KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 2nd Year 2nd Term Examination, 2020

TE 2227

(Mechanics of Textile Structures)

Time: 1 Hour 30 Minutes | Total Marks: 120

N.B.: i) Answer any TWO 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) Show a schematic diagram of a SEM with brief description. 10

1(b) Describe briefly the effects of fiber structure on fiber properties. 11

1(c) Write short notes on 09
- (i) Glass transition temperature
- (ii) Refractive index
- (iii) Torsional properties

2(a) Define flexural rigidity. Prove that specific flexural rigidity = $\frac{1}{4\pi}\frac{\eta\epsilon}{\rho}$, where the symbols have their usual meanings. 15

2(b) Describe the process of measuring dielectric constant of a textile material. 12

2(c) A cotton fiber has breaking twist 50 and diameter 0.015 mm. Find out BTA of it. 03

3(a) Briefly describe the different types of swelling with sketch. 10

3(b) Show the Relationship between transverse diameter swelling and transverse area swelling. 15

3(c) Describe the effects of swelling on fiber properties. 05

SECTION-B

4(a) Define crimp interchange. Drive an equation from crimp interchange. 10

4(b) What types of conditions are considered for warp jamming and weft jamming for woven fabrics? 05

4(c) A cotton fabric of 20Ne warp and 24Ne weft, 65 EPI and 60 PPI having a modular length, $l_1 = 0.0448$ cm and ρ=1.5 g/cc. Find out $C_1, C_2, \theta_1, \theta_2, P_1, P_2, l_2, d_1, d_2, h_1, h_2$ and D. 15

5(a) Show that yarn twist Retraction factor, $R_y = 1 - \frac{1}{C_y}$, where the symbols have their usual meanings. 15

5(b) What is meant by yarn jamming? 05

5(c) Find out the yarn diameter of 80 Denier polyester yarn in (i) Mils unit (ii) Micrometer unit and (iii) Inch unit. Assuming ρ=1.38. 10

6(a) What is fiber migration? Discuss the mechanism of fiber migration. 10

6(b) Show the Relationship between English count (Ne) and yarn diameter (d). 10

6(c) Define fabric geometry. Why fabric geometry is important for fabric? Explain. 10

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 2nd Year 2nd Term Examination, 2020

TE 2213

(Textile Testing-I)

Time: 1 Hour 30 Minutes | Total Marks: 120

N.B.: i) Answer any TWO 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)	Find out the objectives of Textile Testing. Write short notes on the effect of moisture on textiles.	04
1(b)	Point out the features of multifibre fabrics, different light sources of testing & Grey scales. Mention the causes of irregularities in yarns.	12
1(c)	Establish a relation between M.R & M.C. Mention the important matters of a yarn hairiness test. Calculate CIW of 70/30 Polyester/Cotton, if oven dry weight of the consignment is 150 kg.	14
2(a)	Describe a method of measuring moisture of a yarn package.	08
2(b)	Why evenness is important in yarns? Critically analyze the comparisons of different evenness tests of yarns.	10
2(c)	Differentiate between crease resistance and crease recovery. Narrate the precautionary measures of the crease recovery tests along with the significant matters of the established crease recovery tests.	12
3(a)	Find out the main technical phenomena related with stiffness and shear tests of a fabric which are the important things of a standard lab report?	12
3(b)	Point out the significant items measured by Uster, HVI, AFIS & Uster tester. How crimp is measured by the testing companies?	08
3(c)	Establish an equation of measuring cloth cover. Write short notes on: (i) CSP (ii) CIW (iii)Wearer trials (iv) Laboratory tests and (v) Important Parts of a Sample preparation.	10

SECTION-B

4(a)	Illustrate the influence of drapability of a fabric mentioning the important parts of a drape measuring test. Why Blue wool is used in testing lab?	15
4(b)	Establish a relation between yarn diameter and count. Mention the significant portions of measuring single yarn's strength.	12
4(c)	What is the main advantage of Beesleys Balance?	03
5(a)	Let a package of cotton yarn is collected from a ring frame. If the length and weight of the sample is 350 cm and 30 grains respectively, find the count in Ne, Nm, Denier, KTex and Worsted count.	08
5(b)	State the dimensional stability & PPI measuring steps following any established standard. Show importance of bending length of a fabric.	16
5(c)	How testing machine affects tensile testing?	06
6(a)	Critically analyze merits and demerits of skein yarn strength methods & Fabric thickness methods.	18
6(b)	Write short notes on: (i) Specific stress (ii) Secant modulus and (iii) Work of rupture.	06
6(c)	How counting glass works for measuring threads per unit length?	06

