

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 1st year 2nd Term Examination, 2015
Department of Electronics & Communication Engineering
Ch 1209
(Chemistry)

TIME: 3 hours

FULL MARKS: 210

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

SECTION A

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

1. a) What is valence bond theory? How does it differ from the Lewis concept of chemical bonding? 10
b) What is cell potential? Give a schematic presentation of electron moving direction between electrode and solution during oxidation and reduction. 08
c) Write down complete molecular orbital diagram for N₂ molecule. 07
d) Draw the structure of Si. Please write down the mechanism of solar cell based on Si with appropriate examples and figures. 10
2. a) What is electrolysis? write down the differences between electrolytic cell and galvanic cell. 09
b) What is transport number? The speed ratio of silver and chloride ions in a solution of silver chloride electrolysed between silver electrodes is 0.916. Find the transport number of the two ions. 08
c) What is a cell constant? How is it determined? 09
d) Explain clearly why equivalent conductance increases at dilution and specific conductance decreases? 09
3. a) What is effective atomic number? Describe Sidgwick's theory of complex compound formation with limitations. 10
b) State and explain the valence bond theory of complex compound formation. 08
c) What is isomerism in complex compounds? H₂O coordinates with H⁺ ion forming H₃O⁺. Do you expect coordination of another H⁺ ion forming H₄O⁺²? Explain. 08
d) Discuss methods of identification of cis-trans isomers of inorganic complexes. 09
4. a) What is hydrogen bond? Discuss the bonding and properties of water. 08
b) Define specific conductance and common ion effects with their examples. 09
c) Draw cyclic voltammogram for a complete reversible system and show anodic and cathodic peak currents and peak potentials within the figure. 08
d) In periodic group IVA, carbon is a non-metal, silicon and germanium are metalloids, tin and lead are metals. Explain why this is so? 10

SECTION B

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

5. a) "Energy is quantized" – explain. 04
b) Show that a tiny particle like electron has both particle and wave properties. 08
c) What is electromagnetic radiation? Sketch the change of electromagnetic radiation with change of dipole moment of HCl molecule. 09
d) Explain about emission and absorption spectra. 08
e) Write down the conditions of a molecule to be infrared and microwave active. Mention different types of microwave active molecules with their change of moment of inertia. 06

6. a) Derive an expression for the change of moment of inertia $I = \mu r_0^2$ where I = change of moment of inertia, μ = reduced mass of the molecule and r_0 = equilibrium distance between two atoms in a molecule or bond length. 07
- b) In carbon monoxide molecule value of $2B$ for the $J = 0 \rightarrow J = 1$ is 3.84235 cm^{-1} . Calculate the change of moment of inertia, I_{co} of carbon monoxide molecule. 08
- c) Write down the properties of Raman spectra. 10
- d) What do you mean by degree of freedom? Calculate the degree of freedom of H_2O , NH_3 and CO_2 molecules. 10
7. a) State and explain Beer-Lambert's law. 10
- b) Sketch and explain about different electronic transition on irradiation of UV-visible radiation. 12
- c) State the photochemical laws. What is quantum yield? 08
- d) Write down the different steps of the following photochemical reaction: 05
- $$\text{Br}_2(\text{g}) + \text{H}_2(\text{g}) \rightleftharpoons \text{HBr}(\text{g})$$
8. a) What is co-polymer? Condensation polymerization is also called step reaction polymerization – explain with relevant examples. 12
- b) What is living polymer? Briefly discuss the polymerization of $(\text{CH}_3)_3\text{C}-\text{CH}=\text{CH}_2$ in presence of acid catalyst. 13
- c) How would you differentiate between thermosetting and thermoplastic polymer? 10

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 1st Year 2nd Term Examination, 2015
Department of Electronics and Communication Engineering
CSE 1209
(Computer Fundamentals and 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) What is a computer? List six types of computers that are designed for use by a single person. (06)
b) Why are mainframe systems usually limited in the number of tasks they perform? (06)
c) Describe the four phases of the information processing cycle. (08)
d) Name and differentiate the two main categories of storage devices. (08)
e) What is CPU? What are the functions of CPU? (07)
2. a) Most standard keyboards include five major groups of keys. List and explain them. (15)
b) How does a mechanical mouse work? (07)
c) Write the differences between arithmetic operations and logical operations. (08)
d) What is data bus? (05)
3. a) "A processor's performance is dictated by its architecture" – justify the statement. (07)
b) What is an operating system? Explain the major functions of an operating system. (09)
c) Explain the functions of a driver. (05)
d) What are the advantages of high level language over low level language? (06)
e) What are the advantages of parallel processing? (08)
4. a) What is meant by protocol? List three common LAN protocols. (07)
b) Define LAN, CAN, and Internet. (06)
c) Convert $(1011101.011)_2$ to decimal number. (06)
d) The numbers in the sequence 1123581321 ... are called Fibonacci numbers. Write a program using a do ... while loop to calculate and print the first m Fibonacci numbers. (08)
e) What are the differences between a RISC processor and a CISC processor? (08)

