KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
Department of Textile Engineering
B. Sc. Engineering 1st Year 2nd Term Examination, 2016
TE 1221
(Textile Fibers)

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) What is textile fiber? Classify the textile fibers with example.   15

1(b) Discuss about the morphological diagram of cotton fiber with chemical composition.   15

1(c) Write short notes: (i) Lignin (ii) Carbonizing.   05

2(a) What is ginning?   05

2(b) Discuss about polymeric structure of wool.   10

2(c) Describe physical properties of wool fiber.   10

2(d) Differentiate between lint and linters.   10

3(a) Sketch a Morphological structure of jute fiber mentioning the chemical composition. 15

3(b) Mention the grading system for cotton and jute fiber.   10

3(c) Why cotton is called versatile fiber?   05

3(d) Write down the physical properties of the cotton fiber.   05

4(a) State a procedure of distinguishing wool fiber from silk fiber.   05

4(b) Sketch a micro-structure of wool fiber.   10

4(c) State the silk manufacturing procedure briefly.   10

4(d) Discuss about chemical composition and favorable properties of coir and banana fiber. 10

SECTION-B

5(a) Describe the characteristics of fiber forming polymers.   05

5(b) What is spinneret? Describe the steps of melt spinning.   10

5(c) Depict the spinning methods of man-made fibers with their advantages and limitations. 15

5(d) Mention spinning system for the following fibers: 05

   i) Nylon ii) Polyester iii) Carbon iv) Cavler & v) Viscose rayon .

6(a) Classify the regenerated fibers.   05

6(b) Why rayon is called regenerated cellulosic fiber?   05

6(c) State the various steps involved in viscose process.   15

6(d) Write down the physical & chemical properties of polyester fiber.   10

7(a)   What is polyamide fiber?   05

7(b)   Show the reaction for producing Nylon-66.   07

7(c)   Differentiate between Nylon 6 & Nylon-66.   08

7(d)   Describe the manufacturing process of polyester fiber.   15

8(a)   Write short notes on:-   14

            (i) Carbon fiber (ii) Cavler fiber.

8(b)   Write down the trade name (minimum four) with country of origin for the following   10
        fibers:-

            (i) Nylon (ii) Polyester (iii) Viscose rayon (iv) Glass fiber.

8(c)   What is elastomeric fiber? Show the production process of spandex.   11

--) END (---

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 interference of light? Discuss the important conditions for the interference of light.   10

1(b) Prove that the distance ß between two successive bright-fringes formed in the Young's experiment is given by $ß = \dfrac{\lambda D}{d}$ 15

1(c) In a typical bi-prism arrangement of (b/a)=20 and for sodium light (λ=5890Å),one obtain a fringe width of 0.1cm; here b and a are the distance between the bi-prism and the screen, the slit and the bi-prism respectively.(Assuming μ=1.52). Calculate the angle 'α' (refracting angle of the bi-prism).   10

2(a) Discuss the properties of Carnu's Spiral and explain its relationship with Fresnel's half period zones.   12

2(b) Derive an expression for magnification of compound microscope.   13

2(c) A plane grating has 15000 lines per inch. Find the angle of separation of the 5048Å and 5016Å lines of helium in the second order spectrum.   10

3(a) Give the explanation of the Compton effect with the help of quantum theory and find an expression of the Compton shift $\Delta\lambda$.   13

3(b) Discuss the discrepancies of Bohr's atom Model. Derive the expressions for radius and energy of an electron orbit of the hydrogen atom   12

3(c) The photoelectric threshold frequency of silver is 1.086×10^{15}Hz. Calculate (i) the maximum kinetic energy of ejected electrons and (ii) the stopping potential in volts for the electrons, when the sliver surface is illuminated with ultra-violated light of frequency 1.5×10^{15}Hz.   10

4(a) Define Black body radiation ,Emissive power, Ultraviolet catastrophe, Photon and Absorptive power   12

4(b) State and explain Brewster's law. Show that at the polarizing angle of incidence the reflected and refracted rays are mutually perpendicular to each other.   13

4(c) Using Bohr's formula (i) Calculate the longest wavelength in the Balmer series and (ii) Between what wavelength limits does the Balmer series limit?   10

SECTION-B

5(a)   What do you mean by symmetry operation? Prove that a crystal cannot have five fold   12
symmetry.

5(b)   What is density of packing? Calculate the relative density of packing of simple cubic,   13
body centered cubic and face centered cubic structure atom.

