

**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

**Department of Textile Engineering**

B. Sc. Engineering 2<sup>nd</sup> Year Backlog Examination, 2016

**TE 2103**

(Weaving Engineering)

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) Describe different types of fabric. 08  
1(b) Show the flow chart of weaving. 07  
1(c) What are the necessities of yarn guides? 10  
1(d) Describe different types of yarn guide with figure. 10
- 2(a) Sketch different types of yarn packages used in weaving. 10  
2(b) Tabulate the differences between precision and non-precision winding. 10  
2(c) What is winding efficiency? Describe the factors of winding efficiency. 15
- 3(a) Describe different types of creel with neat sketch. 10  
3(b) What are the differences between high speed warping machine and sectional warping machine? 08  
3(c) Draw and describe the tensioning device according to the working principle. 12  
3(d) Define the following terms:- 05  
(i) Coil angle and (ii) Angle of wind.
- 4(a) What are the control systems of warping? 08  
4(b) Describe the working principle of a high speed warping machine with diagram. 15  
4(c) Discuss the causes and remedies of any 4 (four) faults of warping process. 12

**SECTION-B**

- 5(a) Describe the drying system of sizing. 13  
5(b) What are the properties of good sizing materials? 15  
5(c) Write the name of different techniques of sizing. 07
- 6(a) Describe the technological changes takes place due to sizing. 15  
6(b) State the objects of sizing. Discuss different types of sizing. 15  
6(c) List out the names of some natural and synthetic sizing agents. 05
- 7(a) Mention the causes and remedies of sizing process faults. 15  
7(b) What are the substitutions of sizing? 07  
7(c) State the disadvantages of sizing. 13
- 8(a) Write a short note on Chittaranjan loom. 10  
8(b) Describe the basic principles of weaving with neat sketch. 20  
8(c) What is drawing-in? 05

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**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

*Department of Textile Engineering*

B. Sc. Engineering 2<sup>nd</sup> Year Backlog Examination, 2016

**TE 2209**

(Fabric structure and Design-I)

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 are texture and structure of a woven fabric? 08
- 1(b) State the necessity of drafting plan, lifting plan and denting plan. Give graph paper example of drafting and lifting plan of a suitable weave. 15
- 1(c) How drafting plan can be indicated by ruling line? Give example. 12
- 2(a) Differentiate between straight draft and skip draft. 10
- 2(b) Discuss the factors affecting the prominence of twill line. 12
- 2(c) State the classification of twill weaves with example by formula number. 13
- 3(a) Give graph paper example with drafting and lifting plan of the following designs:- 20
- (i) Diaper twill based on  $\frac{3}{3}$  twill.
- (ii) Vertical Zig-zag based on  $\frac{4}{3}$  twill.
- 3(b) What are the differences between satin and sateen weave? Give graph paper examples. 15
- 4(a) What are the factors that affecting prominence of twill line? 10
- 4(b) Write the name of common twill derivatives. 07
- 4(c) What are the features of Horizontal and Zig-zag twill? 05
- 4(d) What is shaded twill? Give a graph paper example of both single shaded twill and double shaded twill. 13

**SECTION-B**

- 5(a) Mention the basic characteristics of a plain weave. 05
- 5(b) Compare fancy matt and stitch matt. 06
- 5(c) Give graph paper example with drafting and lifting plan of the followings:- 24
- (i)  $\frac{1}{1}(5+3)$  weft rib.
- (ii) Fancy matt on 10×10.
- (iii)  $\frac{4}{3}(4+3)$  Matt.

- 6(a) Write down the common features and end uses of Brighton Honeycomb. Give graph paper example of an ordinary Honeycomb with drafting plan. 12
- 6(b) Give graph paper example of a distorted warp thread effect with drafting and lifting plan. 11
- 6(c) How crepe weave can be produced by reversing a small motif? Explain with graph paper example. 12
- 7(a) Give graph paper example with drafting and lifting plan of the followings:- 18  
 (i) Devon Hucka back.  
 (ii) Mock leno on 10×10.
- 7(b) Give graph paper example (with drafting and lifting plan) of a stripe effect by combining warp and weft face weaves. 17
- 8(a) What are the main features of Bedford cord weave? 05
- 8(b) Write down the types of Bedford cord. 05
- 8(c) What are the factors considered for stripe and check form? 15
- 8(d) Classify stripe and check weaves. 10

