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) Make sentence with the following structures using the words given in brackets: (14)

   i.   Subj. + intransitive verb + adv. of manner. (*Speak as verb*)
   ii.   Subj. + transitive verb + object (N/P) + noun complement. (*Nominate as verb*)
   iii. That + subj. + verb + adv. of manner + verb + adj. complement. (*Work and is as verb*)
   iv.   What + subj. + verb + adv. of manner + verb + object. (*Write and inspire as verb*)
   v.   Since + subj. + verb + adv. of manner, subj. + verb + adv. of place. (*Walk and reach as verb*)
   vi.   Subj. + neither + verb + nor + verb + preposition + object. (*Complain and revolt as verb*)
   vii. Subj. + and + subj. + verb + adv. of place. (*Participate as verb*)

   b) Change the following words as asked in brackets and make sentences with the changed forms: (12)

   i.   Space (*into adjective*)   iii. Exploration (*into verb*)   v.   Naturally (*into adjective*)
   ii.   Devote (*into noun*)   iv.   Permanent (*into adverb*)   vi.   Strong (*into noun*)

   c) Make new words with the following suffixes and use the new words in sentence: (09)

   ....able, ...ate, ...ee, ...ism, ...mania, ...let.

2. a) Make WH question with each of the following sentences: (14)

   i.   The road is 20 feet wide.   v.   Nasim wrote an essay.
   ii.   The essay sounds revolutionary.   vi.   She is sleeping deeply.
   iii. The train is running 60 km an hour.   vii. The poem is amusing.
   iv.   Habib has been living in this village for ten years.

   b) Make sentences using the following modals as directed: (12)

   i.   Should (*to express duty at present*)   iv.   Can (*to express ability*)
   ii.   Could (*to express past ability*)   v.   Will (*to express polite request*)
   iii. Might (*to express guess*)   vi.   Must (*to express internal necessity*)

   c) Write two synonyms for each of the following words and use the synonyms in sentence: (09)

   Good,   Hard,   Expand.

3. a) Correct the following sentences: (14)

   i.   Take care to your health for a happy life.   vi.   Chitra is running to time.
   ii.   He what offers is from his earnestness.   vii. Our principal is a man of part.
   iii. When it is a rainy day we shouldn't go out of home.
   iv.   He ate not only a piece of bread, a banana but also.
   v.   B.A.F. is with the vigilance of the sky frontier of Bangladesh.

   b) Complete the following sentences with clauses as asked in brackets: (12)

   i.   It is fine .... (*Noun clause*)
   ii.   We entitle the poem .... (*Noun clause*)
   iii. .... he is absent in the meeting. (*Adv. clause*)
   iv.   .... he could play football. (*Adv. clause*)
   v.   We admire Roni .... (*Adj. clause*)
   vi.   Rabbu, ... , is a good boy. (*Adj. clause*)

c) Fill in the gaps of the following sentences with suitable words: (09)

    i. He .... praises .... rewards the boy.
    ii. .... Rana .... his brother studies hard.
    iii. Money and wealth, ... I have none, were .... in flood.

4. a) Transform the following sentences as asked in brackets: (14)

    i. Nabil writing acutely prepares an informative essay. (*into simple*) *complex*
    ii. The article is too revolutionary to be acceptable. (*into complex*)
    iii. He says what he feels deeply. (*into simple*)
    iv. We called him what the villagers named. (*into simple*)
    v. The man came here when there was storm. (*into simple*)
    vi. He is indifferent. (*into negative*)
    vii. He is the best of all boys in the village. (*into comparative degree*)

b) Express the following notions/attitudes in sentence: (12)

i.	Praise	iii.	Approval	v.	Command
ii.	Co-operation	iv.	Friendliness	vi.	Honesty

c) Differentiate between gerund and present participle with examples. Define transitive verb with example. (09)