5(c)   The orthorhombic crystal has axial units in the ratio of 0.424:1:0.367.Find the Miller   10
indices of crystal face whose intercepts are in the ratio 0.212:1:0.183.

6(a)   Explain the Concept of phonon. Show that the dispersion relation for the lattice wave in a   10
monoatomic linear lattice of mass 'm' spacing 'a' and nearest neighbor interaction 'f' is

$$\omega = \sqrt{\frac{4f}{m}} \left| Sin(\frac{Ka}{2}) \right|,$$ where ω is the angular frequency and k is the wave vector.

6(b)   What are the assumptions of Einstein's theory of specific heat of solids? Derive relation   15
for lattice heat capacity following Einstein model.

6(c)   Show that average Kinetic energy of a free electron at OK is $\frac{3}{5}E_f$ is Fermi energy and   10
average speed is $\frac{3}{4}V_f$. where V_f is the velocity at Fermi surface.

7(a)   Obtain an expression for electrical conductivity of a metal on the basis of free electron   10
theory .Hence prove Ohm's Law.

7(b)   Explain the concept of density of states for a free electron and hence prove that   15

$$D(E) = \frac{V}{2\pi^2}(\frac{2m}{\hbar^2})^{3/2}E^{1/2}$$

7(C)   Copper has a mass density ρ_m =8.9gm/cc^3 and an electrical resistivity   10

ρ =1.5×10^{-8} ohm-m at room temperature. Calculate

(i)Fermi energy (E$_f$)

(ii)The concentration of the conduction electrons.

(iii)The mean free time(τ)

8(a)   Define additive color mixture. How can be determined three color mixture data for   10
matching spectrum colors?

8(b)   Explain the terms population inversion and stimulated emission. Discuss the properties of   15
LASER beam and mention the application of LASER.

8(c)   The coherence length for sodium light is 2.87×10^{-2}m.The wavelength of sodium light is   10
5893Å. Calculate (i) the number of oscillation corresponding to the coherence light and
(ii) the coherence time.

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

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.

SECTION-A

1(a) Define order and degree of the differential equation with examples. Form the differential   13
equation of $xy=ae^x+be^{-x}+x^2$, where a and b are arbitrary constants.

1(b) Solve any two of the following differential equations :   22

        i. $(x^2y-2xy^2)dx-(x^3-3x^2y)dy=0$.

        ii. $(y+x-5)dy=(y-x+1)dx$.

        iii. $(1+x^2)\frac{dy}{dx}+y=\tan^{-1}x$.

2(a) Solve the differential equation: 11

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

2(b) Solve the differential equation: 13

$$\frac{d^2y}{dx^2}+y=\text{Cosec}x \text{ using the method of variation of parameter.}$$

2(c) Solve $(D^2-4D-5)y=xe^{-x}$ given that $y=o$ and $Dy=0$ for $x=0$, where $D=\frac{d}{dx}$.   11

3(a) A particle moves along the curve whose parametric equations are $x=2t^2, Y=t^2-4t, z=3t-5$ 12
where t is the time . Find the component of its velocity and acceleration at t=1 in the
direction $\underline{i}-3\underline{j}+2\underline{k}$.

3(b) If $\vec{q}=-\vec{\nabla}\emptyset$ and $\emptyset(1,2,3)=0$ then find $\emptyset$, given that   12
$\vec{q}=(3x^2yz^2-y+2)\hat{i}+(x^3z^2+x-z)\hat{j}+(2x^3yz-y+7)\hat{k}$.

3(c) Find the directional derivative of $P=4e^{2x-y+z}$ at the point (1,1,-1) in the direction towards   11
the point (-3,5,6).

4(a) Test the vector $\underline{F}=(2xy+z^3)\underline{i}+x^2\underline{j}+3xz^2\underline{k}$, is irrotational or not . If the vector is   11
irrotational, find its scalar potential.

4(b) If $\underline{A}=(2y+3)\underline{i}+xz\underline{j}+(yz-x)\underline{k}$, evaluate $\int_c\underline{A}-\underline{dr}$ along with path c whose parametric   12
equation is $x=2t^2$, $y=t$, $z=t^3$ from t=0 to t=1.

4(c) Evaluate $\iint\limits_s\vec{F}.\vec{n}\,ds$ over the entire surface S of the region bounded by   12

$x=0, z=0, x^2+z^2=9, y=0, y=8$.

