

**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

*Department of Textile Engineering*

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

**Ch-1221**

(Chemistry-II)

Time: 3 Hours

Total Marks: 210

**N.B.:** i) Answer any THREE questions from each section in separate scripts.

ii) Figures in the right margin indicate full marks.

iii) Assume reasonable data if missing any.

**SECTION-A**

- 1(a) What is plane polarized light? Discuss its role on chiral compounds. 08
- 1(b) Explain meso compounds and diastereomers. 10
- 1(c) Discuss the stereochemistry of SN1 and SN2 reactions. 10
- 1(d) Explain the notations R and S as used in stereochemistry. 07
- 2(a) Define staggered and eclipsed conformations with examples. 08
- 2(b) Discuss the stereo-stability of cyclohexane giving energy diagram. 14
- 2(c) Write down the probable stereo-isomers of bromo-chloro octane. 07
- 2(d) Distinguish among primary, secondary and tertiary amines? 06
- 3(a) Why amino acids are weaker acids than the corresponding unsubstituted acids? Explain the following with reference to amino acids and proteins: 15
- (i) Isoelectric point
- (ii) Zwitter ion
- (iii) Peptide linkage
- 3(b) Outline a suitable method for synthesis of amino acid. 08
- 3(c) What is N-terminal residue of polypeptide? Discuss any one method for identification of N-terminal residue of peptide. 12
- 4(a) Explain different types of alcohol giving examples. 08
- 4(b) Write down the structure of carbonyl compounds ciprofloxacin and uracil and mention their applications. 10
- 4(c) Discuss the stereochemistry of nucleophilic addition-reaction to carbonyl compounds. 09
- 4(d) Mention the synthesis and applications of  $\text{CH}_2\text{Cl}_2$  and  $\text{CHCl}_3$  compounds. 08

**SECTION-B**

- 5(a) What are carbohydrates? How are they classified? 10
- 5(b) What are the limitations of the open-chain structure of D-(+)-glucose? 10
- 5(c) Give the mechanism of osazone formation of glucose. 08
- 5(d) Fructose is a 2-keto hexose. Explain it. 07

6(a)	Define oligosaccharides with examples.	05
6(b)	Deduce the structure of Amylopectin by end group analysis.	12
6(c)	What is invert sugar? Discuss the conversion process of D-glucose to D-fructose.	10
6(d)	What is mutarotation? Explain with the help of an example.	08
7(a)	What is aromaticity? Discuss the modern theory of aromaticity.	12
7(b)	Explain the resonance hybrid structure of benzene.	08
7(c)	Halogen deactivates the benzene ring. Explain.	09
7(d)	What is ring current? Explain.	06
8(a)	What is meant by the terms dye and pigment? How are dyes classified on the basis of application?	08
8(b)	Discuss the theories of colour.	07
8(c)	Briefly discuss the properties and application of Direct dyes and Vat dyes.	10
8(d)	Write short notes on	10
	(i) Dye intermediates	
	(ii) Nomenclature of dye	

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**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

**Department of Textile Engineering**

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

**Hum-1221**

**(Business and Communicative English)**

Time: 3 Hours

Total 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**

- 1(a) Complete the questions using a suitable verb: 14
- i) I am looking for Paul ..... him?- Yes. He was here.
  - ii) Why ..... to bed so early last night?- Because I felt tired.
  - iii) Where .....?- Just to the postbox to post the letters.
  - iv) ..... television every evening?- Not only if there's a good programme.
  - v) Your house is very beautiful. How long ..... here?- Nearly 10 years.
  - vi) How was your holiday? ..... a nice time?- Yes, thanks. It was great.
  - vii) ..... Julie recently? Yes, I met her a few days ago.
- 1(b) Make sentences on the following structures using the words given in brackets. 12
- i) Subj. + Intransitive verb + adverbial. (Go as verb)
  - ii) Subj. + Linking verb + adj. complement + extension. (Become as verb)
  - iii) Subj. + Linking verb + noun complement + extension. (Become as verb)
  - iv) Subj. + Transitive verb + infinitive as obj. (Finish as verb)
  - v) Subj. + Transitive verb + noun + noun complement. (Consider as verb)
  - vi) Subj. + Transitive verb + noun + adj. complement. (Consider as verb)
- 1(c) Make sentences using the following phrases and idioms: 09
- Point blank; Out right; Fresh blood; Slow coach; Sine die; For good.
- 2(a) Frame W/H questions from the underlined parts of the following answers: 14
- i) Mangoes grow abundantly in Rajshahi.
  - ii) Only the strong people can do this job.
  - iii) Because of cloudy weather, we postponed our plan.
  - iv) I waited here for three hours.
  - v) We need papers to write on.
  - vi) I reside in the second floor of the building.
  - vii) It is half past twelve.
- 2(b) Make sentences using the following words as directed: 12
- Above (as noun); Above (as adverb); All (as adjective); Drama (as adverb); Wise (as noun); Beauty (as verb).
- 2(c) Change the following words as directed and use them in sentences: 09
- Act (into verb); Broad (into verb); Base (into noun); Base (into adjective); Capital (into verb); Density (into adjective).