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

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

    Good manners play an important role in the life of boys and girls. Though good manners are very valuable possession for developing social relations, yet they coast nothing. They help a person to win friends. The social standing of a man is judged by the manners he possesses. Polished and polite manners create a healthy impact. Good manners go a long way in making a person cultured and civilized. A man without good manners remains a savage. Normally good manners are inherited from parents. But these also can be learnt from others. It is, therefore, essential that all children are taught good manners from the childhood itself. Children with good manners are liked by one and all. They are appreciated even by strangers. If a person is dressed well, it does not mean that he must be possessed good manners as well. Courtesy and politeness are keys to good manners. Biographies of great men can also help us in learning good manners. Good manners not only demanded courtesy and politeness but also respect for the feelings and opinions of other people. For our enrichment these are basic elements.

    i. What is the importance of good behavior?
    ii. What does the government do for children?
    iii. What are the requirements of good nature?
    iv. What should we do for good character?

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

6. a) Write a paragraph on "Laptop and Cell Phone" following the technique of contrast. (15)

b) Write a report to the editor of a newspaper on "The Annual Sports of your University". (20)

7. a) Amplify the idea contained in the statement "Cowards die many times before their death". (15)

b) Prepare a C.V. along with a job application. (20)

8. Write a free composition on one of the followings (around 2000 words): (35)

a) International peace
b) Dignity of human beings

Khulna University of Engineering & Technology
B. Sc. Engineering 1st Year 2nd Term Examination, 2016
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 Electronics. Write down the application area of electronics.   (05)

    b) What is p-n junction? Explain the formation of depletion layer in a p-n junction. Also explain a   (12)
       p-n diode on different biasing conditions.

    c) "The efficiency of a full wave rectifier is double than that of a half wave rectifier"- Justify this   (12)
       statement.

    d) In the bridge type circuit as shown in Fig. 1(d), the diodes are assumed to be ideal. Find: (i) d.c.   (06)
       output voltage, (ii) peak inverse voltage, and (iii) output frequency.

2. a) "A transistor acts as an amplifier as well as a switch"- Justify the statement by showing the   (10)
       circuit diagram and necessary mathematical verification.

    b) What are the different current components of a transistor and establish the relation among them.   (11)

    c) How transistor acts as an amplifier? For a common Emitter connection show that-   (14)

       (i) $I_C = \beta I_B + I_{CEO}$, from this explain the concept of I_{CEO}.

       (ii) $\beta = \dfrac{\alpha}{1-\alpha}$, here the symbols have their usual meanings.

3. a) Derive the expression of stability factor.   (09)

    b) Assume that a Si transistor with $\beta = 50$, $V_{BE} = 0.6V$, $V_{CC} = 22.5V$, $R_C = 5.6k\Omega$ is used in Fig.   (13)
       3(b). It is desired to establish a Q-point at $V_{CE} = 12V$, $I_C = 1.5mA$, and a stability factor $S \le 3$.
       Find R_1, R_2, and R_e.

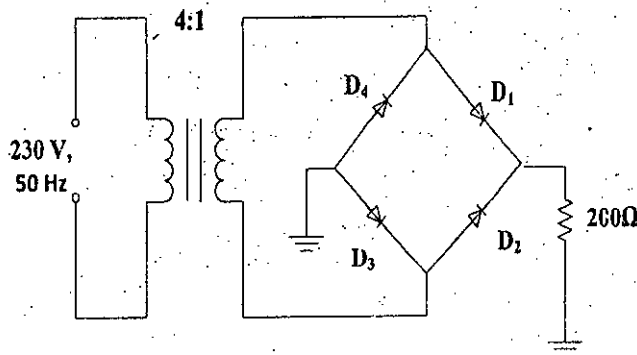
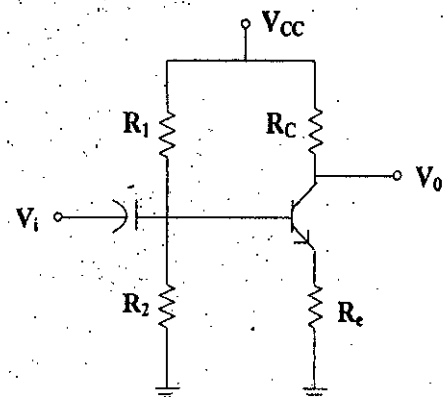Fig. 1(d)   Fig. 3(b)

    c) Draw the dc load line and determine the operating point for the Fig. 3(c). Also draw the ac load   (13)
       line.