SECTION B

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

5. a) What do you mean by variable? Write down the rules to give the name of a variable. (12)
b) Write down the differences between (i) Arithmetic operators and (ii) Relational operators. (10)
c) Write a program that can find out the maximum of three numbers. (13)
6. a) What do you mean by nested if statement? Explain it with an example. (11)
b) "All character arrays are not string but all strings are character arrays" – justify the statement. (05)
c) Write the differences between (i) One dimensional and (ii) two dimensional arrays. (08)
d) Suppose you have an array of integer type that holds N numbers of numbers. Now write necessary code to find out the maximum number from that array. (11)

7. a) What do you mean by function in C programming? (08)
b) Write the syntax of function definition. (08)
c) Write a short note on "return" statement in C programming function. (08)
d) Write a program that can add two strings. (11)
8. a) What is flow chart? Write the flowchart to generate the sum(s) from the following series. (10)
- $$S = 1 + x + x^2 + \dots + x^k$$
- b) Write the necessary code in C to find out the value of " e^x " when x will be given through keyboard. (12)
c) Write down the limitations of binary search. (07)
d) Write a program to copy the contents from one file to another. (06)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

B.Sc. Engineering 1st Year 2nd Term Examination, 2015
 Department of Electronics and Communication Engineering
 ECE 1209
 (Analog Electronics-I)

TIME: 3 hours

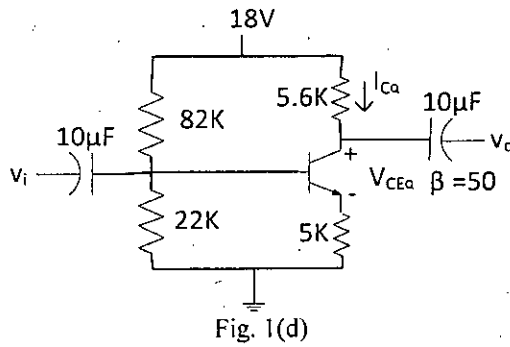
FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
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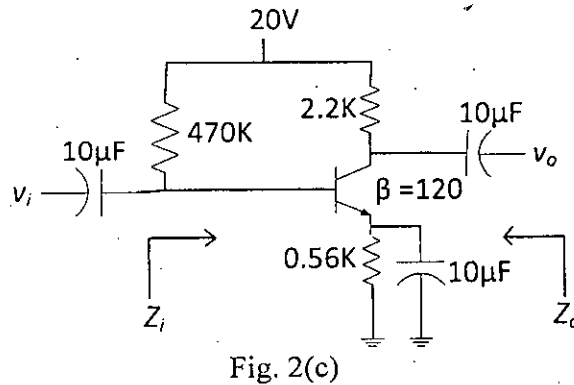
SECTION A

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

1. a) What is load line analysis? Explain the switching operation of BJT using load line analysis. (12)
- b) What do you mean by bias stabilization and thermal runaway? Explain in brief. (07)
- c) Write the mathematical expressions of stability factors and hence show that voltage divider bias configuration is most stable. (08)
- d) Determine the values of I_{CQ} and V_{CEQ} for the voltage divider configuration of Fig. 1(d). (08)



2. a) What do you mean by 'BJT modeling'? Compare r_e model and hybrid model mentioning their advantages and disadvantages. (11)
- b) Write the merits of emitter follower configuration. Using r_e modeling concept, derive the expression for input impedance (Z_i) and output impedance (Z_o) for emitter follower configuration. (12)
- c) Determine: (a) r_e , (b) Z_i , (c) Z_o , and (d) A_V for the following network. (12)



3. a) Define h -parameters. How can you determine the h -parameters from transistor characteristic curves? (07)
- b) Derive the expression for A_i , Z_i , A_V , and Y_o for a basic transistor amplifier circuits using h -parameters model. (12)
- c) Draw the Darlington pair circuit and derive the expression of its current gain using hybrid modeling concept. (07)

- d) Determine the input impedance and overall voltage gain of the following two-stage amplifier using simplified hybrid model. (09)

$$\begin{array}{llll} h_{ie} = 2k & h_{fe} = 50 & h_{re} = 6 \times 10^{-4} & h_{oe} = 25 \mu A/V \\ h_{ic} = 2k & h_{fc} = -51 & h_{rc} = 1 & h_{oc} = 25 \mu A/V \end{array}$$

