

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 2nd Year 2nd Term 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) What is yarn evenness? Describe a yarn evenness test. 12
- 1(b) What is CSP? Describe a process of measuring yarn strength in skein method. 13
- 1(c) Write short notes on: (i) U% (ii) CV% (iii) CRT (iv) CRL. 10
- 2(a) Define irregularity. Discuss the causes of irregularity in yarn. 08
- 2(b) What is yarn hairiness? Discuss about a yarn hairiness test. 15
- 2(c) Describe a procedure of measuring effective length with a Shirley Comb Sorter. 12
- 3(a) Define moisture content and moisture regain. 05
- 3(b) Establish a relation between M.R & M.C . 10
- 3(c) What is relative humidity? Show a method of measuring moisture of a yarn package. 12
- 3(d) Briefly explain the effect of moisture on textiles. 08
- 4(a) Write short notes on : (i) CRE (ii) Work of rupture (iii) PMD 09
- 4(b) Describe a process of measuring relative humidity. 10
- 4(c) Discuss the factors affecting the tensile properties of textiles. 10
- 4(d) Show standard moisture regain of five different fibers mentioning impact of M.R on it. 06

SECTION-B

- 5(a) What is count? Show a relation between yarn diameter and count. 12
- 5(b) Weight of 2000m Nylon yarn is 1.6g. Find count of it in Denier, Tex, N_m and N_e 08
- 5(c) Discuss the effect of twist factor on physical properties of textiles. 09
- 5(d) Narrate a procedure of measuring count of a yarn 06
- 6(a) What are EPI & PPI? 02
- 6(b) Show a process of measuring fabric thickness. 12
- 6(c) What is stiffness? Describe a process of measuring fabric stiffness. 14
- 6(d) Show a process of measuring dimensional stability of a fabric. 07
- 7(a) Describe the method of measuring crease recovery of textile materials. 12
- 7(b) Tabulate the differences between crease resistance and crease recovery. 08

7(c)	Define crimp%. Describe the working principle of WIRA crimp tester.	15
8(a)	What is bending length? Show a procedure of measuring bending length of a fabric.	12
8(b)	Show a format of a lab report.	10
8(c)	Show a relation between Twist angle and yarn count.	07
8(d)	Write short notes on: (i) HVI (ii) AFIS (iii) Uster tester 5.	06

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
Department of Textile Engineering

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

ME 2221

(Solid Mechanics and Machine Design)