SECTION-B

5(a) Find the transformed equation of $3x^2+2xy+3y^2-18x-22y+50=0$ when the origin is shifted   12
at (2,3) and the axes are rotated through an angle 45°.

5(b) Write down the general equation of conic. Identify the conic,$6x^2+5xy-6y^2-4x+7y+11=0$.   12
Also find its centre if it is a central conic.

5(c) Find the direction cosines of the line which is equally inclined to the axes.   11

6(a) Find the rectangular and spherical polar co-ordinates for a point ,whose cylindrical polar   12
co-ordinates are $(4\sqrt{5} ,\tan^{-1}(\frac{1}{3}), -2)$.

6(b) Find the equation of the plane passing through the line of intersection of the planes   12
$x+2y+3z-4=0$ and $2x+y-z+5=0$ and perpendicular to the plane $5x+3y+6z+8=0$.

6(c) Find the angle between the plane $2x+y+2z+5=0$ and the line $\frac{x-3}{6} = \frac{y-2}{3} = \frac{z+1}{-2}$ 11

7(a) Examine whether the four points (0,1,2),(3,0,1),(4,3,6) and (2,3,2) are coplanar or not. If   14
they are non-coplanar, then find the volume of the tetrahedron, whose vertices are those
four points.

7(b) Find the equation of a circle, whose centre is at (1,3,4) and lying on the sphere   11
$x^2+y^2+z^2-2y-4z-11=0$.

7(c) Measure the semi-vertical angle of the right circular cone represented by the equation   10
$2(y^2+z^2) -x^2=0$ and also find its axis.

8(a) Define skew lines. Find the length and equation of the shortest distance (S.D) between   17
two skew lines x+y=0,z= 4 and $\frac{x-1}{4} = \frac{y-2}{3} = \frac{z-36}{-6}$.

8(b) What conics do the equation $x^2-5xy+y^2+8x-20y+15=0$.Find its standard form. Also find   18
the length, equation and direction of its axes.

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
Department of Textile Engineering
B. Sc. Engineering 1st Year 2nd Term Examination, 2016
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.
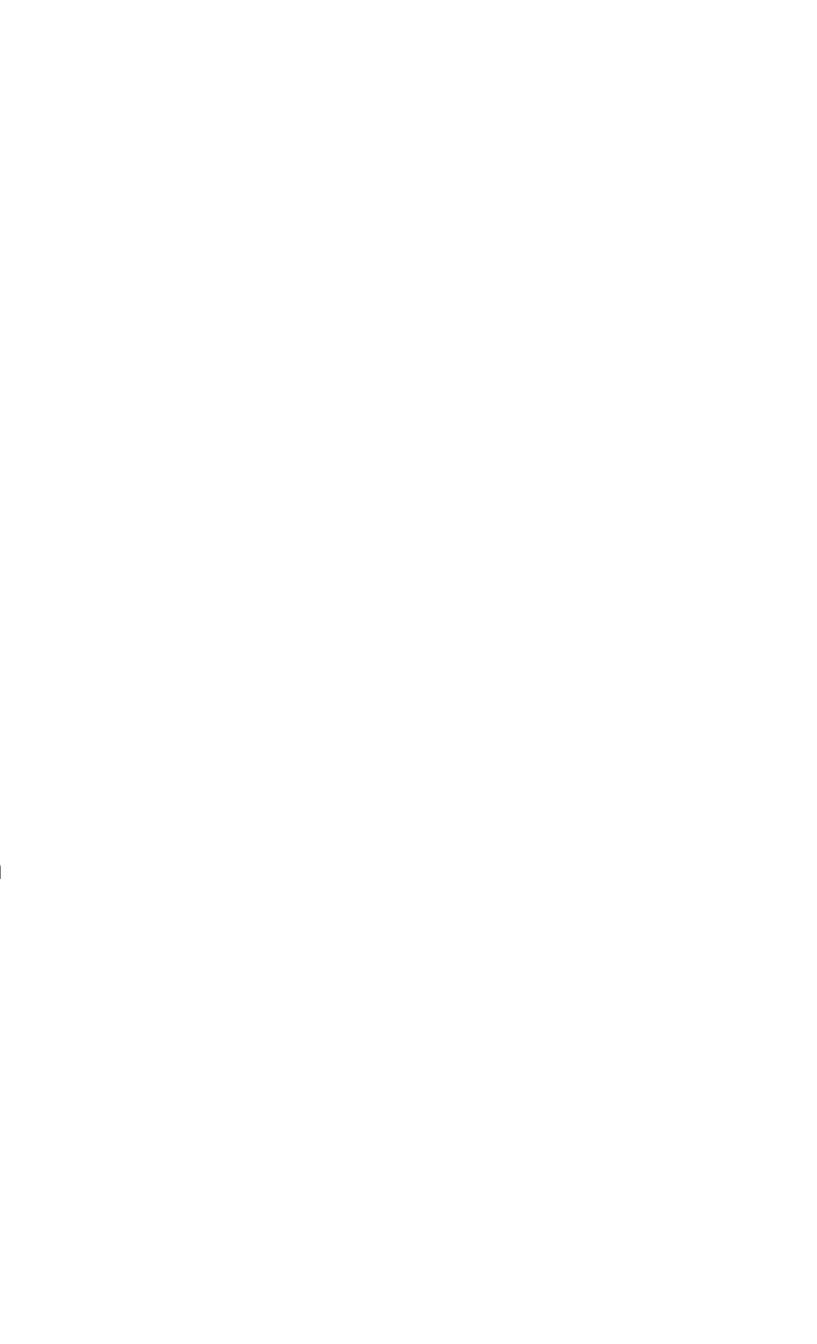   ii) Figures in the right margin indicate full marks.