4. a) What are the differences between transistor and FET? Draw the 3D and corresponding 2D   (13)
       structure of JFET. What are the JFET parameters and establish the relationship among the
       parameters.

    b) For n-channel Si-FET with $a = 3 \times 10^{-4}$ cm and $N_D = 10^{15}$ electrons/cm^3, find the pinch off   (08)
       voltage and the channel half width for $V_{GS} = (1/2)V_P$ and $I_D = 0$.

    c) Draw the construction of n-channel D-MOSFET and E-MOSFET. What is the difference   (08)
       between them?

    d) Construct CMOS using PMOS and NMOS. Draw their symbols.   (06)

5. a) Draw the two transistor model of SCR and explain its principle of operation. (08)

b) Draw the symbol, characteristics and applications of DIAC and TRIAC. (08)

c) Define UJT. Draw the characteristics curve of UJT and explain by indicating different regions. (12)

d) A UJT has 10 volts between the bases. If intrinsic standoff ratio is 0.65, find the value of standoff voltage and peak point voltage where forward voltage drop of a p-n junction is 0.7 V. (07)

6. a) Define op-amp. Write down the salient features of op-amp. (07)

b) Define CMRR and slew rate. Derive the expression of overall gain for an instrumentation amplifier. (12)

c) Draw the circuit diagram using operational amplifier circuit for the following mathematical expression. (12)

(i) $Ri + L\dfrac{di}{dt} + \dfrac{1}{C}\int i\,dt = v$

(ii) $V_0 = \dfrac{R_F}{R_1}(V_2 - V_1)$

d) Draw the instrumentation amplifier circuit. (04)

7. a) Define Feedback circuit. Classify this. Write down the advantages of negative feedback circuit with brief description. (12)

b) What is sinusoidal oscillator? Explain the principle of operation of Hartley oscillator with net sketch. (12)

c) Calculate the cutoff frequency of a second order high pass filter as in Fig. 7(c) for $R_1 = R_2 = 2.1k\Omega$, $C_1 = C_2 = 0.05\mu F$, $R_G = 10k\Omega$, and $R_F = 50k\Omega$. (11)
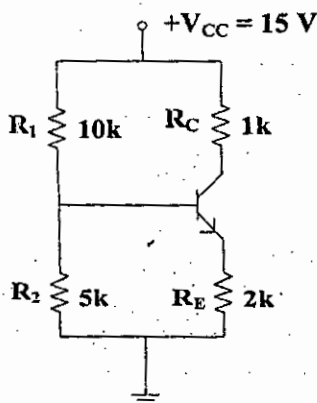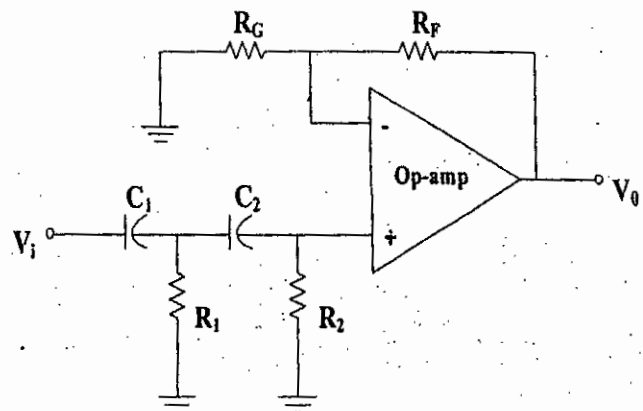