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 2<sup>nd</sup> Year Backlog Examination, 2016

EE 2121

(Electrical Circuits, Machines and Electronics)

Time: 3 Hours

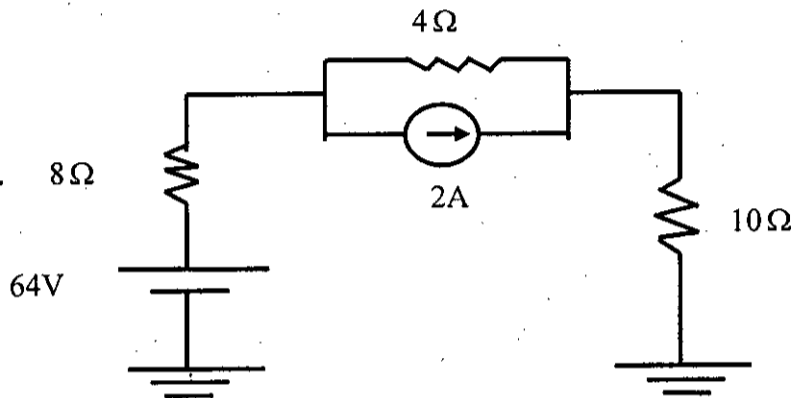
Total Marks: 210

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

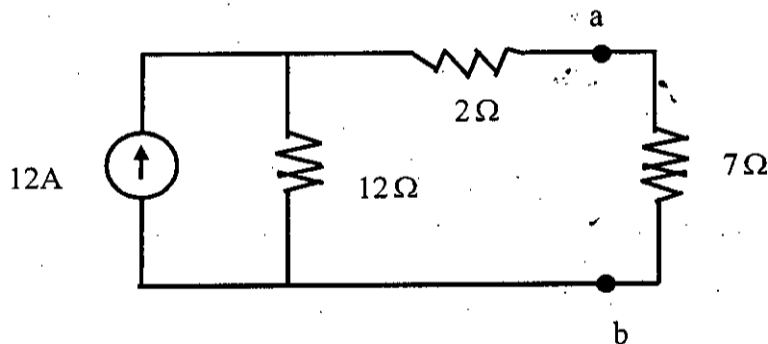
ii) Figures in the right margin indicate full marks.

**SECTION-A**

- 1(a) State and explain Ohm's law, KVL and KCL. 09
- 1(b) Using nodal analysis, find the current through the  $4\Omega$  resistor of below figure. 08



- 1(c) Write down the condition for maximum power transfer of an electrical circuit. Also find the maximum power. 08
- 1(d) State Thevenin's theorem. Find the Thevenin equivalent circuit for the network shown in the following figure. 10

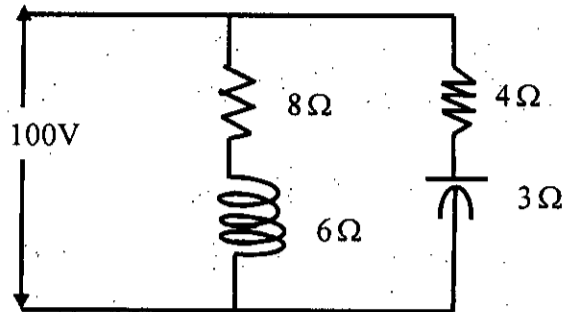


- 2(a) Define instantaneous value and RMS value of alternating current. Show that the RMS value of a sinusoid over one half cycle is 0.707 times of its maximum value. 12
- 2(b) Prove that for a series RLC circuit,  $Q_s = \frac{1}{R_s} \sqrt{\frac{L}{C}}$ . 11

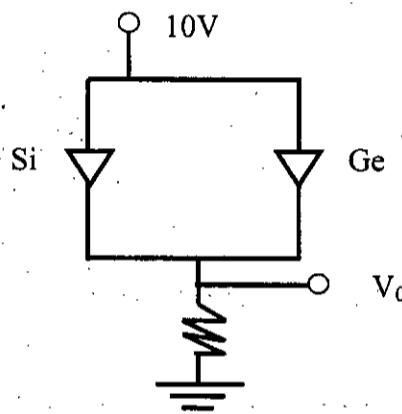
2(c) For the circuit of bellow figure, find

12

- (i) Conductance and susceptance of each branch
- (ii) The resultant conductance and susceptance
- (iii) Vector diagram.