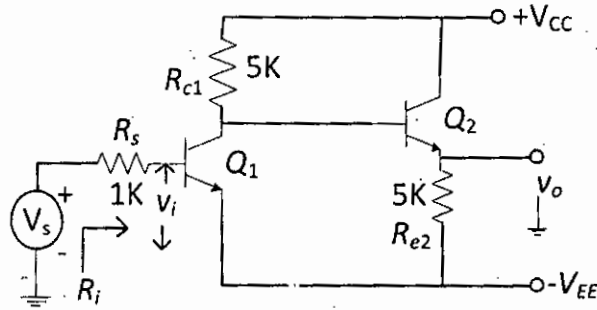


Fig. 3(d)

4. a) What are the major considerations in designing power amplifier circuits? Explain in brief. (07)
- b) "The efficiency of power amplifier increases with smaller input operating cycle" – justify the statement with necessary diagrams. (08)
- c) What are the advantages of cascading different amplifier circuits? Which one of the possible three configurations should be used in cascade if maximum voltage gain is to be realized? (10)
- d) Why the push-pull power amplifier is called so? Deduce the expression of maximum efficiency of push-pull power amplifier. (10)

SECTION B

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

5. a) Show that electron moves in a parabolic path in the region between two parallel plates of a capacitor. (10)
- b) Show that the electrostatic deflection sensitivity of a cathode-ray tube is $S = \frac{1LV_d}{2dV_a}$, (12)
where the symbols have their usual meanings.
- c) Write down the similarities between electrostatic-deflection sensitivity and magnetic-deflection sensitivity. (06)
- d) Discuss about the path of a charged particle in presence of parallel electric and magnetic fields. (07)
6. a) Explain the voltage divider biasing of FET amplifier and consequently discuss the effect of R_s on the resulting Q point. (10)
- b) For a JFET self-bias configuration prove that $V_D = V_{DD} - V_{RD}$, with necessary diagram. (10)
- c) Determine the following for the common gate configuration below: (i) V_{GSQ} , (ii) I_{DQ} , (15)
(iii) V_D , (iv) V_G , (v) V_S , and (vi) V_{DS} .

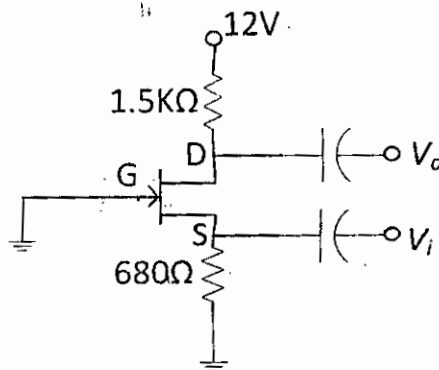
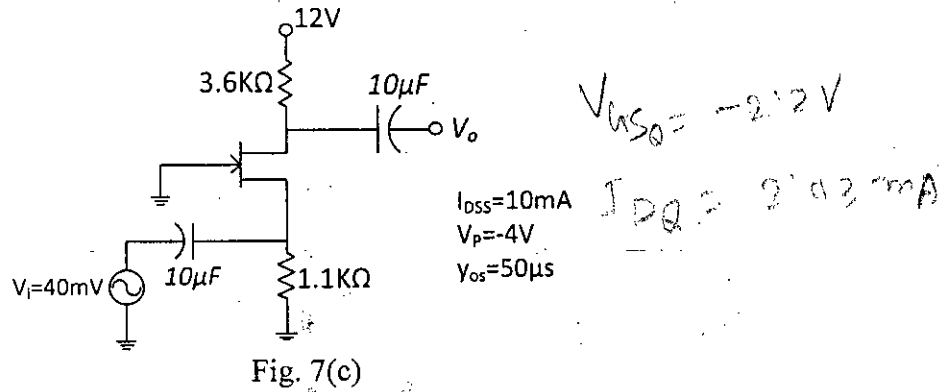


Fig. 6(c)

$$I_{DSS} = 12 \text{ mA}$$

$$V_p = -6 \text{ V}$$

7. a) Show that $g_m = g_{m0} \left(1 - \frac{V_{GS}}{V_p} \right)$; where symbols have their usual meanings. (08)
- b) For a self-bias configuration of JFET amplifier, show that the voltage gain with unbypassed R_S is less than the voltage gain with bypassed R_S . (12)
- c) Determine the following parameters for the network in Fig. 7(c); (i) g_m , (ii) r_d , (iii) Z_i (15)
with and without r_d (iv) Z_o with and without r_d and (v) V_o with and without r_d . Also give your comments on the results of (iii) – (v).