Fig. 3(c)   Fig. 7(c)

8. a) Define active filter. Classify this. Draw the gain vs. frequency curve of different types of filters and explain the significance of cut-off frequency. (10)

b) Draw the 1st order high pass Butterworth filter and find out the output voltage and gain. (10)

c) Define power amplifier. Classify this. Show that the maximum efficiency of class-A amplifier is 25%. (09)

d) Explain the principle of operation of a push-pull amplifier. (06)

Khulna University of Engineering & Technology
B. Sc. Engineering 1st Year 2nd Term Examination, 2016
Department of Biomedical Engineering

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) Define direction cosines and direction ratio. If l_1, m_1, n_1 and l_2, m_2, n_2 are direction cosines of (17) two mutually perpendicular lines, show that the direction cosines of the line perpendicular to them both are

$$m_1 n_2 - m_2 n_1, \qquad n_1 l_2 - n_2 l_1, \qquad l_1 m_2 - l_2 m_1$$

   b) Prove that the lines whose direction cosines are connected by the two relations (18)

$al + bm + cn = 0$ and $ul^2 + vm^2 + wn^2 = 0$ are perpendicular if

$$a^2(v + w) + b^2(w + u) + c^2(u + v) = 0$$

and parallel if $\dfrac{a^2}{u} + \dfrac{b^2}{v} + \dfrac{c^2}{w} = 0$

2. a) Two system of rectangular axes have the same origin if a plane cuts at a, b, c and a_1, b_1, c_1 (10) respectively from the origin, prove that

$$\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{a_1^2} + \frac{1}{b_1^2} + \frac{1}{c_1^2}$$

   b) Determine the equation of the curve $x^2 - y^2 - 2\sqrt{2}x - 10\sqrt{2}y + 2 = 0$ (10)
after rotating of axes through 45°.

   c) Define shortest distance. Find the length and the equation of the S.D. between the lines whose (15) equations are

$x + y = 0, z = 4$ and $\dfrac{x-1}{4} = \dfrac{y-2}{3} = \dfrac{z-36}{-6}$

3. a) Show that the plane $2x - 2y + z + 16 = 0$ touches the sphere (10)

$x^2 + y^2 + z^2 + 2x - 4y + 2z - 3 = 0$ and find the co-ordinates of the point of contact.

   b) Define right circular cone. Find the equation of the right circular cone whose vertex is (15)
$P(2, -3, 5)$, axis PQ which makes equal angles with the axes and semivertical angle is 45°.

   c) A sphere of radius k passes through the origin and meets the axes in A, B, C. Prove that the (10)
centroid of the triangle ABC lies on the sphere $(x^2 + y^2 + z^2) = \dfrac{4}{9}k^2$

4. a) The axes being rectangular, find the equation of the perpendicular from origin to the line (10)
$x + 2y + 3z + 4 = 0 = 2x + 3y + 4z + 5$.   Find the co-ordinate of the foot of the
perpendicular.

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b) Find the angle between the line $\dfrac{x-3}{6} = \dfrac{y-2}{3} = \dfrac{z+1}{-2}$ and the plane $2x + y + 2z = 5$. (10)

c) Find the length and the equation of the shortest distance between the lines (15)

$\dfrac{x-1}{2} = \dfrac{y-1}{3} = \dfrac{z-4}{4}$ and $\dfrac{x-2}{3} = \dfrac{y-4}{4} = \dfrac{z-5}{5}$.