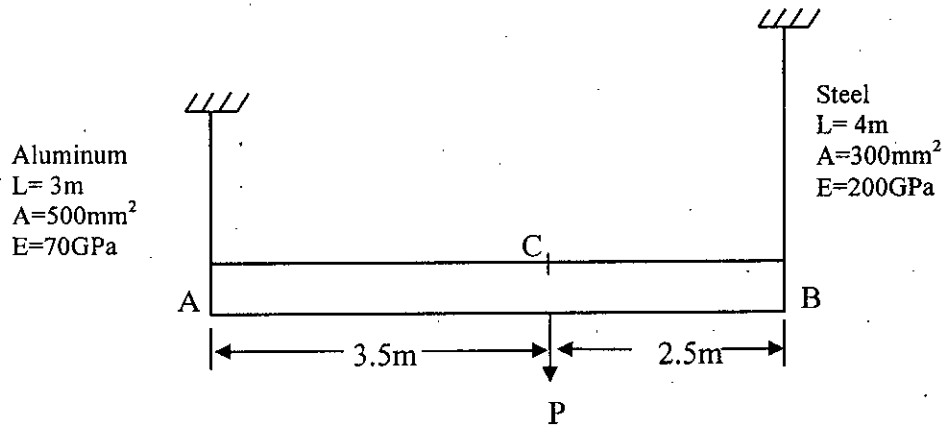
Time: 3 Hours

Total Marks: 210

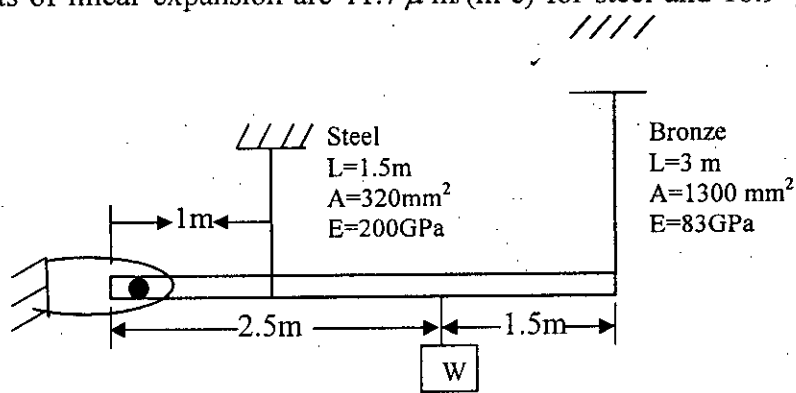
- N.B.:** i) Answer any THREE questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION-A

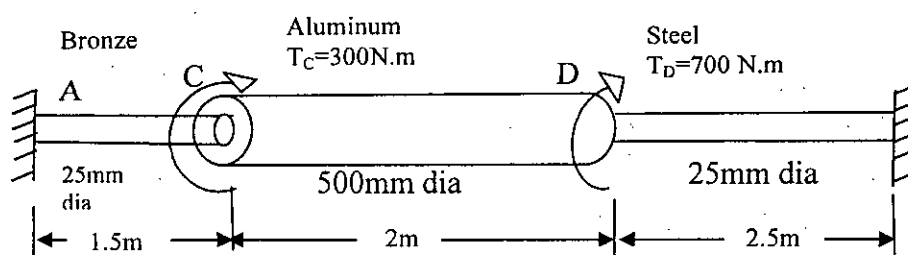
- 1(a) Draw the stress-strain diagram denoting significant points for (i) Cast iron (ii) High carbon steel and (iii) Mild steel. 09
- 1(b) Show that the tangential stress in a thin walled cylindrical shell of diameter D and wall thickness t subjected to internal pressure P are given by $\sigma_1 = \frac{PD}{2t}$. 10
- 1(c) The rigid bar AB attached to two vertical rods as shown is horizontal before the load P is applied. Determine the vertical movement of P if its magnitude is 50 kN. 16



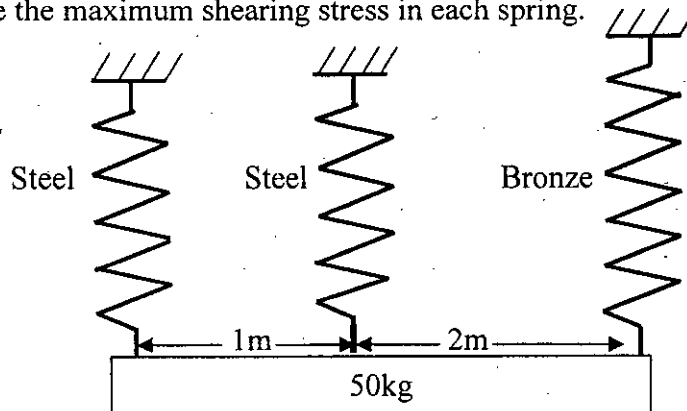
- 2(a) A rigid bar of negligible weight is supported as shown in figure. If $W=80$ kN, compute the temperature change that will cause the stress in the steel rod to be 55MPa. Assume the coefficients of linear expansion are $11.7 \mu\text{m}/(\text{m}^\circ\text{C})$ for steel and $18.9 \mu\text{m}/(\text{m}^\circ\text{C})$ for bronze. 18



