## SECTION-A

1(a) What constitutes excess work content? What are the techniques to reduce the work contents? — 10

1(b) What is work simplification? How does it help in work study? — 10

1(c) Write down about micro-motion study. What are the applications of micro-motion study? — 10

1(d) Write a note on cycle graph and chronocycle graph. — 05

2(a) Define 'SIMO Chart' and 'Travel Chart'. What are the information that should be given in a chart? — 10

2(b) What is the main difference between operation process chart and flow process chart? Construct a flow process chart for the machining of a component. — 15

2(c) What are the benefits and expectations of various stakeholders from productivity? — 10

3(a) Write short notes on: — 10
   i) Predetermined Motion Time Study (PMTS)
   ii) Work Sampling

3(b) A worker operating on a machine performs the following elements. The description of element, their observed time and rating are given. Compute the standard time for the component. — 15

| Element | Description | Observed time | Rating | Relaxation allowance |
|---------|-------------|---------------|--------|----------------------|
| A | Position the job | 0.25 | 80% | 10% |
| B | Switch 'ON' and lower drill | 0.09 | 100% | 11% |
| C | Drill hole | 2.8 | 90% | 12% |
| D | Raise drill and switch 'OFF' | 0.05 | 80% | 10% |
| E | Remove job from jig | 0.15 | 110% | 11% |

3(c) Explain the effect of following on standard time: — 10
   i) Skill of the operator
   ii) Variation in work

4(a)  Solve the following game graphically                                      15

|   |   | B |   |
|---|---|---|---|
|   |   | 1 | 2 |
| A | 1 | 2 | 4 |
|   | 2 | 2 | 3 |
|   | 3 | 3 | 2 |
|   | 4 | -2 | 6 |

4(b)  Consider the following set of constraints:                                20

$$x_1 + 2x_2 + 2x_3 + 4x_4 \leq 40$$

$$2x_1 - x_2 + x_3 + 2x_4 \leq 8$$

$$4x_1 - 2x_2 + x_3 - x_4 \leq 10$$

$$x_1, x_2, x_3, x_4 \geq 0$$

Solve the problem for the following objective function,

Maximize, $Z = 3x_1 - x_2 + 3x_3 + 4x_4$

# SECTION-B

5(a)  What are the primary reasons for holding inventory?                       05

5(b)  Describe briefly the A-B-C approach to inventory control.                 10

5(c)  The Dine corporation is both a producer and a user of brass coupling. The firm operates    20
220 days a year and uses the coupling at a steady rate of 50 per day; Coupling can be
produced at a rate of 200 per day. Annual storage cost is $2 per coupling, and machine
setup cost is $70 per run.

    i)    Determine the economic run quality,

    ii)    Approximately how many runs per year will there be?

    iii)    Compute the maximum inventory level.

    iv)    Determine the length of pure consumption portion of the cycle.

6(a)  Define scheduling. Why is scheduling fairly complex for job shops?        05

6(b)  The following table contains information on the cost to run three jobs on four available    15
machines. Determine an assignment plan that will minimize costs.

|   |   | MACHINE | | | |
|---|---|---|---|---|---|
|   |   | A | B | C | D |
| Job | 1 | 12 | 16 | 14 | 10 |
|   | 2 | 9 | 8 | 13 | 7 |
|   | 3 | 15 | 12 | 9 | 11 |

6(c) The following table contains information concerning four jobs that are awaiting 15 processing at a workcenter.

| Job | Job Time (days) | Due date (days) |
|-----|-----------------|-----------------|
| A | 14 | 20 |
| B | 10 | 16 |
| C | 7 | 15 |
| D | 6 | 17 |

Find:

   i)      Sequence the job using (1) FCFS (2) SPT (3) EDD

   ii)     For each of the methods in part (i), determine the average flowtime, average tardiness and average number of jobs at the workcenter.