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

5. a) Define ordinary and partial differential equation with examples. Form a differential equation (09) for which $be^{ax} + ae^{-by} = c \ (constant)$.

b) Solve $\left(xcos\dfrac{y}{x} + ysin\dfrac{y}{x}\right)y = \left(ysin\dfrac{y}{x} - xcos\dfrac{y}{x}\right)x\dfrac{dy}{dx}$. (10)

c) Applying the method of variation of parameters solve $\dfrac{d^2y}{dx^2} - 4\dfrac{dy}{dx} + 4y = (x+1)e^{2x}$. (16)

6. Solve any three of the followings: (35)

a) $log\left(\dfrac{dy}{dx}\right) = ax + by$

b) $\dfrac{dy}{dx} = \dfrac{y(x-2y)}{x^2 - 3xy}$

c) $(3x + y - 3)dy = (2x + y - 2)dx$

d) $\left(1 + e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1 - \dfrac{x}{y}\right)dy = 0$

7. a) Solve $xdx + ydy + \dfrac{xdy - ydx}{x^2 + y^2} = 0$. (11)

b) Solve any two of the followings: (24)

(i) $(D^2 - 1)y = xsinx + (1 + x^2)e^x$

(ii) $(D^3 + 2D^2 + D)y = x^2e^{2x} + sin^2x$

(iii) $x^2\dfrac{d^2y}{dx^2} - x\dfrac{dy}{dx} - 3y = x^2lnx$, where $D \equiv \dfrac{d}{dx}, D^2 \equiv \dfrac{d^2}{dx^2}$ and so on.

8. a) What do we understand by ordinary point, regular singular point and irregular singular point? (17)

Solve in series: $x^2\dfrac{d^2y}{dx^2} + x\dfrac{dy}{dx} + (x^2 - 1)y = 0$.

b) Solve the boundary value problem $\dfrac{\partial^2u}{\partial t^2} = a^2\dfrac{\partial^2u}{\partial x^2}$ subject to the conditions: (18)

$u(0, t) = u(2, t) = 0$ and the initial conditions $u(x, 0) = \lambda sin\dfrac{\pi x}{2}$ and $\dfrac{\partial u(x, 0)}{\partial t} = 0$.

Khulna University of Engineering & Technology
B. Sc. Engineering 1st Year 2nd Term Examination, 2016
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) State the general properties of carbohydrates. What are the uses of carbohydrates?   (10)

    b) Define protein. Classify protein according to structure with diagram of each.   (15)

    c) State the chemical reaction shown by protein. Describe any one of them.   (10)

2. a) What is electrophoresis? How they can be used in laboratory?   (15)

    b) Describe the metabolism and absorption of lipid.   (10)

    c) Define Lipoprotein. Name the different types of Lipoprotein with their normal values.   (10)

3. a) Name the different color reaction exerted by protein. Describe Ninhydrin reaction.   (15)

    b) What is phospholipid? State biomedical importance of phospholipid.   (10)

    c) What is Eicosanoids? How they are formed?   (10)

4. a) Define Fatty acid. State the biomedical importance of Fatty acid.   (10)

    b) Define sphingolipid. State its biological importance.   (15)

    c) What reactions are usually shown by carbohydrate? What lab test is done to detect sugar in urine?   (10)

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

5. a) What do you mean by bioenergetics? Describe laws of thermodynamics.   (18)

    b) Mention chemical composition of a man weighing 65 kg.   (05)

    c) Give a short note on biosensor.   (12)

6. a) Outline the application of recombinant technology in different fields of science. (18)

    b) Draw basic structure of DNA mentioning names of different components.   (07)

    c) Justify the use of enzyme as an analytical agent.   (10)

7. a) Mention different properties of enzyme with diagram.   (15)

    b) Write a short note on spectrophotometer.   (15)

    c) Illustrate the structure of nucleotide with diagram along with variations of (05)
        different sugars and bases.

8. a) Illustrate the diagram showing the production of recombinant DNA using human (15)
        gene and bacterial plasmids.

    b) Discuss about the role of biotechnology in pharmaceutical industries regarding (13)
        production of enzymes.

    c) What are the techniques used for the measurement of enzyme activity?   (07)