KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

B.Sc. Engineering 1st Year 2nd Term Examination, 2016

Department of Electronics and Communication Engineering

Ch 1209

(Chemistry)

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

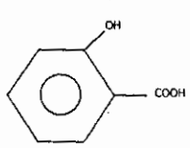
(Answer **ANY THREE** questions from this section in Script A)

1. a) What is molar conductance? Show graphically the variation of equivalent conductance against $\sqrt{c}$ for LiCl, $NiSo_4$ and C_3H_7COOH. Explain the nature of the curve. (12)
   b) State and explain Kohlrausch's law of ionic mobilities. How does it help in determining the equivalent conductance of weak electrolytes? (11)
   c) How is mobility of an ion related to the transport number? (07)
   d) The resistance of a N/5 solution of a salt is found to be 2.5×10^2 ohms. Calculate the equivalent conductance of the solution. Cell constant = $1.15\ cm^{-1}$. (05)

2. a) What is transport number? Describe one method of determining transport number. (13)
   b) What do you mean by abnormal ion conductivity? Give example. (05)
   c) What is meant by Li-intercalation? Draw the diagram of Lithium ion battery. How does the Li-ion battery develop voltage? (12)
   d) The emf of the following cell at 25^0C is 0.112V. (05)
   $SCE\|unknown\ solution|C_6H_4(OH)_2, C_6H_4O_2|Pt$. If the electrode potential of calomel electrode is 0.242V, find the $P^H(E_Q^o = 0.699V)$.

3. a) What do you mean by allowed transitions and forbidden transitions? Describe the various types of absorption band which arise as a result of the electronic transition. (10)
   b) What are the bathochromic and hypsochromic shift? In polar solvents $n \rightarrow \pi^*$ transitions undergo bathochromic shift but $\pi \rightarrow \pi^*$ transitions usually undergo hypsochromic shift - explain. (10)
   c) How can you determine the concentration of analyte using absorption laws? (10)
   d) What do you mean by quantization of energy? Calculate the energy associated with a radiation having wavelength $4000A^{\circ}$. (05)

4. a) What is degree of freedom? How many vibrational degrees of freedom are obtained for C_6H_6 molecule? (10)
   b) Discuss the inductive and mesomeric effects influencing the carbonyl absorption frequency. (10)
   c) How will you differentiate between the following pairs of compounds using IR-spectra? (08)



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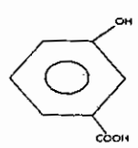

   d) Write a short note on finger print region. (07)

SECTION B

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

5. a) How does molecular orbital theory differ from valance bond theory? Explain with diagram. (10)
   b) What is bond order? Write down the conditions for effective combination of atomic orbits to form molecule. (08)
   c) Explain the inter and intra-molecular hydrogen bonding with examples. (07)
   d) Draw and explain the molecular orbital energy level diagram of O_2^+. (10)

6. a) Explain CFT for octahedral fields. (10)
   b) Discuss about Jahn-Teller effect with suitable example. (10)
   c) What do you mean by inner orbital complexes and outer orbital complexes? Explain why $[Fe(CN)_6]^{3-}$ is an inner orbital complex, while $[FeF_6]^{3-}$ is an outer orbital complex. (07)
   d) What is EAN rule? Calculate the EAN of i) $[Cu(CN)_4]^{2-}$ ii) $Fe[(CN)_6]^{3-}$ and iii) $[Pt(NH_3)_4]^{4+}$. (07)

7. a) Discuss the effect of (i) solvent and (ii) Nucleophiles nature on S_N1 and S_N2 reactions. (10)
   b) Complete the following reactions: (12)

   $CH_3CH{=}CH_2 + HBr \xrightarrow{\text{H}_2\text{O}_2} ?$. Briefly illustrate with mechanism for each product
   c) Outline the free radical mechanism of polymerization. (08)
   d) Discuss the S_N2 reaction mechanism of alkyl halides. (05)

8. a) What do you mean by quantum yield of photochemical reaction? What are the causes of high and low quantum yield? (10)
   b) When a substance A was exposed to light, 0.002 mole of it reacted in 20 minutes and 4 seconds. In the same time A absorbed 2×10^6 photons of light per second. Calculate the quantum yield of the reaction. (07)
   c) Distinguish between photochemical and thermal reactions. (08)
   d) What is degree of polymerization? What are the differences between chain polymerization and step polymerization? (10)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

B.Sc. Engineering 1st year 2nd Term Examination, 2016

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) Define computer. How did computer evolve over time? Explain in briefly. (12)
   b) Draw the block diagram of a digital computer and describe the main parts of it. (12)
   c) A computer has 4 GB of memory. Each word in this computer is 16 bytes. How many bytes are needed to address any single word in memory? (11)