7(a) Differentiate between CPM and PERT.    10

7(b) The table contains information related to the major activities of a research project. Use 20 the information to do the following.

| Activity | Immediate predecessor | Expected Time (days) |
|----------|-----------------------|----------------------|
| a | - | 5 |
| c | a | 8 |
| d | c | 2 |
| b | a | 7 |
| e | - | 3 |
| f | e | 6 |
| i | b,d | 10 |
| m | f,i | 8 |
| g | - | 1 |
| h | g | 2 |
| k | h | 17 |
| end | k,m | |

   i)      Draw a precedence diagram using AOA rule.

   ii)     Find the critical path.

   iii)    Determine the expected length of the project.

7(c) Write short notes on group layout.    05

8(a) A large manufacturer of pencil sharpeners is planning to add a new line of sharpeners, **15** and you have been asked to balance the process. Given the following task times and precedence relationships. Assume that cycle time is to be the minimum as possible.

| Task | Length (Minutes) | Immediate follower |
|------|------------------|--------------------|
| a | 0.2 | b |
| b | 0.4 | d |
| c | 0.3 | d |
| d | 1.3 | g |
| e | 0.1 | f |
| f | 0.8 | g |
| g | 0.3 | h |
| h | 1.2 | end |

8(b) The Second National City Bank, following the civil war in Lebanon, decided to **20** relocate its Beirut branch office to another city in the region. In order to be close to its customers, the bank's planning group suggested relocating to one of three cities: Ankara, Turkey; Athens, Greece; or Cairo, Egypt. The annual operating costs for the relocated branch including rents for office space, wages, taxes etc. were estimated as follows: Ankara $5.8 million, Athens $6.2 million and Cairo $4.9 million. The management of the Second National concluded that for its business the most important subjective factors were i) government bureaucracy ii) services available (telex, telephone etc.) and iii) political stability (government changes, riots, strikes etc.). All these views as being equally important. Management in this case felt that objective factors were equally important to relevant subjective factors. Following responses to forced pairwise comparison, the following results were obtained:

| Site | Govt. bureaucracy, pairwise comparisons | | | Services, pairwise comparisons | | | Stability, pairwise comparisons | | |
|------|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| Ankara | 0 | 1 | | 1 | 1 | | 0 | 0 | |
| Athens | 1 | | 1 | 1 | | 1 | 1 | | 0 |
| Cairo | | 0 | 0 | | 0 | 0 | | 1 | 1 |

  i)   Determine the objective-factor measure for each relocation city.

  ii)  Determine the subjective-factor measure for each relocation city.

  iii) Select the best relocation city if objective and subjective factors are equally important.

----**END**----

## SECTION-A

| | | |
|---|---|---|
| 1(a) | Write the features of modern spinning. | 05 |
| 1(b) | Describe the mechanism of yarn formation from sliver in rotor spinning. | 10 |
| 1(c) | Why rotor spinning is called breakage spinning? | 05 |
| 1(d) | Make a comparative statement between ring and rotor yarn properties. | 10 |
| 1(e) | In a rotor spinning machine, rotor speed = 90000 rpm, rotor dia = 60 mm. Fiber, sliver and yarn linear density are 0.20 tex, 4000 tex and 25 tex respectively. Find the following: | 05 |

      i)     Total draft

      ii)    TPM

      iii)   Rate of delivery

      iv)   No. of fibers in yarn cross section

      v)    Production/shift/frame in kg

      (TM = 4500; No. of rotor/frame = 100)

| | | |
|---|---|---|
| 2(a) | What is rotor deposite? Describe the causes and remedies of rotor deposite. | 15 |
| 2(b) | List the merits and demerits of rotor spinning. | 06 |
| 2(c) | Make a comparative statement among the ring, rotor, friction and airjet spinning system. | 05 |
| 2(d) | Write the principle of friction spinning. | 06 |
| 2(e) | Mention the different modern spinning system. | 03 |

| | | |
|---|---|---|
| 3(a) | Narrate the operating principle of Air-vortex spinning. | 10 |
| 3(b) | Show the advantages and disadvantages of Air-vortex spinning. | 08 |
| 3(c) | What is false twist? Discuss the false twist with the necessary diagrams. | 12 |
| 3(d) | Write some features of Dref-2 process. | 05 |

| | | |
|---|---|---|
| 4(a) | Depict the different process parameters for blending P/C in cotton spinning machine. | 25 |
| 4(b) | Why Cotton-Polyester blending is done in draw-frame? | 05 |
| 4(c) | *Point out the merits of blending.* | 05 |