SECTION-A

1(a)   Make appropriate W/H questions from the following answers.   14

   (i) Now it is 10 a.m

   (ii) The word integrity means honesty.

   (iii)These books are Amin's.

   (iv)Practice makes a man perfect.

   (v) It is 20 minutes to 10 now

   (vi)Her politeness pleased us.

   (vii) We went to airport to see of our leader

1(b)   Make sentences expressing the following notions/emotions   12

   (i) Apology (ii) Regret (iii) Greeting (iv) Threat (v) Farewell (vi) Surprise.

1(c)   Make sentences using the following phrases and idioms.   09

   Ad hoc, In fine, On and on, , Maiden speech, Man of word, Irony of fate.

2(a)   Make new words with each of the following prefixes and suffixes and use them in   14
       sentences.

       Be...., De...., a...., En...., ...ment, ...let, ...age.

2(b)   Make one antonym and one synonym of each of the following words and use them in   12
       sentences.

       Brutal; Brisk; Deep; Pale; Vacation; Declare.

2(c)   Define Participle, Gerund and Infinitive .Give two examples of each of them in sentences.   09

3(a)   Make sentences using the following Modals as directed   14

   (i) Could (To express polite request)

   (ii) Should (To express duty in the past)

   (iii)May (To express guess about the present)

   (iv)Be going to (To express strong possibility)

   (v) Must (To express command)

   (vi)Used to (To express past habit)

   (vii) Can (To express ability)

3(b)   Make sentences using the following words as directed.   12

   Last (as adverb); Fast (as noun); Fast (as adjective); Back (as noun): Long (as verb);

   Birth (as adjective).

3(c)   Change the following words as directed and make sentences with the changed words.   09

Capital (into verb); Immense (into noun); Necessary (into verb); Explanation (into verb); Political (into adverb); Science (into adjective).

4(a)   Transform the following sentences as directed.   14

(i) We should look after our parents. (Passive)

(ii) Everybody admits that the earth is round. (Interrogative)

(iii) I am sure that he is ill. (Simple)

(iv) People know his honesty. (Complex)

(v) What a funny story she tells. (Assertive)

(vi) Hamlet is more popular than most other Dramas. (Superlative)

(vii) Feeling well he left the place. (Compound)

4(b)   Put the verb into the correct form, active or passive.   12

(i) Sometimes mistakes ......(make).It's inevitable

(ii) The house is quite old. It .....(build) over 100 years ago.

(iii) My grandfather was a builder. He .....(build) this house many years ago.

(iv) It's a difficult question. I wish ......(I/ Know) the answer.

(v) It's a serious problem. I don't know how it .....(can/solve)

(vi) The television .....(repair). It is working again now.

4(c)   Supply a suitable word to fill in the blanks.   09

(i) We shall be there _____8 P.M.

(ii) _____ had I arrived when trouble started.

(iii) The subject _____ difficult, we cannot understand.

(iv) He has no passion _____ politics.

(v) My brother went away _____ .

(vi) He treats me as _____ .