8. a) Describe the working principle of photo-conductive cells. Also mention some practical applications of photo-conductive device. (10)
- b) What is LCD? Describe the basic operation of LCD panel. (10)
- c) Explain the construction and operating principle of a solar cell. (09)
- d) Write short notes on (i) Photodiode, (ii) Phototransistor. (06)



KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 1st Year 2nd Term Examination, 2015
Department of Electronics and Communication Engineering
Hum 1209
(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 sentences on the following structures. (14)
- (i) Subj. + vi + infinitive as obj.
 - (ii) Subj. + vt + obj. + adverbial
 - (iii) Subj. + vt + obj. + Noun complement
 - (iv) Subj. + vt + obj. + adj. complement
 - (v) Not only subj. + but also subj. + verb + obj. (ride as verb)
 - (vi) Subj. + linking verb + Noun complement
 - (vii) Subj. + vt + obj. + that clause
- b) Change the following words as directed in brackets and make sentence with the changed forms. (12)
Love (into adj.), succeed (into noun), jocularity (into adj.), cancel (into noun), audacious (into noun), noble (into verb).
- c) Write structures using Modal auxiliaries to express each of the following: (09)
- (i) a guess about the present
 - (ii) polite request
 - (iii) opportunity in the past which was not executed
 - (iv) duty in the past
 - (v) strong possibility
 - (vi) unnecessary action in the past
2. a) Make W/H questions from the underlined parts for the following answers. (14)
- (i) I like honest people.
 - (ii) It is half past twelve.
 - (iii) They planned to go on a picnic.
 - (iv) As he is ill, he could not come.
 - (v) Mr. Zahid is 6 feet tall.
 - (vi) The sun rises in the morning.
 - (vii) The flat has been sold at 20 lac taka.
- b) Make sentences using the following words as directed. (12)
Book (as verb), Book (as adj.), That (as adj.), That (as pronoun), Watch (as verb), But (as adverb).
- c) Identify the types of function of a noun as come in the followings with underlined words. (09)
- (i) Azad, a teacher, met Rabbi.
 - (ii) They elected him chairman.
 - (iii) He is a teacher.
 - (iv) I think of Karim.
3. a) Make sentence with each of the following modals as asked in brackets. (14)
- (i) Could. (To express past ability)
 - (ii) Might. (To express uncertainty)
 - (iii) **Would.** (To express past irregular habit)
 - (iv) Must. (To express logical deduction)
 - (v) Be + to. (To express order)
 - (vi) Dare. (To express indulgence)
 - (vii) Had better. (To express the present duty)

- b) Make new words with the following prefixes and suffixes and use them in sentences. (12)
Fore, Pro, Se,, en,, ling,, some.
- c) Define participle, Gerund and infinitive. Give two examples of each of them. (09)
4. a) Transform the following sentences as asked in brackets. (14)
(i) Nasim, a good student, stood first in the first year exam. (Complex)
(ii) Mim is less meritorious than his brother. (Positive)
(iii) Since he studies much he can do well in teaching. (Simple)
(iv) Pip not only fears but also loves Estella. (Simple)
(v) Reza could play football at sixteen. (Complex)
(vi) It is loving that he obeys his parents. (Simple)
(vii) He is sincere in studies, but can't do well in exam. (Complex)
- b) Make one Antonym and one synonym of the following words and use them in sentences. (12)
Calamity; Damage; Eliminate; Moderate.
- c) Identify the parts of speech of the underlined words of the following sentences. (09)
(i) Come near.
(ii) I saw the man near the station.
(iii) He walked right across the garden.
(iv) I am in need of your advice.
(v) I cannot wait long.
(vi) A well timed fast is better than a cure.