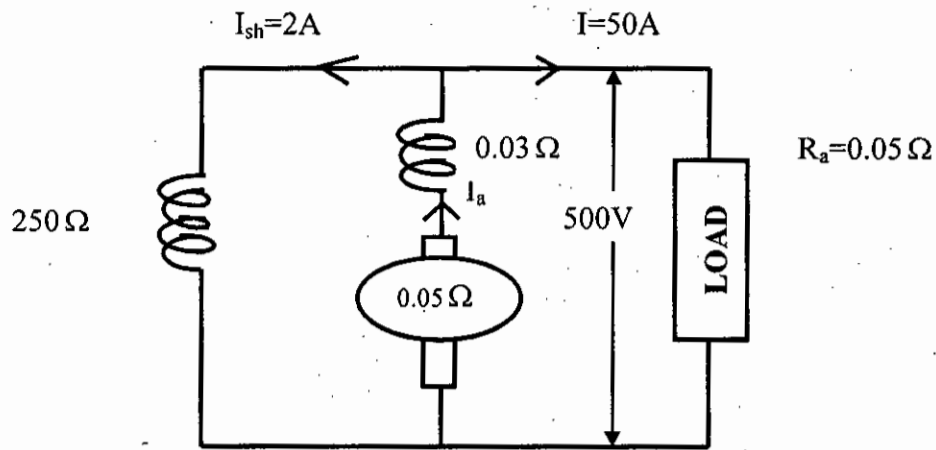
- 3(a) Explain the formation of depletion layer in P-n junction. Also describe P-n junction at different biasing condition. 09
- 3(b) Write short notes on JFET and MOSFET. 08
- 3(c) Determine the voltage  $V_o$  of the network shown in figure. 08



- 3(d) Explain the working principle of npn transistor. 10
- 4(a) Write short notes on: (i) relay isolators and (ii) lighting arrestors. 09
- 4(b) Classify underground cables on the basis of voltages. Also describe the construction of underground cables. 10
- 4(c) Write down the properties of a good insulator. 06
- 4(d) What is trip circuit? Describe the working principle of a trip circuit. 10

### SECTION-B

- 5(a) What is working principle of DC generator? Derive the E.M.F equation of a DC generator. 11
- 5(b) What is meant by armature reaction? Describe the voltage build up process of a DC generator. 11
- 5(c) Mention the application of Lap and wave winding. 05
- 5(d) Calculate the generated voltage and the armature current for below figure. 08



- 6(a) Is it possible to use a DC generator as a DC motor and vice versa? Explain it. 07
- 6(b) What are the factors that control the speed of motor? Describe any speed control method of motor. 12
- 6(c) Why starter is necessary? How does 4-point starter overcome the limitation of 3-point starter? 09
- 6(d) Draw the schematic diagram for motoring actions of a separately excited DC motor. 07
- 7(a) Define transformer and transformation ratio. Derive the e.m.f equation of a single phase transformer. 10
- 7(b) Describe open circuit test and short circuit test of a transformer in brief. 10
- 7(c) Define all day efficiency. Show that for maximum efficiency, "Cu loss = Iron loss" 10
- 7(d) Why transformer rating is in MVA? 05
- 8(a) Explain how a revolving field is produced in an induction motor for two phase supply. 12
- 8(b) A three phase, 60 Hz four pole induction motor operates at 5% slip. Find the followings 08  
(i) Synchronous speed (ii) Motor speed and (iii) Frequency of rotor circuit.
- 8(c) Why does the rotor of an induction motor rotate? 08
- 8(d) Write down the working principle of synchronous generator. 07

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**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

*Department of Textile Engineering*

B. Sc. Engineering 2<sup>nd</sup> Year Backlog Examination, 2016

**TE 2213**

(Textile Testing and Quality Control-I)