2. a) What do you mean by hardware and software? Write some applications of software. (10)
   b) Define algorithm and flowchart. Draw a flowchart to compute the sum of the series- (15)
   $S= \sum_{i=1}^{n} x_i y_i^K$
   c) Draw the tree diagram of memory classification. (10)

3. a) What are the common input and output devices of a computer system? Describe their functionalities in brief. (13)
   b) What is operating system? What are the primary functions of an operating system? Explain in details. (10)
   c) What is cache memory? Write its advantages. (06)
   d) Write down the task of CPU. (06)

4. a) Write down the applications of super computer, mainframe and minicomputer. (10)
   b) Define computer networks. What are the types of computer networks based on size and purpose? (08)
   c) What are the advantages and limitations of Windows and Unix operating system? (07)
   d) Describe the mechanism of laser printer with figure. (10)

SECTION B

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

5. a) Write down the basic structures of C program. (08)
   b) What is variable? Write down the variable naming rules. (10)
   c) Explain data type and keyword with example. (07)
   d) Differentiate global and local scope of a variable. (10)

6. a) Write a program to evaluate, Sum= 1 + ½ + 1/3 + ---------- + 1/n. (10)
   b) State the differences between do while and while loop? (08)
   c) Explain the call by value and call by reference methods. (10)
   d) Write the differences between relational operator and logical operator. (07)

7. a) What is 'if' statement?, Using if, find the largest number among three numbers. (12)
   b) What is recursion? Explain with example. (07)
   c) Develop a function called strcat() to add two string using pointer. (10)
   d) What are the benefits of using pointer in case of returning values from function? (06)

8. a) What is array? Discuss two types of initialization of one-dimensional array with example. (13)
   b) What is string? Write a program to check whether a string is palindrome or not. (12)
   c) Write a program using do-while loop to calculate and print first 'm' Fibonacci numbers. (10)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

B.Sc. Engineering 1st Year 2nd Term Examination, 2016

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.
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 the necessity of biasing a transistor? Design a fixed bias circuit in order to obtain the following load line and Q-point. (10)

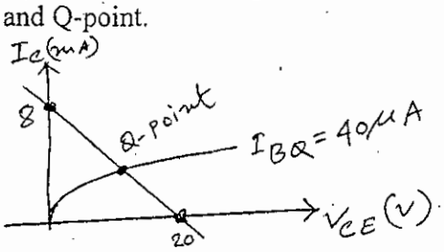

Fig. 1(a)

b) What is meant by bias stabilization? "The Q-point of a bias circuit become more stable if an emitter resistance is connected"– Justify the statement. (10)

c) Write down the necessary conditions for a transistor to work as an amplifier or switch. (05)

d) Determine R_1 and R_c for the following voltage divider network with the operating point of I_{CQ}=2mA and $(V_{CE})_Q$=10V. (10)

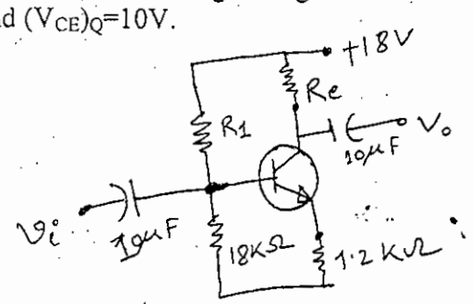

Fig. 1(d)

2. a) What are the differences between small signal analysis and large signal analysis? Write down the procedures of obtaining *ac* equivalent bipolar junction transistor based amplifier circuits. (08)

b) Define r_e-modeling. Draw the r_e-models for common emitter and common collector configuration. (07)

c) Derive the expression for i) Z_i, ii) Z_0, iii) A_v, iv) A_i of common emitter fixed biased configuration in terms of r_e. (10)

d) Find the voltage gain (A_v) of the following network with and without the bypass capacitor (C_E) and comment on the obtained results. (10)

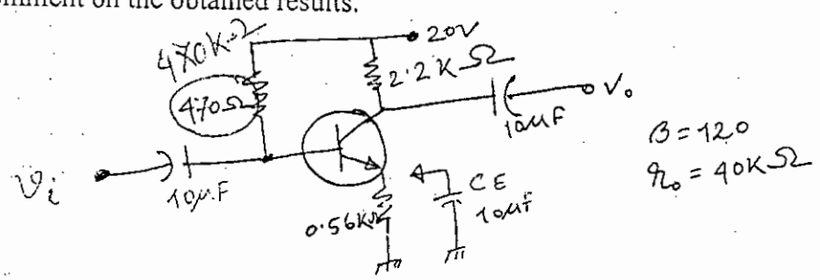

Fig. 2(d)