SECTION-B

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

The clearest sign of growing intelligence is an increase of the quality which we call ·curiosity·. Throughout the history there have been always been men and women who are content to know only what they are told. They wanted to find out more; they wanted to see, if things could be done in different way, better way. Without this curiosity, the desire to know more, there would be no progress. People would simply go on thinking the same thoughts, having the same idea as their ancestors; there would be not change. The people who aren't to think differently and to act differently, are therefore, very important people. But they are nearly always the people who get into trouble. It is because there is another quality in all of us which fights against our curiosity .That is the quality of laziness or the desire to go on doing things in the ways to which we have become accustomed. We persuade ourselves that it is wrong to change out habits of thoughts and action; and when one comes along with different ideas, we do not like it. This is called ·conservation'-that

is the desire to keep things as they are.

Questions:

(i) What do you understand by 'curiosity'?

(ii) What is conservation?

(iii)Explain the reasons of conflict between "curiosity and conservation".

(iv) Who are important people and why are they get into trouble?

5(b) Make a précis of the above passage (Q.5.a) with a suitable title.   15

6(a) Amplify the idea contained in the following statement: 15

We live in deeds not in years.

6(b) Write a listing paragraph on the qualities of an ideal political leader.   20

7(a) Suppose you are a job seeker. Prepare a CV with an application.   20

7(b) Write a short note on your university annual sports day.   15

8 Write a free composition on any one of the following: 35

(a) Global warming: Bangladesh is a victim.

(b) Early Marriage: A social problem in Bangladesh.

--) END (---

SECTION-A

1(a) What are reducing and non-reducing sugars? Give an example of each.   07

1(b) What happens when glucose is treated with: 09

    (i) Conc. HNO_3

    (ii) Methanol in presence of HCl

    (iii) Bromine-water solution

1(c) Discuss the evidence leading to the cyclic structure for D-(+)-glucose.   12

1(d) What is muta rotation? Explain.   07

2(a) Write the structure of sucrose and maltose. What products are formed when the two are   08

    hydrolyzed?

2(b) Explain the ring and bonding nature of cellulose and starch.   08

2(c) Deduce the structure of amylopectin by end group analysis.   12

2(d) What is anomeric effect? Differentiate between anomers and epimers.   07

3(a) Arrange the following compounds in order of increasing base strength. Give a reason for   08

    the order you select.

    (i) NH_3 (ii) CH_3NH_2 (iii) $(CH_3)_2NH$ (iv) $C_6H_5-NH_2$

3(b) How can you identify the 1°,2° and 3° amines by chemical method and IR Spectroscopy?   12

3(c) What are diazonium salts? Why are they soluble in water and insoluble in nonpolar   09

    organic solvents?

3(d) Mention the synthetic methods of ethylamine and phenylamine.   06

4(a) Discuss the properties and applications of dyes and pigments.   10

4(b) Discuss the modern theory of color.   07

4(c) Why molecules having more conjugated multiple bonds absorb lower energies of light   06

    than do molecules having fewer conjugated multiple bonds?

4(d) Write short notes on: 12

    (i) Direct dyes

    (ii) Mordant dyes

    (iii) Vat dyes

    (iv) Azo dyes

SECTION-B

5(a) What is structural isomerism? Discuss the chain isomerism and functional group isomerism.   12

5(b) How will you distinguish between Enantiomers and Diasteriomers?   08

5(c) What do you mean by specific rotation? Explain.   08

5(d) Write down the probable isomeric structures of bromo-chloro-cyclohexane.   07

6(a) What do you mean by staggered and eclipsed conformations? Explain.   10

6(b) Discuss the effects of structure of alkyl halides on the rate of SN1 and SN2 reactions and mention the stereochemistry.   15

6(c) Outline the stereochemistry of cyclohexane giving energy diagram.   10

7(a) What is ring current? Explain.   08

7(b) Discuss the mechanism of Friedel-Craft's acylation reaction.   09

7(c) What is meant by Peptide linkage?   08

7(d) How can you identify C-terminal and N-terminal residue of proteins?   10

8(a) What are aldehydes and ketones? Mention their importance in medicinal world.   08

8(b) Describe the synthesis of ethylene chloride and ethylene glycol.   08

8(c) How do you define the terms aromatic ketones and phenones? Write their general structural formulas.   07

8(d) Complete the following reactions: 12

     (i) $CHCl_3 + 3KOH + C_2H_5NH_2 \longrightarrow$

     (ii) $C_6H_6 + 3O_3 \xrightarrow{H_2O}$

     (iii) $C_6H_6 + 3Cl_2 \xrightarrow{UV_{ray}}$

     (iv) $RCHO + 2R'SH \xrightarrow{H^+}$

--) END (---