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) How the count of a yarn can be measured? Describe any suitable method with proper sketch. 15
- 1(b) Mention the count calculation procedures of double yarn. 05
- 1(c) Distinguish between the direct and indirect count systems of yarn. 09
- 1(d) A lea of cotton yarn weighs 25 grain. Calculate its count in English system. 06
- 2(a) Establish the relationship among the amount of twist, twist multiplier and yarn count (for both direct and indirect system). 10
- 2(b) Describe the working principle of ordinary twist tester with neat sketch. 15
- 2(c) Prove that  $N_e \times T_{ex} = 590.5$ . 05
- 2(d) Calculate the TPI of 40's  $N_e$  cotton warp yarn. 05
- 3(a) Define irregularity. Discuss the effect of irregularity on the quality of textile materials. 10
- 3(b) Describe the working principle of Uster Evenness Tester with schematic diagram. 13
- 3(c) Write short note on :- 12  
(i) Periodic variations (ii) PMD (iii) Limit irregularity (iv) Addition of irregularity.
- 4(a) What is CSP? How strength of a single yarn can be measured? Discuss. 13
- 4(b) List out the methods available for measuring yarn evenness. Describe visual examination method. 15
- 4(c) What is Uster statistics? 07

**SECTION-B**

- 5(a) Define the following terms:- 12  
(i) Yield point (ii) Work of rupture (iii) Tenacity (iv) Mass stress (v) Elastic recovery and (v) Specific stress.
- 5(b) Distinguish among CRL, CRT and CRE principles. 08
- 5(c) Describe the working principle of an Elmendorf tear tester. 15
- 6(a) What are the points to be considered for the measurement of fabric width and fabric thickness? 10
- 6(b) Describe the procedure of fabric thickness measurement by Heal's thickness gauge. 10

- 6(c) How the crease recovery angle can be measured by Shirley crease recovery tester? 15  
Describe the procedure with experimental set up.
- 7(a) Write about the factors affecting tensile properties of textiles. 10
- 7(b) Describe the working principle of Shirley stiffness tester. 15
- 7(c) If bending length of a fabric is 5mm, length of a rectangular strip of material is equal to 10 bending length, fabric mass is  $3\text{gm/mm}^2$  and thickness is 01mm, What will be the bending angle and bending modulus of the fabric? 10
- 8(a) Describe the procedure of diaphragm bursting strength test with neat sketch. 15
- 8(b) Why Ball bursting tester is used instead of Diaphragm bursting tester? 10
- 8(c) How cloth cover of woven and knit fabric can be measured? 10

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**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

*Department of Textile Engineering*

B. Sc. Engineering 2<sup>nd</sup> Year Backlog Examination, 2016

**TE 2127**  
(Textile 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.

**SECTION-A**

- 1(a) Discuss the relationship between fiber properties and fiber structure. 10
- 1(b) Describe X-ray diffraction method to investigate fiber structure. 15
- 1(c) Tabulate the differences between Infrared radiation method and X-ray diffraction method. 10
- 2(a) Define swelling. Classify swelling with brief description and sketch. 15
- 2(b) How the swelling phenomenon can be used practically in textiles to improve functionality? 08
- 2(c) Establish the relationship between transverse area swelling and transverse diameter swelling. 12
- 3(a) Derive the equation for yarn contraction. 12
- 3(b) What is flexural rigidity? Show that, flexural rigidity  $= \frac{1}{4\pi} \cdot \frac{\eta ET^2}{\rho}$ , where the symbols have their usual meanings. 15
- 3(c) Write short note on shape factor. 08
- 4(a) What is fiber migration? Briefly discuss the mechanism of fiber migration. 13
- 4(b) For twist multiplier 4.2 and specific volume 1.12cc/g, find out the twist angle. 05
- 4(c) Sketch and label on idealized helical yarn geometry. From idealized yarn geometry prove that,  $\tan \alpha = 0.0112 V_y^{1/2} \tau$ , where the symbols have their usual meanings. 17