3. a) What are the advantages of hybrid modeling? Draw the exact and appropriate hybrid models of three common configurations. (11)

b) Define h-parameters. How can you determine h-parameters from transistor characteristic curves?

c) What is Miller capacitance? Explain the effect of Miller capacitance on the high frequency cut-off of transistor circuit. (08)

d) Determine the input impedance and overall voltage gain of the following two stage amplifier using simplified hybrid model: (10)

The h-parameters are given as follows:

h_{ie}=2K; h_{fe}=50; $h_{re}=6\times10^{-4}$; $h_{oe}=25\ \mu A/V$;

h_{ic}=2K; h_{fc}=-51; h_{rc}=1; $h_{oc}=25\ \mu A/V$.

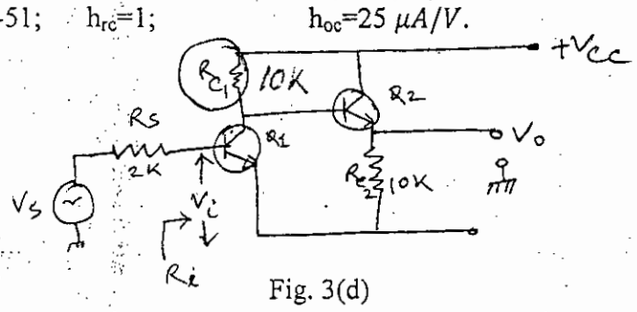

Fig. 3(d)

4. a) Define and classify power amplifier. Why do uses of smaller input cycle provide larger efficiency in power amplifier? (10)

b) Explain the working principle of complementary power amplifier using necessary diagram. (10)

c) Draw the block diagram of a typical class-D power amplifier and briefly explain its operation. (09)

d) How is the frequency response varied with number of stages in multistage amplifier? Illustrate graphically. (06)

SECTION B

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

5. a) If a charged particle enters to a constant uniform magnetic field normally with a speed, then prove that period and angular velocity will be independent of speed or radius. (10)

b) Compare electrostatic deflection sensitivity and magnetic deflection sensitivity. (07)

c) Give your comments about the path of a charged particle in presence of parallel electric and magnetic field. (06)

d) Show that the notion electron in an electromagnetic field can be expressed as : $x = Q(1-cos\theta)$; $z = Q(1-sin\theta)$; and $y = 0$; where the symbols have their usual meanings. (12)

6. a) What are the differences between BJT and FET? (05)

b) Write down the differences between self-bias and fixed bias configuration of FET. (05)

c) Distinguish between p-channel and n-channel JFET? A p-channel JFET has I_{DSS}=4mA and V_p=3V. Sketch its transfer characteristics. (10)

d) For the given network in Fig. 6(d), determine i) I_{DQ}, ii) V_{GSa}, iii) V_{DS} and iv) V_S. Use appropriate transfer curve for calculation. (15)

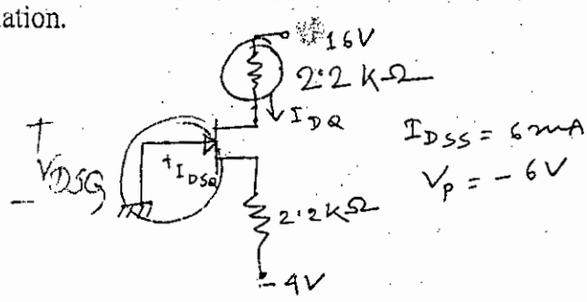

Fig. 6.(d)

7. a) For a self-bias FET configuration, voltage gain increases $(1+g_mR_s)$ times, when bypassed R_s is used. (15)

b) Give the mathematical definition of transconductance. (05)

c) For the following network in figure 7(c), given V_{GSa}=-2.86V and I_{DQ}=4.56mA.

determine i) g_m, ii) r_d, iii) Z_i iv) Z_0 with and without r_d, v) A_v with and without r_d.