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 2nd Year 2nd Examination, 2020

EE2221

(Instrumentation and Electrical Control)

Time: 1 Hour 30 Minutes | Total Marks: 120

N.B.: i) Answer any TWO 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) Define measurement and instrument system. Draw and explain the block diagram of a basic instrument system. 08

1(b) Derive the expression of sensitivity of a resistive strain gauge sensor. Where this sensor is used? 12

1(c) In a variable capacitance transducer the diaphragms are 25 mm in diameter and 4 mm apart. If a pressure produces an average deflection of 0.25 mm. Calculate the value of capacitance after application of force. The capacitance before application of the force is 400 PF. 10

2(a) How deflecting torque and control torque are produced in PMMC instrument? Briefly explain the procedure of extending range of an ammeter. 14

2(b) Show the generalized block diagram of collecting & processing temperature data from five sensors and monitoring at a central computer. 10

2(c) What is the functional difference in measuring ac and dc quantities inside a digital multimeter? 06

3(a) List the methods for measurement of low and high resistance. Describe the "fall of potential" method for measurement of high resistance. 12

3(b) How insulation resistance of fabric material can be measured? Show schematically. 10

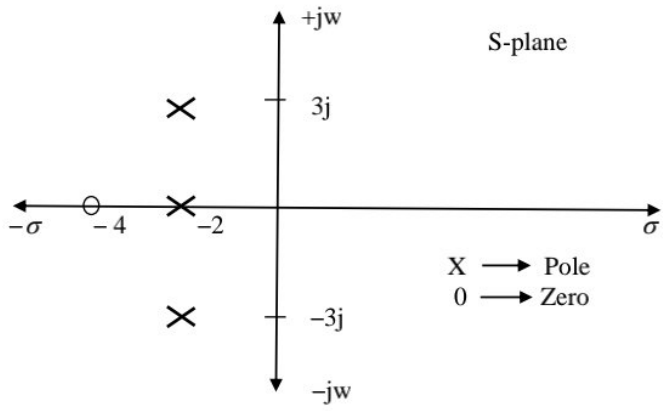
3(c) Which method should be chosen for measuring temperature contact lessly? How does it work? 08

SECTION-B

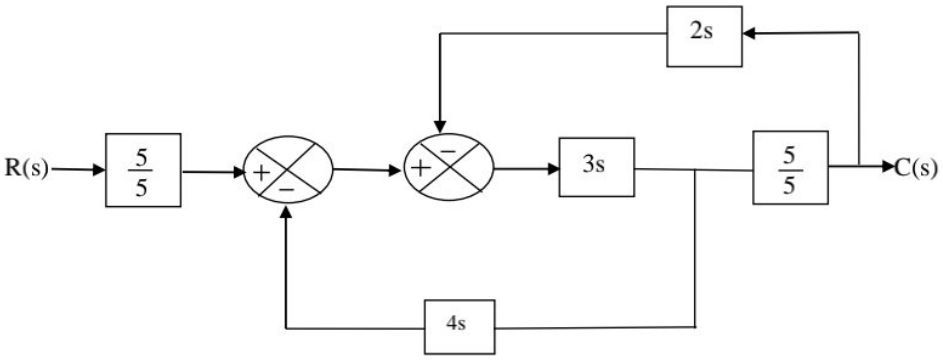
4(a) Give an example of open loop control system and feed-back control system. Define each blocks in your control system given as example. 10

4(b) Suppose, you have 5 rectangular shape boxes. You need to find out the largest box. Which controller you will use and why? Also describe the controller with proper block diagram. 10

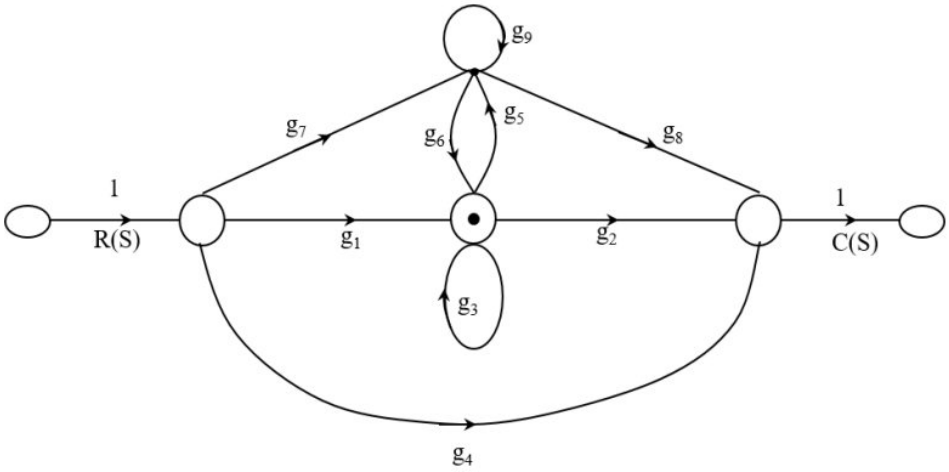
4(c) For the given S-plane as shown in the figure determine the differential equation that represents the system. 10