# SECTION-B

5    Make a Jute Spin Plan for the production of 500 ton/month of CBC yarn.    35
     (Assume all necessary parameters)

6(a)   Differentiate between woolen and worsted yarn. Show the flow chart of worsted yarn.    08
6(b)   Describe the spinning process of woolen yarn.    15
6(c)   Explain the principle of warp spinning.    07
6(d)   Mention the characteristics of good spin finishing.    05

7(a)   What is fancy yarn? Discuss seven different types of fancy yarns.    13
7(b)   What is texurising? Describe a process of texurising.    10
7(c)   Discuss the spin-guard spinning system with the necessary diagram.    12

8(a)   State the Repco Spinning System with the specification of the concerned machine.    12
8(b)   Describe a procedure of making a core spun yarn.    10
8(c)   Evaluate the twist effect on fabric structure.    06
8(d)   State diversified use of Jute. Show relation between Tex and Jute count with example.    07

----END----

KHULNA UNIVERSITY OF ENGINEERING &TECHNOLOGY
*Department of Textile Engineering*
B. Sc. Engineering 4th Year 2ndTerm Examination, 2017
**TE-4203**
(Fabric Manufacturing Engineering-III)

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) | Define yarn traverse velocity and coil angle. | 05 |
| 1(b) | Prove that, $V_t \cos\theta = \pi dn \sin\theta$ where the symbols have their usual meanings. | 12 |
| 1(c) | Establish the relationship between taper angle and the amount of yarn. | 10 |
| 1(d) | Calculate the number drums required to wind 580 lb of 24's in 12 hours. If efficiency is 70% and allow 4% for wastage and left on the bobbins- where RPM of drum is 300 and drum diameter is 4.5 inch. | 08 |

| | | |
|---|---|---|
| 2(a) | Narrate the modern trends in size ingredients. | 10 |
| 2(b) | Make a comparison between multi-cylinder drying and infra-red drying. | 05 |
| 2(c) | Briefly discuss the scopes of recycled manufacturing in garment industry. | 10 |
| 2(d) | Prove that, for conventional loom weft waste% increases with coarser weft and wider fabrics. | 05 |
| 2(e) | The stretch in a sizing machine processing acrylic warp yarn is 2%, 3% and 2% in the creel zone, sizing zone and drying zone respectively. If the warp crimp in the woven fabric is 12% then determine the length of fabric that could be produced from 1500 m length warp sheet in each of the warper's beam. | 05 |

| | | |
|---|---|---|
| 3(a) | Show that, warp strain reduces as the shed becomes symmetric. | 10 |
| 3(b) | Describe the retarded delivery to overcome the buckling of weft during direct weft insertion. | 10 |
| 3(c) | Write the working principle of Shirley take-up motion with relevant calculations. | 10 |
| 3(d) | Write a short note on modernization approach of a production plant. | 05 |

| | | |
|---|---|---|
| 4(a) | What is multiphase weaving system? | 05 |
| 4(b) | What are the basic features of multiphase weaving? | 08 |
| 4(c) | Sketch shed position diagram for $\frac{6}{4}$ plain weave. | 12 |
| 4(d) | How can you determine the elastane % of a fabric which is provided by a new buyer? | 10 |

## SECTION-B

5(a) What is meant by knitting program? What are the importance of knitting program for a factory knitting manager?  12

5(b) What are the importance of multi-feeder machine?  07

5(c) What are the differences between color and color finger box?  06

5(d) Draw an organogram of a knitting floor.  10

6(a) Define 3D ad Multi axial fabric with neat sketch.  10

6(b) What are the differences between linear cam and non-linear cam system?  10

6(c) Describe the working procedure of newly received swatch which is given by H&M buying house.  15