**SECTION-B**

- 5(a) Establish the relation between yarn diameter and yarn count. 10
- 5(b) Derive the equation of yarn diameter for staple yarn. 10
- 5(c) Find out the yarn diameter of a 36 Ne cotton yarn in (i) Mils unit (ii) Inch unit and (iii) Micrometer unit. 06
- 5(d) What is cover factor? Distinguish between warp jamming and weft jamming. 09
- 6(a) Considering pierce's model of fabric geometry, prove that  $h_1 = 4/3P_2 \sqrt{C_1}$ , where the symbols have their usual meanings. 15
- 6(b) Discuss the problems caused by static electricity with their remedies. 12
- 6(c) Define crimp interchange. Write down the equation for crimp interchange. 08

- 7(a) Show that twist contraction factor  $C_y = \frac{1}{2}(1 + \sec \alpha)$ , where the symbols have their usual meanings. 15
- 7(b) What are the conditions of weft jamming in fabric? Derive the equation for weft jamming in plain fabric. 12
- 7(c) Find out the value of D if  $l_1=0.045$  cm,  $l_2=0.049$  cm,  $C_1=0.13$  and  $C_2=0.15$ . 08
- 8(a) Discuss the problems created by friction in textile processing. 08
- 8(b) Define optical orientation factor. How Birefringence can be measured? 12
- 8(c) Explain the geometry of plain knitted structure with the help of early geometrical models and empirical dimensionless relationship. 15

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**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

*Department of Textile Engineering*

B. Sc. Engineering 2<sup>nd</sup> Year Backlog Examination, 2016

**TE 2111**

(Statistical Analysis and Quality Control)

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 Central Tendency? Mention the measures of Central Tendency. 10
- 1(b) Which is the best measure of Central Tendency and why? 10
- 1(c) Prove that  $AM \geq GM \geq HM$ . 15
- 2(a) Describe the moments, skewness and kurtosis. 10
- 2(b) Differentiate between skewness and kurtosis. 10
- 2(c) Given 2,3,7,8 & 10; Find skewness and kurtosis  $\beta_2$ . 15
- 3(a) What is probability? 05
- 3(b) Why do we need probability? 05
- 3(c) A bag contains 10 items in which 3 items are defective. Two items are randomly drawn from the bag without replacement. What is the possibility that the drawn item contains: 15
- (i) No defective and
- (ii) At least one defective.
- 3(d) State and prove the addition law of probability for three not mutually exclusive events. 10
- 4(a) Explain positive and negative correlation. 08
- 4(b) Show that, correlation coefficient is independent of origin and scale of measurement. 12
- 4(c) Find out the rank correlation coefficient for the following data: 15

x:	68	64	75	50	64	80	75	40	55	64
	62	58	68	45	81	60	68	48	50	70

**SECTION-B**

- 5(a) Classify the control-chart. Write down its importance. 10
- 5(b) A modern cotton spinning is going to produce the following yarn count: 30<sup>s</sup>, 34<sup>s</sup>, 31<sup>s</sup>, 29<sup>s</sup>, 28<sup>s</sup>, 32<sup>s</sup>, 33<sup>s</sup>, 34<sup>s</sup>, 33<sup>s</sup>, 31<sup>s</sup>. 25
- Draw a Mean control chart from the above data and make a comment about the process.

- 6(a) What is ANOVA? What are the steps involved in one way ANOVA? 15
- 6(b) ANOVA for no. of garments factory and city type- 20

Garments	City type		
	x <sub>1</sub>	x <sub>2</sub>	x <sub>3</sub>
	5	7	2
2010			
2011	6	9	4

Is there any significance of variance? (level of significance 0.05; df 2/3; tabulate value=9.55)

- 7(a) Short notes on: (i) Hypothesis (ii) Null hypothesis and (iii) Degree of freedom. 10
- 7(b) Discuss different types of sampling. 15
- 7(c) What is cause and effect diagram? When and how a cause and effect diagram can be used? Explain with proper example. 10
- 8(a) If you can't interpret a process accurately what will be the consequences? 10
- 8(b) Show the quality control cycle. 05
- 8(c) Determine trial control limit of range chart by using the data from the following table: 20