- 3(a) Make sentences using Modal auxiliaries following the instructions given below: 14
- i) To express guess about the present.
  - ii) To express inference.
  - iii) To express opportunity in the past which was not executed.
  - iv) To express preference.
  - v) To express strong possibility.
  - vi) To express unnecessary action in the past.
  - vii) To express duty in the past.
- 3(b) Make sentences expressing the following emotions/notions: 12
- i) Approval, ii) Threat, iii) Greetings, iv) Anger, v) Refusal, vi) Disagreement.
- 3(c) Define participle, Gerund, and Infinitive. Give two examples of each of them in sentences. 09
- 4(a) Complete the sentences with subordinate clauses. 14
- i) ..... I would have helped you. (Adv. Clause of condition)
  - ii) He works here .....(Adv. Clause of purpose)
  - iii) ....., the teacher refused to let him in. (Adv. Clause of reason)
  - iv) Tell me .....(Noun clause)
  - v) Tell me the time ..... (Adj. clause)
  - vi) My horse ..... is an Arab. (Adj. clause)
  - vii) I know ..... (Noun clause)
- 4(b) Make new words with the following prefixes and suffixes and use them in sentences: 12
- \_\_\_\_\_ al , \_\_\_\_\_ ship, \_\_\_\_\_ dom, A \_\_\_\_\_
- Dis \_\_\_\_\_, Be \_\_\_\_\_
- 4(c) Complete the sentences with a suitable word: 09
- i) Let's start .....
  - ii) The stranger asked ..... the college is.
  - iii) We all like to ..... praised.
  - iv) ..... a nice time we had!
  - v) Only the station master can say ..... the train will arrive.
  - vi) My father was very ..... by my conduct.

### SECTION-B

- 5(a) Read the passage and answer the questions that follow: 20
- It is neighbourly feeling that binds society together. In very olden times, however, people did not think like this. They were then savages, little better than beasts, and fought with one another. But gradually men became civilized. They saw that if they behaved in this way, society would be destroyed. So they made certain rules to guide their conduct. You will find ten such rules in the Bible. "Do not steal another's property" and "Do not kill your fellow-men" are two of them.

You will notice that these rules tell us not to do certain things; in other words, they lay down certain Don't's of conduct. But it is not enough that we do no harm to our neighbours; it is our duty to see that we do them some good. So when men became more civilized, they began to think of the Do's of conduct as well. 'Let and let live' was a good idea. But men now had even a better idea. They said, "To live one must help others live". When men began to think like this they discovered the great art of living together.

Questions:

- i) What binds society together?
  - ii) How did men behave in very olden times?
  - iii) What did they do when they became civilized?
  - iv) What did they do when they became more civilized?
  - v) How did men discover the art of living together?
- 5(b) Make a précis of the above passage (Q. 5.a) with a suitable title. 15
- 6(a) Write a contrast paragraph on winter season and summer season. 15
- 6(b) Amplify the idea contained in the following: 20  
"False tricks cannot stand for long"
- 7(a) Write an informal report to your Head of the department, informing him about the difficulties and shortcomings of your trip. 15
- 7(b) Suppose there is a post of lecturer vacant in your department. Prepare your CV and apply for the post. 20
- 8 Write a composition on any one of the following: 35
- a) Future of Textile Engineering in Bangladesh.
  - b) Technology- A blessings or a curse.

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**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

*Department of Textile Engineering*

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

**Math-1221**  
(Mathematics-II)

Time: 3 Hours

Total Marks: 210

**N.B.:** i) Answer any THREE questions from each section in separate scripts.

ii) Figures in the right margin indicate full marks.

iii) Assume reasonable data if missing any.