7(a) Narrate the main features of braid fabrics.  05

7(b) "Belt problem increases with the increase in thickness of belt but decreases with dia. of the pulley"- Explain the statement.  15

7(c) Write a short notes on knitting element, yarn tension and fibrous dust system when man-made fabric is produced in weft knitting machine.  15

8(a) Suppose you are a knitting and finishing manager of Interstoff Group. How can you solve the size problems of collar and cuff?  10

8(b) What is meant by needle drop fabric?  05

8(c) How many ways to determine the needle arrangements and cam arrangements of needle drop jersey having 12 wales are knit and 1 wales one miss loops?  15

8(d) How can you identify Fleeces and Terry in laboratory?  05

----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 computer color matching system? Write down the advantages of computer   08
color matching system.

1(b)   Derive the following equation of Kubelka-Munk Theory for matching shade of dyed   17
fabric.

$$\frac{K}{S} = \frac{(1-R)^2}{2R}$$

Where, R = Reflectance, K and S = Absorption and scattering co-efficient respectively.

1(c)   Mention the parameters and their necessities for measuring the shade of colored textile   10
materials in spectrophotometer.

2(a)   Write down the additive and substractive color theory.   08

2(b)   If color difference value ΔE (between standard and a trail sample) is less than 1 using   12
CIELAB and CIELCH theory, do you think both tolerance methods give same result
with visual assessment? Explain your argument for both theories with proper sketch.

2(c)   What is spectrophotometer? Write down the necessity of UV cut off filter, adjustable   08
lens and double beams in reflectance spectrophotometer.

2(d)   Why integrating sphere is used in spectrophotometer instead of bi-directional   07
geometry? Explain with proper diagram.

3(a)   What is metamarism? Which factors have to be considered for shade metamarism of   08
dyed fabric?

3(b)   Write short notes on the following light sources:   09
    i)TL 84 ii) D 65 and iii)CWF

3(c)   State the symptoms and causes of color blindness.   06

3(d)   Suppose your shade status after checking with standard as like below-   12

| ill/obs. | DL* | Da* | Db* | De* | DH* | DE* |
|----------|------|------|-------|-------|------|------|
| D 65/10° | -1.29 | 0.20 | -0.13 | 0.18 | 0.16 | 1.32 |
| TL 83/10° | -1.29 | 0.11 | -0.01 | -0.04 | 0.11 | 1.30 |

Find out:
    i)      Darkness/lightness of shade.
    ii)     Reddish/greenish and yellowish/bluish percentage.
    iii)    Pass/Fail according to CIE LAB theory. If fail, which reasons are
         responsible for failed? How to correct this?

iv) Do you think the value of chroma and hue difference are ok for this shade? If yes or not, why?

v) Metamarism index of this shade under two light sources. Comment is it metamaric or non-metamaric?

4(a) What is solvent scouring? Describe the process of solvent scouring with diagram.     10

4(b) After padding or J-box treatment of open width fabric, fabric is treated at steamer or vapor-loc unit. When and why two different chambers are used? Explain.     05

4(c) Why pre-drying is necessary pad-dyeing of woven fabric? Explain.     06

4(d) When should cold pad batch dyeing should be promoted?     08

4(e) Write down the listing and Tailing effect of woven dyed fabric. Which factors are responsible for these problems?     06

## SECTION-B

5(a) Write down the controlling parameters of padding mangle and stenter machine.     08

5(b) How the adverse effect on fabric color due to drying can be minimized?     05

5(c) Describe the working procedure of cylinder and hot air dryer with fabric passage diagram.     15

5(d) Why fabric speed is an important factor during drying?     07

6(a) Discuss Roberto fiber-filled rollers of expression technique for low wet pick up finishing.     15