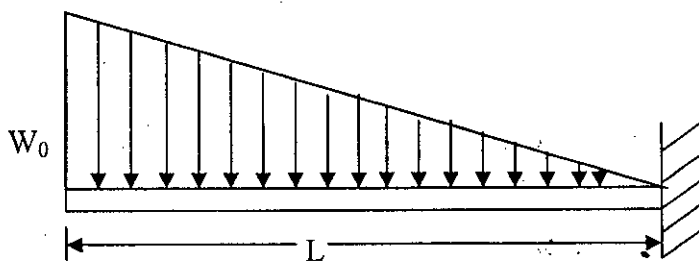
- 2(b) A shaft composed of segments AC, CD and DB is fastened to rigid supports and loaded as shown. For Bronze $G=35$ GPa, for Aluminum $G=28$ GPa and for Steel $G=83$ GPa. Determine the maximum shearing stress developed in each segment. 17



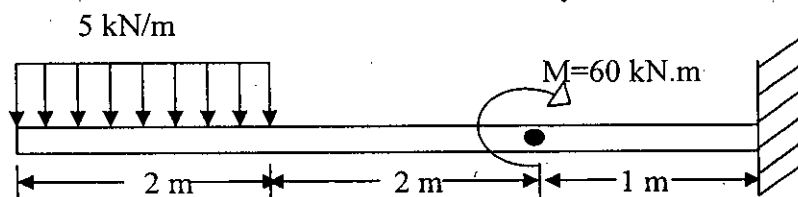
- 3(a) With necessary assumption, derive torsion formula for a solid and hollow shaft. 18
- 3(b) A homogeneous 50kg rigid block is suspended by the three springs as shown in figure, 17
 whose lower ends were originally at the same level. Each steel spring has 24 turns of 10mm diameter wire on a mean diameter of 100mm, and $G=83\text{GPa}$. The bronze spring has 48 turns of 20mm diameter wire on a mean diameter of 150mm and $G=42\text{GPa}$. Compute the maximum shearing stress in each spring.



- 4(a) Write shear and moment equations for the cantilever beam carrying a distributed load 18
 with intensity varying from W_0 at the free end to zero at the wall as shown in figure. 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.



- 4(b) Without writing shear and moment equations, draw the shear and moment diagrams for 17
 the cantilever beam acted upon by uniformly distributed load and a couple as shown in figure.



SECTION-B

- 5 A 4-in. 360° bearing with $L/D=1$ is to support 5 kips with a minimum film thickness 35
 0.0008 in. $C_d=0.004$ in. & $n=600$ rpm. Determine:-
- (i) Absolute viscosity of the oil
 - (ii) A suitable oil grade if the temperature is 160°F .
 - (iii) Frictional loss in hp.
 - (iv) For optimum value of minimum friction, determine the fhp and compare.

6 A pair of carefully cut, full depth 20° involute gears, made of cast iron ASTM 30 is transmitting 5 hp at 1150 rpm of the pinion, $N_p=24$, $N_g=32$, $P_d=8$, $b=1.5$ in. . For the teeth, determine:- 35

- (i) The endurance strength
- (ii) The dynamic load and
- (iii) The service factor

7 A belt drive is to be designed for $\frac{F_1}{F_2}=3$, while transmitting 60 hp at 2700 rpm of the driver D_1 , $m_w \cong 1.85$. Use a medium double belt, cemented joint, a squirrel-cage, compensator-motor drive with mildly jerking loads, center distance is expected to be about twice the diameter of larger pulley. 35

- (i) Choose suitable iron pulley sizes and determine the belt width for $S=300$ Psi.
- (ii) Determine the belt width by ALBA procedure.
- (iii) Compute the maximum stress of the straight part.
- (iv) What is $\frac{F_1}{F_2} = ?$ if $F_1=525$ Ib.