**SECTION-A**

- 1(a) What is differential equation? How linear and non-linear ordinary differential equations can be distinguished? Explain with examples. 08
- 1(b) Find the differential equation whose solution is given by  $y^2 = 4a(x + a)$  and hence find its linearity, order and degree. 12
- 1(c) Solve:
- i)  $\frac{dy}{dx} + \sqrt{\frac{1-y^2}{1-x^2}} = 0$  07
- ii)  $x \frac{dy}{dx} - 4y = x^6 e^x; y(1) = 0$  08
- 2(a) Solve the following equation by the method of variation of parameters  $y'' - 4y' + 3y = (1 + e^{-x})^{-1}$  12  
where  $y' = \frac{dy}{dx}, y'' = \frac{d^2y}{dx^2}$
- 2(b) Solve: 12
- i)  $(x^3 + y^3)dx - 3xy^2dy = 0$
- ii)  $(1 - x^2) \frac{dy}{dx} + xy = xy^2, x < 1$
- 2(c) Solve: 11
- $(D^2 - 4D + 4)y = x^2, y(0) = \frac{3}{8}$  and  $D = \frac{d}{dx}$
- 3(a) Solve: 11
- $y''' - 3y'' + 3y' - y = x - 4e^x$
- 3(b) Find the value of 'a' for which the differential equation  $(xy^2 + ax^2y)dx + (x + y)x^2dy = 0$  is exact and hence solve this equation for the obtained value of a. 12
- 3(c) Solve: 12
- $y' = (-2x + y)^2 - 7$  Subject to  $y(0) = 0$  and write the solution in explicit form.

- 4(a) Evaluate  $\int_S \vec{F} \cdot \vec{N} \, ds$ , where 15  
 $\vec{F} = 18z\hat{i} - 12\hat{j} + 3y\hat{k}$  and S is the part of the plane  $2x + 3y + 6z = 12$  located in the first octant.
- 4(b) Find the directional derivative of  $\varphi(x, y, z) = 4xz^3 - 3x^2y^2z$  at the point 08  
 $(2, -1, 2)$  in the direction  $2\hat{i} - 3\hat{j} + 6\hat{k}$
- 4(c) If  $\underline{F} = (2xz^3 + 6y)\hat{i} + (6x - 2yz)\hat{j} + (3x^2z^2 - y^2)\hat{k}$  then prove that  $\underline{F}$  is 12  
conservative. Also find the work done by it along the path C from  $(1, -1, 1)$  to  $(2, 1, -1)$ .

### SECTION-B

- 5(a) Find the transformation equation of  $3x^2 + 2xy + 3y^2 - 18x - 22y + 50 = 0$  15  
when origin is shifted at  $(2, 3)$  and the axes are turned through an angle  $45^\circ$ .
- 5(b) Prove that  $g^2 + f^2$  in the equation  $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$  remain 15  
invariant by transformation of axes under any angle without change of origin.
- 5(c) Determine the nature of the conic 05  
 $5x^2 - 24xy - 5y^2 + 4x + 58y - 59 = 0$
- 6(a) Find standard form, length and equation of axes of the conic  $x^2 - 5xy + y^2 + 8x - 20y + 15 = 0$  15
- 6(b) Define direction cosines of a straight line. If  $l, m, n$  be the direction cosines of a line 10  
then show that  
 $l^2 + m^2 + n^2 = 1$
- 6(c) Transform the equation  $3x^2 - 3y^2 = 87$  to spherical coordinates. 10
- 7(a) Find the shortest distance between the lines 11  
 $\frac{x-3}{3} = \frac{y-8}{-1} = z - 3$  and  $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$
- 7(b) Show that the lines  $\frac{x+1}{2} = \frac{y-2}{2} = z$  and  $\frac{x-1}{6} = y + 1 = \frac{z-3}{5}$  are coplanar. Also find 14  
their point of intersection, and the equation of the plane containing them.
- 7(c) Find the equation of the cone whose vertex is at  $A(0,0,1)$  and guiding curve is 10  
 $(x - 1)^2 + y^2 = 1, z = 0$
- 8(a) Find the distance of the point  $(1, -2, 3)$  from the plane  $x - y + z = 5$  measured 12  
parallel to the line  $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$
- 8(b) Find the image of point  $(p, q, r)$  with respect to the plane  $2x + y + z = 6$  12
- 8(c) Find the equation of the plane which passes through the points  $(2, 2, 1)$  and  $(9, 3, 6)$  11  
and is perpendicular to  $2x + 6y + 6z + 9 = 0$

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**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

*Department of Textile Engineering*

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

**Ph 1221**  
(Physics)

Time: 3 Hours

Total Marks: 210

- N.B.:** i) Answer any THREE questions from each section in separate scripts.  
ii) Figures in the right margin indicate full marks.  
iii) Assume reasonable data if missing any.

