E-type MOSFET. (05)

   b) Draw the symbol, transfer characteristics, and output characteristic curves of different type of n-channel FETs. (08)

   c) Explain the construction and working principle of n-channel JFET with relevant diagram. (11)

d) For the network shown in Fig. Q4(d), find I_{DQ} and V_{GSQ}. (11)

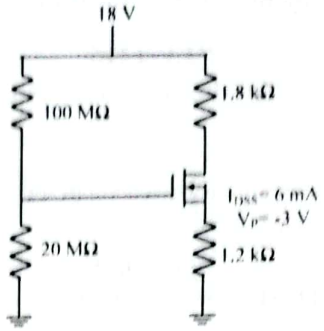

Fig. Q4(d)

Section B

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

5. a) What do you mean by SCR? Draw and explain the V-I characteristic curves of TRIAC and DIAC. (10)

b) A half-wave rectifier circuit employing an SCR is adjusted to have a gate-current of 1 mA. The forward breakdown of SCR is adjusted 100 V for I_g=1 mA. If a sinusoidal voltage of 200 V peak is applied then find (i) firing angle, (ii) conduction angle. (iii) average output voltage, (i) average current for load resistance of 200 Ω, and (v) power output. Assume the holding current is zero. (08)

c) Differentiate between TRIAC and DIAC. Construct a high power lamp switch using TRIAC and explain its operation. (07)

d) Explain the construction and working principle of a UJT. (10)

6. a) What is op-amp? Show that an op-amp can be used as a (i) summing amplifier, (ii) noninverting amplifier, and (iii) integrator. (11)

b) Design op-amp circuits to provide the following output voltages: (i) $v_0 = 6v_1 - 11v_2$ and (ii) $v_0 = 3\frac{dv_1}{dt} + 7\int v_2 dt$. (10)

c) Determine the output voltage for the circuit shown in Fig. 6(c). (10)

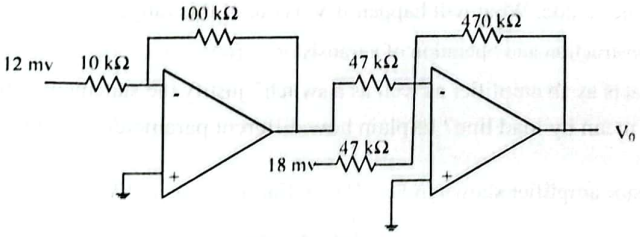

Fig. for Q6(c)

d) Define the terms virtual ground and CMRR of an op-amp. (04)

7. a) Define sinusoidal oscillator. What are the essential parts of an oscillator circuit? " An oscillator must maintain the Barkhausen criteria to give a continuous undamed oscillation"-justify the statement. (10)

b) Explain the principle of operation of Colpitt's oscillator. Also derive the expression of feedback fraction. (10)

c) What do you mean by feedback amplifier? Classify feedback amplifiers. What are purposes feedback amplifiers? (07)

d) Mention the differences between oscillator and alternator. With a negative voltage feedback, an amplifier gives an output of 10 V with an input of 0.5 V. When feedback is removed, it requires 0.25 V input for the same output. Calculate (i) gain without feedback and (ii) feedback fraction, m_v. (08)

8. a) What do you mean by small signal analysis of BJT? Draw the re model for common-emitter configuration of BJT and derive the expression of input impedance, output impedance, voltage gain, and current gain. (08)

b) Mention the performance parameters of power amplifier. Also classify power amplifier based on mode of operation with appropriate diagrams. (09)

c) Explain the operation of transformer coupled push-pull amplifier and its crossover distortion. (07)

d) Define active filter. Design a second-order active high-pass filter circuit with overall gain, A_v = 20 and cut-off frequency, f_c = 1.5 kHz. Also draw the frequency response curve. (11)