SECTION B

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

5. a) Read the passage and answer the questions that follow. (20)
People moan about poverty as a great evil; and it seems to be an accepted belief that if people have plenty of money, they would be happy and useful and get more out of life. But as a rule, there is more genuine satisfaction in life and more obtained from life in the humble cottage of the poor than in the palaces of the rich. I always pity the sons and daughters of rich men, who are attended by servants. It is because I know how sweet and pure the home of honest poverty is, how free from care and social envies and jealousies, how loving and united its members are in the common interest of supporting the family – that I congratulate the poor man's son. It is for these reasons that from the ranks of the poor, so many strong, eminent, and self-reliant men have always sprung and must spring. It seems to be a matter of universal desire that poverty should be abolished. But to abolish honest, industrious, self-denying poverty would be to destroy the soil upon which mankind produces the virtues that will enable our race to reach a still higher civilization than it now possesses.
Questions:
(i) What do people generally think about poverty?
(ii) What is the author's opinion of it?
(iii) Why does the author prefer poverty to riches?
(iv) Would you abolish poverty? If not, why not?
- b) Make a précis of the above written passage (Q 5.a) with a suitable title. (15)
6. a) Amplify the idea contained in of the following statement. (15)
Chicken is the country's but the city eats it.
- b) Write a letter emphasizing on the quality education in our country to be published to the editor of a newspaper. (Around 1200 words) (20)
7. a) Amplify the idea "Defer not till tomorrow what you can do today". (Around 800 words) (15)
- b) Write a letter to your younger brother emphasizing on the demerits of frustration among a youth today. (Around 1200 words) (20)
8. Write a free composition on one of the followings. (Around 2000 words) (35)
(a) Smoking or health – the choice is yours.
(b) Bribery: A social problem in Bangladesh.

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

B.Sc. Engineering 1st year 2nd Term Examination, 2015

Department of Electronics & Communication Engineering

Math 1209

(Mathematics - II)

TIME: 3 hours

FULL MARKS: 210

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

SECTION A

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

1. a) Find the transformed equation of $3x^2 + 2xy + 3y^2 - 18x - 22y + 50 = 0$ when origin is shifted at (2, 3) and the axes is rotated through an angle of 45° . 15
b) Find the rectangular and spherical coordinates for a point whose cylindrical coordinates are $(4\sqrt{5}, \tan^{-1}(-1/2), 1)$. 10
c) Transform the equation $19x^2 + 5xy + 7y^2 - 13 = 0$ omitting the xy term. 10
2. a) Reduce the equation $x^2 + 4xy + y^2 - 2x + 2y - 6 = 0$ to its standard form and find vertex and equation of directrices. 18
b) Write the various forms of the equation of a plane. 05
c) Find the equation to the right circular cylinder of radius 2 whose axis passes through (1, 2, 3) and has direction radius (2, -3, 6). 12
3. a) The direction cosines of two lines are given by the relations $al + bm + cn = 0$ and $ul^2 + vm^2 + wn^2 = 0$. Find the conditions that the lines are perpendicular and parallel, respectively. 16
b) Find the equation of the plane through the points (2, 2, 1) and (9, 3, 6) and perpendicular to the plane $2x + 6y + 6z = 9$. 09
c) Find the angle between the line $\frac{x-3}{6} = \frac{y-2}{3} = \frac{z+1}{-2}$ and the plane $2x + y + 2z + 5 = 0$. 10
4. a) Find the equation of the sphere in which the circle $x^2 + y^2 + z^2 + 7y - 2z + 2 = 0$, $2x + 3y + 4z - 8 = 0$ is a great circle. 13
b) Find the distance of the point (1, -2, 3) from the plane $x - y + z = 5$ measured parallel to the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$. 10
c) Find the equation of the right circular cone whose vertex is the origin, axis is the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{4}$ and semi-vertical angle is 45° . 12

SECTION B

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

5. a) Define order and degree of a differential equation with example. Find the differential equation of $xy = ae^x + be^{-x}$, where a and b are arbitrary constants. 10
b) Solve $x \frac{d^2y}{dx^2} + x \left(\frac{dy}{dx} \right)^2 - \frac{dy}{dx} = 0$. 15

c) Solve $(x+1)\frac{d^2y}{dx^2} + (x-1)\frac{dy}{dx} - 2y = 0$ by the method of factorization of operators. 10

6. Solve any three of the followings. 35

a) $x\frac{dy}{dx} - y = \sqrt{x^2 + y^2}$

b) $(2x - 2y + 5)\frac{dy}{dx} = x - y + 3$

c) $(1+x^2)\frac{d^2y}{dx^2} + 1 + \left(\frac{dy}{dx}\right)^2 = 0$

d) $x\frac{dy}{dx} + \sin 2y = x^4 \cos^2 y$

7. Solve any three of the followings. 35

a) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = x^2 e^x$

b) $\frac{d^2y}{dx^2} + 9y = \cos 3x + \sin 2x$

c) $(D^2 - 6D + 9)y = 1 + x + x^2$

d) $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 2 \cosh 2x$

8. a) Solve $(2x+1)^2 \frac{d^2y}{dx^2} - 6(2x+1)\frac{dy}{dx} + 16y = 8(2x+1)^2$. 17

b) Solve $\frac{d^2y}{dx^2} + 4y = 4 \tan 2x$ by the method of variation of parameters. 18