8 A 200-hp, 600 rpm induction motor is to drive a jaw crusher at 125 rpm; starting load is heavy; operating with shock; intermittent service; $c=113$ to 123 in.. Recommend a multiple V-flat drive for this application. The B.F. Goodrich company recommended eight D480 V-belts with a 26-in. sheave and a 120.175 in. pulley; $c \approx 116.3$ in. 35

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

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

EE 2221

(Instrumentation and Electrical Control)

Time: 3 Hours

Total Marks: 210

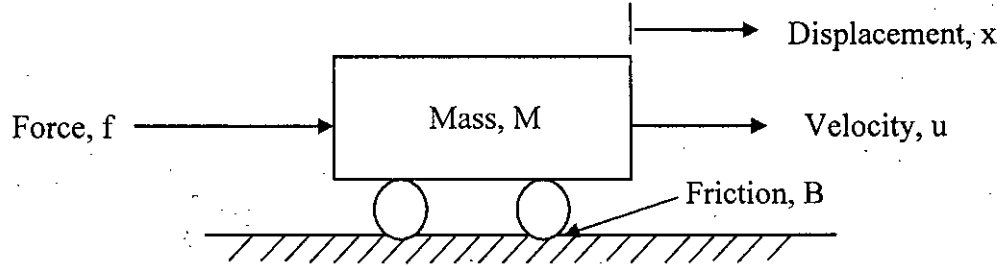
N.B.: i) Answer any THREE questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION-A

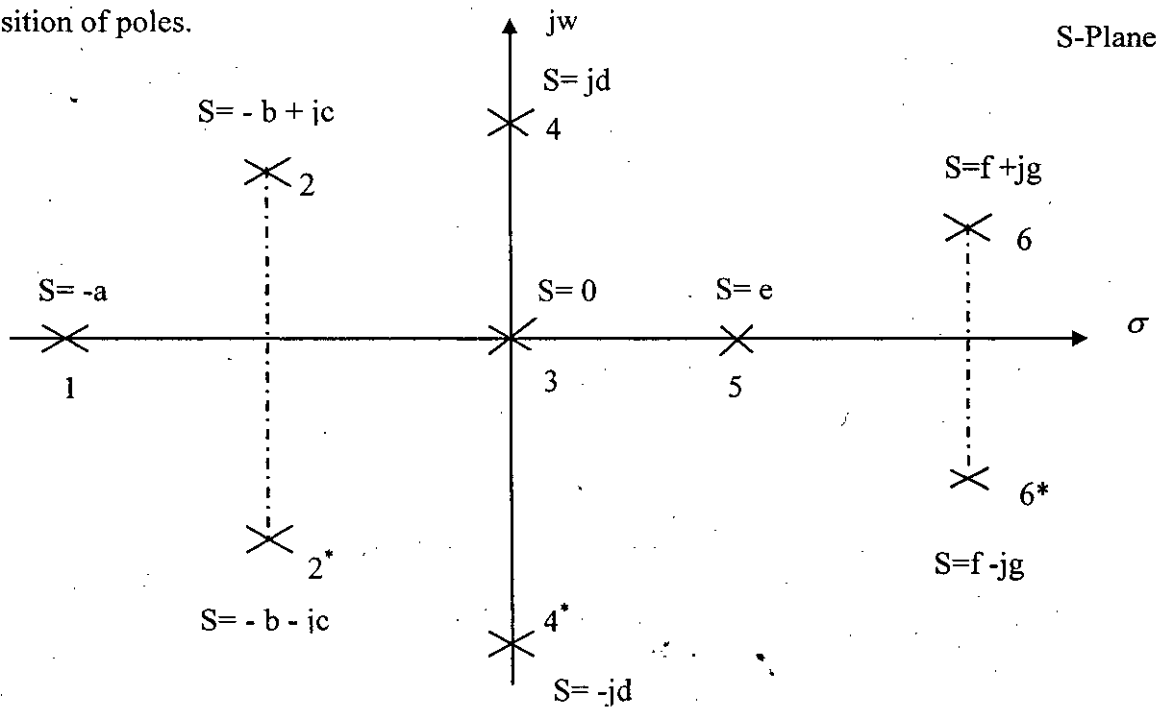
- 1(a) What is data acquisition system? Draw the block diagram of it and describe each block. 10
- 1(b) Describe a method for measurement of low resistance in which there is no erroneous problem of lead resistance. 10
- 1(c) Classify resistance with specifying their ranges of values and suggest some method for measurement of these resistances. How to avoid leakage current effect of high resistance measurement? 15
- 2(a) Describe two AC bridges by which you can measure capacitance and inductance. 15
- 2(b) Explain the method for measurement of earth resistance. Why earthing is necessary for electrical system? 10
- 2(c) On a 250V supply, a fault having a resistance of $20\ \Omega$ develops between the unearthed end of the winding of an electric heater and the frame. If the resistance of the substation earth electrode is $4\ \Omega$ that of human body $2000\ \Omega$ and the state maximum current through the body is 25mA, what is the safe maximum resistance of consumer's earth electrode? 10
- 3(a) Classify transducer. Describe different mechanism for converting Linear motion into electrical signal. 10
- 3(b) Deduce the equation for gauge factor. How does capacitive transducer work? 10
- 3(c) Explain different ways for converting temperature into electrical signal. How smoke can be detected in an enclosed space? 15
- 4(a) What is strain gauge? A compressive force is applied to a structural member. The strain is 5 micro-strain. Two separate strain gauges are attached to the structural member, one is a nickel wire strain gauge having a gauge factor of -12.1 and the other is nichrome wire strain gauge having a gauge factor of 2. Calculate the value of resistance of the gauges after they are strained. The resistance of strain gauges before being strained is $120\ \Omega$. 12
- 4(b) Describe the operation of LVDT with proper diagram. 08
- 4(c) Explain the mechanism for operating any de electrical device from using the sunlight as energy sources. Describe maximum power point for photovoltaic cell. 10
- 4(d) Write down the advantages of digital instruments over analog instruments. 05