Sample	Slip ring diameter (cm)				
	1	2	3	4	5
1.	5.02	5.01	4.94	4.99	4.96
2.	5.01	5.03	5.07	4.95	4.96
3.	4.99	5.00	4.93	4.92	4.99
4.	5.03	4.91	5.01	4.98	4.89
5.	4.95	4.92	5.03	5.05	5.01

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**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

*Department of Textile Engineering*

B. Sc. Engineering 2<sup>nd</sup> Year Backlog Examination, 2016

**TE 2219**

(Polymer Engineering and Composite)

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 the following terms: 06  
(i) Polymer (ii) Monomer and (iii) Oligomer.
- 1(b) Briefly discuss the classification of industrial polymers with example. 14
- 1(c) Write down the monomer, repeat unit and polymer of the followings: 15  
(i) Polyethylene (ii) Polystyrene (iii) Polyether (iv) Nylon and (v) P.V.C
- 2(a) How can the molecular weight of the product in step polymerization be controlled? 05
- 2(b) Distinguish between chain growth and step growth polymerization. 10
- 2(c) Discuss the methods of free radical polymerization with example. 20
- 3(a) What is crystallinity? Mention its effect on the polymer properties. 15
- 3(b) Compare between the properties of crystalline and amorphous polymer. 10
- 3(c) Explain  $T_g$  of copolymers. Discuss the polymer behavior below and above  $T_g$ . 10
- 4(a) What is polymer degradation? Discuss the types of polymer degradation. 10
- 4(b) Describe photo degradation process of polymer. 12
- 4(c) What is polydispersity and monodispersity? 05
- "Increase of molar mass increases tensile strength, impact strength and chemical resistivity"—Explain this statement. 08

**SECTION-B**

- 5(a) What is polymer composite? Discuss the fibers for high performance composites. 11
- 5(b) Write down different fiber architectures used for composites and their characteristics. 10
- 5(c) What are the influences of fiber architectures on the properties of composites? 08
- 5(d) Define the following terms:- 06  
(i) Planar (ii) 3D and (iii) Net-shaped performing composite.
- 6(a) Write down the classification of composite. 10
- 6(b) Describe the benefits of using composite materials. 10
- 6(c) What is matrix? Discuss the types of matrix. 09
- 6(d) Mention the properties of matrix. 06

- 7(a) Discuss the polymeric matrixes for rigid and flexible composites. 12
- 7(b) Classify reinforcing materials. Discuss the effect of their geometry on the properties of composites. 11
- 7(c) Describe the fiber-matrix interface? Why fiber-matrix interface is considered in polymer composite? 08
- 7(d) Mention the role of coupling agents. 04
- 8(a) What is meant by nano-compsites ? State the typical applications of nanocomposites. 15
- 8(b) What factors are to be considered in selecting the composite manufacturing process? 10
- 8(c) Write short notes on:- 10
- (i) Polymer matrix resins
  - (ii) Thermoplastic resins

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**KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY**

*Department of Textile Engineering*

B. Sc. Engineering 2<sup>nd</sup> Year Backlog Examination, 2016

**EE2221**

(Instrumentation and Electrical Control)

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.