**SECTION-A**

- 1(a) What is Huygens principle? Obtain the laws of reflection and refraction on the basis of wave theory of light. 10
- 1(b) Describe Young's double slit experiment and derive an expression for the intensity at a point on the screen and hence find the conditions for maxima and minima. 15
- 1(c) In a Newton's rings experiment the diameter of the 15<sup>th</sup> ring was found to be 0.590 cm and that of the 5<sup>th</sup> ring was 0.336 cm. If the radius of the plano-convex lens is 100 cm, calculate the wave length of light used. 10
- 2(a) What is meant by diffraction of light? Distinguish between the Fresnel and Fraunhofer classes of diffraction. 10
- 2(b) Explain Brewster's law. Show from this law that when light is incident on a transparent substance at the polarizing angle, the reflected and refracted rays are at right angles. How will you obtain and detect plane polarized light? 15
- 2(c) Calculate the specific rotation for sugar solution using the following data: 10  
Length of the tube = 20 cm  
Volume of the tube = 120 cm<sup>3</sup>  
Quantity of sugar dissolved = 6 gm  
Angle of rotation of the analyzer for restoring equal intensity = 6.6°
- 3(a) What is Compton effect? Explain and derive an expression for Compton shift on the basis of quantum theory. Discuss the results. 15
- 3(b) What are de Broglie matter waves? Mention the factors on which the wavelength of the particle depends. 10
- 3(c) The photoelectric threshold frequency of silver is  $1.086 \times 10^{15}$  Hz. Calculate (i) the maximum kinetic energy of ejected electrons and (ii) the stopping potential in volts for the electrons, when the silver surface is illuminated with ultra-violet light of frequency  $1.5 \times 10^{15}$  Hz. 10
- 4(a) Define Wien's displacement law. Briefly explain the 'Green House Effect' from Wien's displacement law. 12
- 4(b) Explain how Bohr's postulates have led to an elucidation of the spectrum of Hydrogen atom. Calculate the numerical value of Rydberg's constant for this atom. 13
- 4(c) An electron is confined to a box of length  $10^{-10}$  m. Calculate the minimum uncertainty in its velocity. 10

**SECTION-B**

- 5(a) What is meant by a symmetry operation? Prove that a crystal cannot have five fold symmetry. 10
- 5(b) Explain the concept of Miller indices. How are they calculated? How the orientation of a plane is specified by Miller indices? 15
- 5(c) Calculate the packing fraction in crystals for (i) simple cubic (ii) body centered cubic and (iii) face centered cubic structures, treating the atoms as spherical. 10

- 6(a) Give the brief outlines of the form of input energy of a LASER. Give some characteristic properties of a LASER light. 12
- 6(b) Define stimulated absorption and metastable state. What is population inversion in a LASER? Explain optical pumping. 13
- 6(c) A LASER beam has a power of 110 mW. It has an aperture of  $5.16 \times 10^{-3}$  m and it emits light of wavelength 6958 Å. The beam is focused with a lens of focal length 0.11m. Calculate the area and the intensity of the image. 10
- 7(a) Explain the concept of phonon. Show that the dispersion relation for the lattice waves in a monoatomic linear lattice of mass 'm', spacing 'a' and nearest neighbor interaction 'f' is  

$$\omega = \sqrt{\frac{4f}{m}} \left| \sin\left(\frac{Ka}{2}\right) \right|$$
, where  $\omega$  is the angular frequency and K is the wave vector. 10
- 7(b) What are the assumptions of Debye model for the lattice specific heat? Calculate the lattice specific heat capacity according to the Debye theory. 15
- 7(c) Calculate the maximum phonon frequency generated by scattering of visible light of wavelength  $\lambda = 4920$  Å. Given that velocity of sound in medium is  $3.41 \times 10^5$  cm/sec and refractive index is 1.52. 10
- 8(a) Define additive color mixture. How can be determined three color mixture data for matching spectrum colors? 10
- 8(b) Which metallic properties of solids are explained by free electron gas theory? Derive an expression for thermal conductivity from the free electron theory of metals. 15
- 8(c) Show that average kinetic energy for a free electron at 0 K is  $\frac{3}{5} E_f$ . Where  $E_f$  is Fermi energy. 10

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