5(a) A system is represented by the block diagram as shown in the figure. Reduce the block diagram to a single transfer function block. Find the poles and zeros of this system and comment on the system stability. 15



5(b) Find the overall transmittance of the SFG as shown in figure. 15



6(a) Characteristic equation of a system is given by $Q(s) = S^5+S^4+S^3+2S^2+2S+5$. Apply Rouths's stability criterion to determine whether the system is stable or unstable. Find the number of roots in right half plane. 10

6(b) What is PLC? Describe the generalized block diagram of PLC. 10

6(c) What is the basic difference between microprocessor and microcontroller? How microcontrollers are contributing in industrial automation? Explain briefly. 10

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 2nd Year 2nd Term Examination, 2020

TE 2203

(Fabric Manufacturing Engineering-I)

Time: 1 Hour 30 Minutes Total Marks: 120

N.B.: i) Answer any TWO 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) Why yarn preparation is necessary before weaving? Write down the features of a good warp. 15

1(b) How does winding improve the quality of yarn? 07

1(c) The rate of winding (calculated) of modern high speed cone winding machine is 732 meter per min. Calculate the no. of drums required to wind 388 lbs of 40'S from ring bobbin in 9 hrs. (Assume efficiency 84% and Allow ½% for waste and left on the bobbins). 08

2(a) BOD should be low for size ingredients. Mention the reasons. 09

2(b) Why drying is required? Which drying system is best for drying yarn and why? Justify your opinion. 13

2(c) 30 tex Cotton yarn has add-on of 12%. If the moisture regain of the warp is 10% then calculate the oven-dry mass of the size added per kg of the unsized warp. 08

3(a) Describe the warping process that facilitate the weaving of complex color pattern. 12

3(b) What precautions should be taken to reduce the incidence of extra ends and to compensate for the missing ends during weaving of the beam? 08

3(c) Calculate the weight of 1000 yds fabric in kg whose warp and weft crimp is 3% and 5% respectively of following specification: 10

$$\frac{9 \times 9}{75 \times 60} \times 1.43\ m$$

SECTION-B

4(a) Differentiate between Fabric machine and Garment length machine. 07

4(b) Define VDQ pulley. How could VDQ pulley control fabric GSM? 08

4(c) Describe in brief the knitting action of self acting needle with neat sketch. 15

5(a) Describe the following designs with notation diagram, cam arrangement and needle arrangement. 10

(i) Polka Rib (ii) Double Lacoste

5(b) Write short notes on the following: 12

(i) Held Loop and (ii) Sinker

5(c) Calculate the production in kg/month of a plain interlock machine from the following: 08

Machine diameter = 40"

Gauge = 30

Number of feeders = 92

Machine speed = 30 rpm

Machine efficiency = 90%

Course density = 15 courses/cm

Wales density = 13 wales/cm

Fabric weight = 100 gm/m^2

6(a) Differentiate between synchronized and delayed timing with neat sketch. 12

6(b) Explain the following terms with sketch: 12

(i) Laddering (ii) Eight lock structure (iii) Warp knitting

6(c) Calculate the length of fabric produced per shift at 75% efficiency of a knitting machine from the following particulars: 06

No. of feeder = 48

Fabric open width = 264 cm

Stitch density = 15

Machine speed = 20 rpm

Machine diameter = 300 mm

Machine gauge = 14

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 2nd Year 2nd Term Examination, 2020

ME 2221

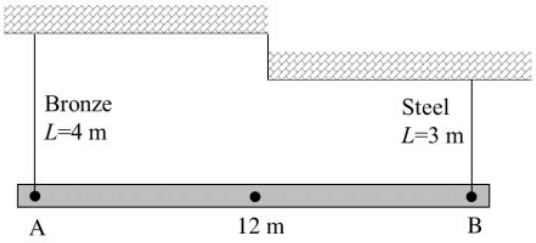
(Solid Mechanics and Machine Design)