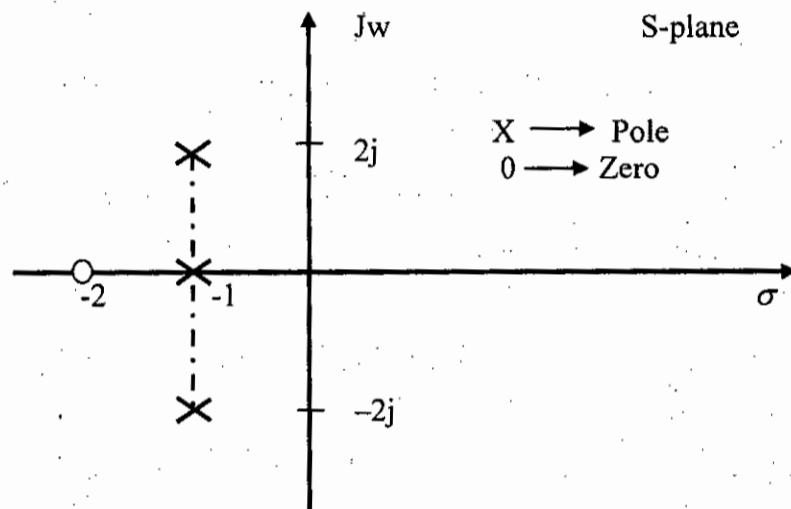
**SECTION-A**

- 1(a) Draw the generalized block diagram of instrumentation system and describe each block 12  
concisely.
- 1(b) What is relative error? How ranges of voltmeter and ammeter can be extended? Explain 13  
with circuit diagram.
- 1(c) An ammeter reads 6.7A and the true value of current is 6.54A. Determine the error and 10  
the correction for this instrument.
- 2(a) Deduce the sensitivity equation for wheatstone Bridge where symbols name their general 15  
meaning.
- 2(b) Classify resistance with given ranges. Deduce how to measure low resistance excluding 13  
the effect of lead resistance.
- 2(c) How to avoid leakage current effect during measurement of high resistance? 07
- 3(a) What is the necessity of using guard circuit? Describe the Megger test method. 09
- 3(b) Find the general equation of AC bridge. How could we measure  $R_1$  (unknown resistance) 11  
and  $L_1$  (unknown inductance) from this equation?
- 3(c) A resistance of  $80\ \Omega$  is to be measured by Voltmeter-Ammeter method using a 1A 15  
ammeter having resistance of  $2\ \Omega$  and 50V voltmeter having a resistance of  $5000\ \Omega$ .  
(i) Suggest which one of the two V-I method should be used?  
(ii) Explain the suggestion that you claim.
- 4(a) What are the advantages and disadvantages of PMMC? Compare analog and digital 10  
instruments.
- 4(b) Describe the wien's bridge for measuring the frequency. Also calculate the limiting error 12  
for the multiplication and division at any two quantities.
- 4(c) Write short notes on thermistor and thermocouple. Also describe smoke detector and 13  
photovoltaic transducer with diagram.

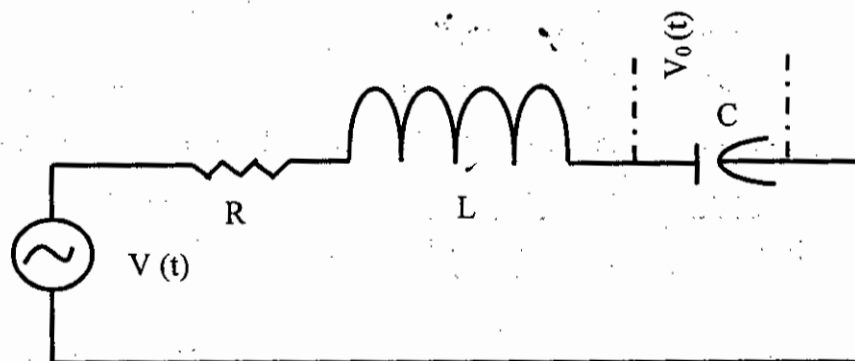
**SECTION-B**

- 5(a) What is control system? What are differences between closed loop and open loop control 10  
system?
- 5(b) Describe a closed loop and open loop control system with block diagram and example. 15

- 5(c) Define state, process, input, output and comparator. 10
- 6(a) Classify industrial controllers. Describe P, PI and PID controllers. 10
- 6(b) What is PLC? Describe the generalized block diagram of PLC. 12
- 6(c) Define microprocessor and microcontroller. Draw the bus architecture of 8085 microprocessor. 13
- 7(a) Why control system is so important for textile engineer? 09
- 7(b) What is critical damping constant? For the given S-plane, determine the differential equation that represents the system in following figure. 10



- 7(c) What do you mean by stable, unstable and marginally stable system? Show them graphically. Also find the relationship between R, L, C for stable system in following figure. 16



- 8(a) Write five (05) comments on damping ratio. 05
- 8(b) Define the terms: Pole, Zero, TF, BD and stability. Find the pole, zero, TF of the following differential equation. Also show them in S-plane. Comments on the stability. 20

$$\frac{d^2 y}{dt^2} + 5 \frac{dy}{dt} + 6y = 2 \frac{du}{dt} + 1$$

- 8(c) State the Routh's Stability Criterion. Describe it with one example. 10

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