SECTION-B

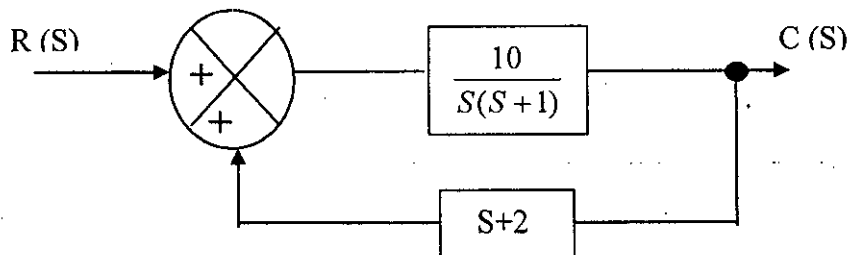
- 5(a) Define control system. Explain open loop and closed loop control system with basic block diagram representation. 08
- 5(b) Consider the following automobile system as shown in below figure. Represent the system using mathematical modeling, transfer function and block diagram. 06



- 5(c) Define poles and zeros. For the following positions of poles in S-plane as shown in below figure, draw the system homogenous response and comment on system stability for each position of poles. 12

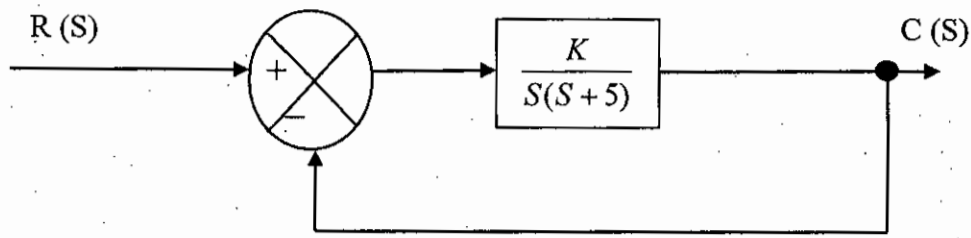


- 5(d) For a diagram modeled by the block diagram of below figure, find the poles and zeros of the system and comment on system stability. Also write the mathematical model for the system in differential equation form. 09