Time: 1 Hour 30 Minutes | Total Marks: 120

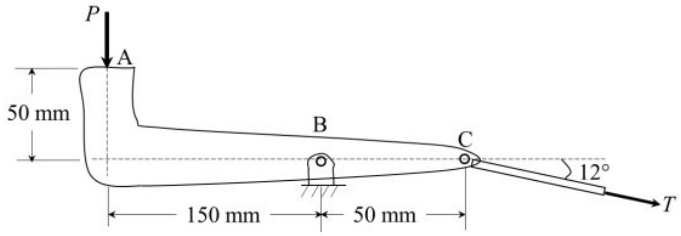
N.B.: i) Answer any Two questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.
iii) Assume reasonable data if missing any.

SECTION-A

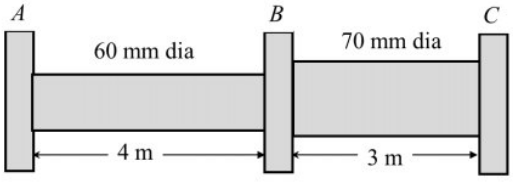
1(a) A homogeneous 1000 kg bar AB is supported at either end by a cable as shown in figure below. Calculate the smallest area of each cable if the stress is not to exceed 100 MPa in bronze and 130 MPa in steel. 10



1(b) For the problem shown in figure below, compute the maximum force *P* that can be applied by the machine operator, if the shearing stress in the pin at B and the axial stress in the control rod at C are limited to 30 MPa and 35 MPa respectively. The diameters are 7 mm for the pin, and 14 mm for the control rod. Assume single shear for the pin at B. 20



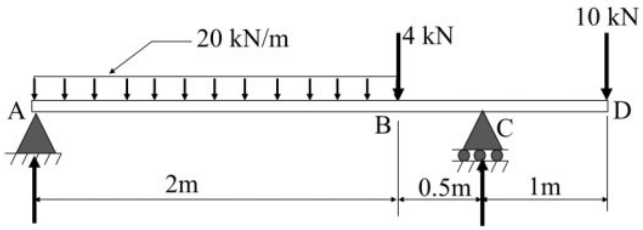
2(a) The steel shaft shown in figure below rotates at 4 Hz with 30 kW taken off at A, 20 kW removed at B and 50 kW applied at C. Using G = 80 GPa, find the maximum shearing stress and the angle of rotation of gear *A* relative to gear *C*. 18



2(b) Show that a hollow circular shaft whose inner diameter is half the outer diameter has a torsional strength equal to $\frac{15}{16}$ of that of a solid shaft of the same outside diameter. 12

3(a) A 10 m section of steel [$E = 200$ GPa and $\alpha = 11.9 \times 10^{-6} m/(m.°C)$] rail has a cross-sectional area of 7000 mm^2. Both ends of the rail are tight against adjacent rails that, for this problem, can be assumed to be rigid. The rail is supported against lateral movement. For an increase in temperature of 60°C, determine the normal stress in the rail. 10

3(b) Write shear and moment equations for the beam as shown in figure below. Also, draw shear and moment diagrams, specifying values at all change of loading positions and at points of zero shear. Neglect the mass of the beam. 20



SECTION-B

4. A 1035 hot rolled steel bar has been machined to a diameter of 25mm. It is to be placed in reversed axial loading for 70,000 cycles to failure in an operating environment of 450°C. Using ASTM minimum properties and a reliability of 99.99 percent, estimate the endurance limit and fatigue strength at 70,000 cycles. 30

5. A helical compression spring is made with oil-tempered wire with wire diameter of 5 mm, mean coil diameter of 50 mm, a total of 12 coils, a free length of 125 mm, with squared ends. 30
   (i) Find the solid length.
   (ii) Find the force necessary to deflect the spring to its solid length.
   (iii) Find the factor of safety guarding against yielding when the spring is compressed to its solid length.

6. A shaft is loaded in bending and torsion such that M_a = 80 N.m, T_a = 49 N.m, M_m =57 N.m, and T_m = 39 N.m. For this shaft, S_u = 690 MPa and S_y = 570 MPa, and a fully corrected endurance limit of S_e=210 MPa is assumed. Let K_f =2.2 and K_{fs}=1.8. With a design factor of 2.0 determine the minimum acceptable diameter of the shaft using the 30
   (a) DE-Gerber criterion
   (b) DE-elliptic criterion
   (c) DE-Soderberg criterion
   (d) DE-Goodman criterion.

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