8. a) Describe the basic operating principle of solar cell. (11)

b) What are the differences between enhancement and depletion MOSFET? Explain the construction and operation of depletion type MOSFET using necessary diagrams. (12)

c) Determine the lower cut-off frequency for the network shown in Fig. 8(c) using the following parameters. C_G=0.01 μF, C_C=0.5 μF, C_S=2 μF, R_{sig}=10 KΩ, R_D=4.7 KΩ, R_S=1 KΩ R_L=2.2 KΩ, I_{DSS}=8 mA, V_p=-4 V, r_d=∞ Ω, V_{DD}=20V. (12)

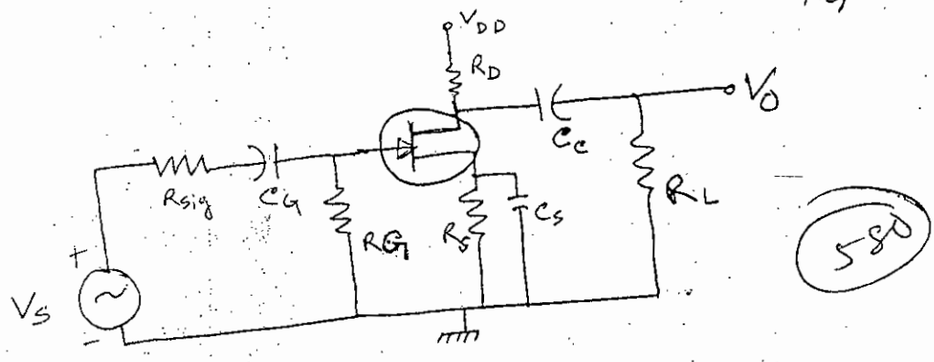

Fig. 8(c)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

B.Sc. Engineering 1st year 2nd Term Examination, 2016

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 sentence with the following structures using the words given in brackets. (14)
   i) Either + subject + or + subject + verb + object (make as verb)
   ii) Subject + verb + not only + object + but also + object (write as verb)
   iii) Subject + intransitive verb (sleep as verb)
   iv) Subject + verb + object (direct)+object (indirect). (offer as verb)
   v) There + verb + subject + extension (remain as verb)
   vi) That + subject + verb + adverb of manner + verb +adjective complement (write and is adverb in turn)
   vii) Since + subject + verb + adjective complement, subject + verb + adverb of place (is and attend as verb)

   b) Change the following words as asked in brackets and make sentence with the changed forms. (12)
   Intrude (into noun), Pretend (into noun), Affliction (into verb), Embitter (into adjective), Agility (into adjective), Blatant (into adjective)

   c) Make new words with the following prefixes and suffixes and use them in sentences. (09)
   For----, Fore------, Se-------, ------ive, --------ish, -------some.

2. a) Transform the following sentences as asked in brackets. (14)
   i) Habib, a man of strict principle, works in a bank. (into complex)
   ii) He is aware of his word. (into negative)
   iii) No one will deny that he is brave. (Affirmative)
   iv) Your play is death to us. (Complex)
   v) Since he cares for honesty and foresight he can do well in business. (into simple)
   vi) Were I a child ! (into assertive)
   vii) Try to complete the task as we direct. (into simple)

   b) Make use of following words in sentence as asked in brackets. (12)
   Academic (as noun), Accessory (as noun), above (as adverb), Backlight (as verb), Baffle (as noun), Bag (as verb)

   c) Supply a suitable word to fill in the blanks. (09)
   i) Hearing the news, he hurried ----------home.
   ii) ----------at home, he met his parents.
   iii) ----------walking along the street, he met me.
   iv) He availed----------of the opportunity.
   v) The nurse kept the baby----------
   vi) He is ----------to death.

3. a) Make W/H questions from the following answers. (14)
   i) Dhaka is a famous <u>for mosque</u>.
   ii) He earns <u>fifty thousand</u> taka per month.
   iii) We have achieved our independence <u>in 1971</u>.
   iv) <u>Bangla</u> s our mother tongue.
   v) His father has been ill <u>for several days</u>.
   vi) Saad is a <u>20 years and six months</u>.
   vii) The boy is playing <u>with a toy</u>.

   b) Express the following notions/function in sentence. (12)
   i) Apology, ii) Love, iii) Tension, iv) Condolence, v) Rude, vi) Fear

c) Differentiate direct and indirect objects with example. Define in transitive verb with example. (09)

4. a) Correct the following sentences. (14)

i) The girl is ashamed to copy in the examination.
ii) A walking is a good exercise.
iii) He likes playing piano.
iv) His circumstance is bad.
v) No pain was spared.
vi) He works that sincerely can inspire the people.
vii) Wait here since we come back.

b) Compare the following sentences with clauses as asked in brackets. (12)

i) ---------- instigates a society. (Noun clause)
ii) ----------we will continue the meeting. (Adverbial clause)
iii) Nila , ----------, works in a company. (Adj. clause)
iv) We call him ---------- (Noun clause)
v) Wealth and men,----------, are essential for a country. (Adj. clause)
vi) ---------- I could play football. (Adverbial clause)

c) Write two antonyms for each of the following words and make sentence with the antonyms. (09)

Enemy, idle, Callous.