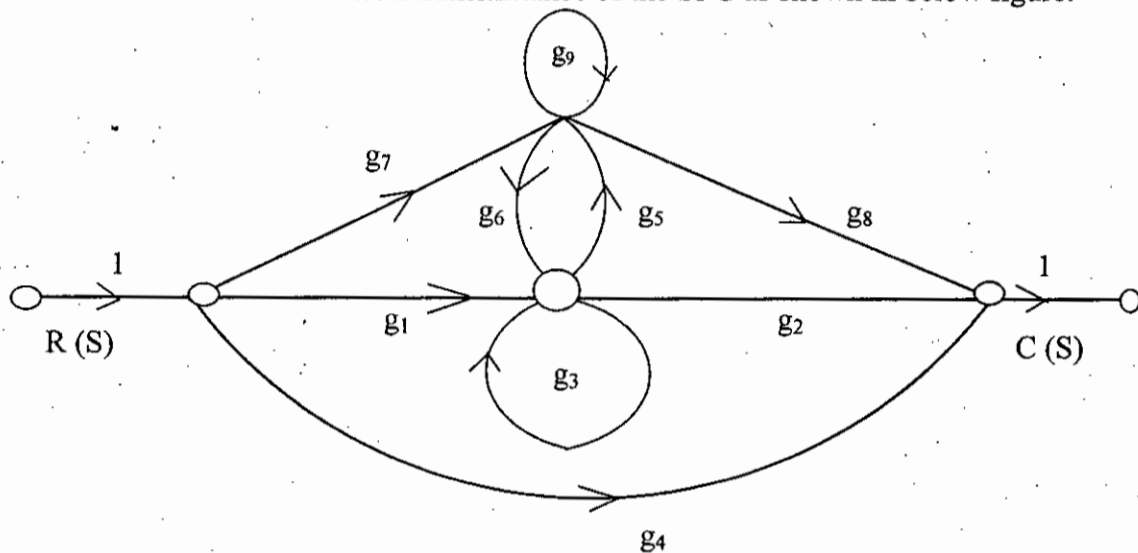


- 6(a) Show that transient response of a system is given by $C_{tr} = A e^{at} \sin(\omega_d t + \Phi)$, when all roots are complex. 15
- 6(b) Define under damped, over damped, critically damped, undamped and unstable system with their necessary pole-zero maps and system response. Also mention their typical value of damping ratio. 10

- 6(c) Define damping ratio. Design the value of gain K for the unity feedback control system as shown in figure, so that the system will response with a 10% overshoot. 10



- 7(a) The performance equation of a DC motor is given by $A_2 D^2 W_m + A_1 D W_m + A_0 W_m = e_a$. Where W_m is the response and e_a is input. Find the steady state response when a DC voltage is applied as input. 10
- 7(b) What is SFG? Obtain the overall transmittance of the SFG as shown in below figure. 12



- 7(c) Explain Routh's stability criterion. The characteristic equation of a system is given by $Q(S) = S^5 + S^5 + 10S^3 + 72S^2 + 152S + 240$ whether system is stable or unstable. Find the number of roots and show them graphically. 13
- 8(a) Classify industrial controllers. Describe P, PI and PID controllers. 10
- 8(b) What is PLC? Described the generalized block diagram of PLC. 12
- 8(c) Define microprocessor and microcontroller. Draw the bus architecture of 8085 microprocessor. 13

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 2nd Year 2nd Term 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) Write the importance of fabric analysis very briefly. 05
- 1(b) State the necessity of drafting plan, lifting plan and denting plan. Give graph paper example of drafting and lifting plan of any suitable weave. 10
- 1(c) How warp and weft from a piece of woven cloth can be identified? 08
- 1(d) Define contact field, interlacing field, free field and open field with suitable representation. 12
- 2(a) How ornamentation of plain cloth can be done? 05
- 2(b) Compare fancy matt and stitch matt. 06
- 2(c) Give graph paper example with drafting and lifting plans of the followings:- 24
- (i) Regular matt on 16×16.
- (ii) Irregular warp rib on 20×20.
- (iii) Regular weft rib on 20×20.
- 3(a) Describe the methods of indicating drafting plan. Compare divided draft and group draft. 12
- 3(b) Give graph paper example with drafting and lifting plans of the following designs:- 16
- (i) Diamond weave on 20×20.
- (ii) Horizontal Zigzag based on $\frac{4}{3}$ twill.
- 3(c) Give graph paper example of the followings:- 07
- (i) Expanded twill.
- (ii) Warp face twill.
- 4(a) Depict the factors on which the prominence of twill line depends. 08
- 4(b) Give graph paper example of the following designs with drafting plan and lifting plan- 27
- (i) Odd no. Cork screw weave
- (ii) Weft way elongated twill based on $\frac{4}{2}$ twill.
- (iii) Warp way stepped twill on $\frac{3}{1}$ twill base.

SECTION-B

- 5(a) Classify satin weaves. State the conditions for selection of move number for satin weaves. 10
- 5(b) Differentiate between satin and sateen weaves. Give graph paper examples of regular satin and irregular sateen. 20
- 5(c) Mention the end uses of Zigzag, Herring bone, Diamond, Diaper and Broken twill. 05
- 6(a) Give graph paper example with drafting and lifting plan of the followings:- 27
- (i) Devon Hucka back.
 - (ii) 24×24 brighton Honey comb.
 - (iii) Weft distorted effect
- 6(b) Mention the technical features and specific end uses of Mock leno and ordinary Honey comb weaves. 08
- 7(a) How crepe weaves can be constructed by superimposing? Discuss the construction principle and give example with drafting and lifting plan. 12
- 7(b) Give graph paper example of a wadded twill faced Bedford Cord weave with drafting and lifting plan. 13
- 7(c) Why wadded threads are used with Bedford Cords? 05
- 7(d) State the feature of Bedford Cord weaves. 05
- 8(a) Show graph paper example of stripe design which is constructed by combining warp and weft face weaves, with drafting and lifting plan. 15
- 8(b) Give graph paper example of plain faced Bedford Cord on alternate picks, with drafting and lifting plan. 12
- 8(c) Discuss the specific end uses of crepe weaves. 08

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

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

Hum 2221

(Sociology and Economics)

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 Sociology? Why Sociology is important for the students of textile engineering? 10
1(b) What is social stratification? Why human society is stratified? 10
1(c) Differentiate between class system and caste system. 15

2(a) What is "Urban Growth"? What are the causes of "Urban Growth"? 10
2(b) Explain the social and behavioral characteristics of urban living. 15
2(c) What is suburban? What are the problems of suburban living? 10

3(a) What is difference between crime and deviant behavior? 05
3(b) Explain the Demographic transition theory of population? 15
3(c) Explain the role of social bonding for social control. 15

4(a) Explain the Biological and Cultural context of human behavior. 15
4(b) Explain the carriers of culture that share every society 20

SECTION-B

- 5(a) How is ECONOMICS like a science? Distinguish between Microeconomics and Macroeconomics. 15
5(b) Use a production possibility frontier (PPF) to illustrate society's tradeoff between a clean environment and high income. Explain. 10
5(c) Show what happens to the Frontier if engineers develop an automobile engine with almost no emissions. 10

6(a) Pharmaceutical drugs have an inelastic demand and computers have an elastic demand. Suppose, that technological advance doubles the supply of both products (that is, the quantity supplied at each price is twice what it was).
a) What happens to the equilibrium price of quantity in each market? 15
b) Which product experiences a larger change in price and which in quantity? 10
c) What happens to total consumer spending on each product? 10

- 7(a) What is an indifference curve? Discuss the characteristics of an indifference curve. 10
- 7(b) A person who consumes coke and cheese gets a raise, so his income increases from \$3000 to \$4000. Show what happens if both coke and cheese are normal goods. Now show what happens if cheese is an inferior good. 15
- 7(c) Draw and explain the cost curves for a typical farm for a given price. 10
- 8(a) If price rise, people's income from selling goods increases, the growth of real GDP ignores the gain, however, why does Economist prefer real GDP as a measure of Economic well-being? 15
- 8(b) What are national savings, private savings and public savings? 10
- 8(c) What is the role of financial system? Mention the name and describe two markets that are part of the financial system in our economy. 10

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