SECTION B

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

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

People mean about poverty as a great evil; and it seems to be an accepted belief that if people had plenty of money, he 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 maris son. It is for these reasons that from the ranks of the poor so many strong, eminent, 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 ? If why?

b) Make a précis of the above passage (Q5.a) with a suitable title. (15)

6. a) Amplify the following idea in detail. (15)
Charity begins at home.

b) Write a report on sports day observed at your campus. (Around 1200 words) (20)

7. a) Write a letter to the editor of a newspaper demanding better medical facilities in government hospitals. (15)

b) Write a formal report on the condition of your hall dining. (20)

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

(i) Mass media and development in a country.
(ii) Bribery : A national problem in Bangladesh

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

B.Sc. Engineering 1st Year 2nd Term Examination, 2016

Department of Electronics and Communication Engineering

Math 1209

(Mathematics II)

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) 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 sets of axes being rectangular. (15)
   b) Reduce the following conic to the standard form $8x^2 + 4xy + 5y^2 - 16x - 14y + 13 = 0$ and find the vertex, equation of directrix and equation of axis of the conic. (20)

2. a) Find the rectangular and spherical co-ordinates for a point whose cylindrical co-ordinate are $(3, \frac{2}{3}\pi, 4)$. (12)
   b) If dc's of two lines are connected by the relation $2l + 2m - n = 0$ and $lm + mn + nl = 0$ then find the dc's of the lines. Examine whether or not they are perpendicular. (12)
   c) Show that the bisectors of internal and external angles of two lines are perpendicular to each other. (11)

3. a) A variable plane is at a constant distance p from the origin and meets the axes A, B, C. Show that the locus of the centroid of the tetrahedron $OABC$ in $x^{-2} + y^{-2} + z^{-2} = 16p^{-2}$. (15)
   b) Verify whether or not the following straight lines are co-planar. (10)
   $\frac{x-4}{3} = \frac{y-1}{2} = \frac{z-3}{1}$, $x + y + 2z - 4 = 0 = 3x - 2y - z - 3$.
   c) Find the equation of the planes through the straight line $3x - 4y + 5z - 10 = 0 = 2x + 2y - 3z - 4$ and parallel to the coordinate axes. (10)

4. a) Find the feet points of the S.D. on the line $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$. Hence find the length and equation of the S.D. (15)
   b) Find the image of the point (1,3,4) with respect to the plane $2x - y + z + 3 = 0$. (10)
   c) Find the equation of the sphere whose center lies on the line $\frac{x+1}{3} = \frac{y-3}{-4} = \frac{z+2}{5}$ and which passes through the points (3,4,5) and (−3,0,1). (10)

SECTION B

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

5. a) Form differential equation for $xy = ae^x + be^{-x} + x^2$. Finally write down order and degree of the differential equation. (10)
   b) Solve $x\frac{d^2y}{dx^2} + x\left(\frac{dx}{dy}\right)^2 - \frac{dy}{dx} = 0$. (14)
   c) Define integrating factor. Find an integrating factor of $(x^2 + y^2)dx - 2xydy = 0$, hence solve the equation. (11)

6. Solve any three (03) of the following differential equations. (35)
   a) $(e^x + 1)ydy = (y + 1)e^x dx$
   b) $(x + y + 1)dx - (2x + 2y + 1)dy = 0$
   c) $(x^2 - xy + y^2)dx - xydy = 0; y(1) = 2$
   d) $\frac{dy}{dx} + ycotx = 5e^{\cos x}$

7. Solve any three (03) of the followings (when $D = \frac{d}{dx}$)

a) $(D^2 + 4)y = x^2, y(0) = 0, Dy(0) = 0, D = \frac{d}{dx}$

b) $(D^2 - 6D + 8)y = e^{e^{-2x}}$

c) $(D^2 - 4D + 4)y = \frac{e^{2x}}{x^3}$

d) $(D^2 - 2D + 1)y = e^x x sin\ 2x$

8. a) Solve $x\frac{d^2y}{dx^2} - (x + 2)\frac{dy}{dx} + 2y = x^3$ by the method based on factorization of operators.

b) Solve the equation $\frac{d^2y}{dx^2} + y = secx$ by the method of variation of parameters.

c) Solve the homogenous linear equation $(x^2D^2 - 6xD + 6) = 0$, where $D = \frac{d}{dx}$.