6(b) Mention the considerable factors of low wet pick up finishing.     08

6(c) Write down the difference between topical and expression technique.     06

6(d) If the fabric reflectance of OBA dyed fabric is more, how the reflectance can be adjusted as per standard swatch?     06

7(a) Why electrostatic method is convenient for flock application? Describe this procedure.     15

7(b) What kind of information we can get from print artwork?     05

7(c) Why neutralization is necessary after burnout printing?     05

7(d) Why adjustment of heating is necessary for puff printing?     05

7(e) Mention two printing faults with remedial technique.     05

8(a) What is ink-jet printing? Why ink-jet printing is special than other printing styles?     05

8(b) Write down the properties for ink used in ink-jet printing.     07

8(c) Describe continuous ink jet printing with relevant figure.     15

8(d) Mention the differencesbetween continuous ink-jet and drop on demand ink-jet printing method with figure.     08

----END----

KHULNA UNIVERSITY OF ENGINEERING &TECHNOLOGY
*Department of Textile Engineering*
B. Sc. Engineering 4th Year 2ndTerm Examination, 2017
**TE-4207**
(Apparel Manufacturing Engineering-IV)
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 production planning? Mention the responsibilities of production management   08
       of a RMG industry.

1(b)   16 workers manufacture 520 pcs of polo shirt in 8 hours shift. SMV of a polo is        05
       8 minutes. Calculate labor productivity.

1(c)   Define production bottleneck. How production bottlenecks can be eliminated? Discuss   07
       briefly.

1(d)   Shed some light on the allowances considered in SMV calculations. Calculate SMV for   15
       the operations tabulated below-

| Elements | Observed rating | Observed time | Frequency |
|---|---|---|---|
| Get bundle and sort parts | 95 | 0.32 | 1/30 |
| Match pocket flap to lining | 105 | 0.11 | 1/1 |
| Sew round flap | 100 | 0.48 | 1/1 |
| Trim threads and turn-out flap | 85 | 0.35 | 1/1 |
| Top stitch flap | 90 | 0.56 | 1/1 |
| Close bundle and place aside | 110 | 0.23 | 1/30 |

2(a)   A garment factory has 240 machines in operation manned by 220 operators. The          20
       machines cannot be worked without an operator wholly engaged on it. The original
       cost of all these 240 machines is Tk 5000000. The following particulars are for a
       period of 1 year. Compute the comprehensive machine hour rate.

       Normal available hours per month                 :   210

       Absenteeism (without pay) hours per month         :   20

       Leave (with pay) hours per month                  :   20

       Normal idle hours per month                       :   10

       Average rate of wages per day of 8 hours          :   Tk 100

       Production bonus estimated                        :   15% on wages

       Value of power consumed                           :   Tk 100000

       Supervising and indirect labour                   :   Tk 200000

       Lighting and electricity                          :   Tk 25000

       Repairs and maintenance                           :   2% on value of machines

       Insurance                                         :   Tk 60000

       Depreciation                                      :   15% on original cost

2(b) What is progressive bundle system? Elaborate progressive bundle system and specify  10
for which type of product it can be more effective.

2(c) Write short not on GSD.  05

3(a) State the importance of cutting room management.  05

3(b) Why ratio marker is more efficient for fabric consumption? Explain briefly.  05

3(c) Plan an optimum cut for the following order-  13

| Colors\Sizes | S | M | L | XL |
|---|---|---|---|---|
| RED | 21 | 42 | 42 | 21 |
| BLUE | 42 | 42 | 42 | 21 |
| GREEN | 21 | 42 | 42 | 21 |

Consider: i) Maximum ply height is 21

      ii) Number of garments per marker = 4

3(d) The pre-production plan of a garment factory for the next 13 weeks has provided the  12
following information-

| Style | Order Qty. | SMV/gmt. |
|---|---|---|
| A | 20000 | 30 |
| B | 8000 | 42 |
| C | 36000 | 20 |
| D | 24000 | 35 |

Has the factory sufficient capacity to meet the plan?

If the style 'D' is the first style to be delivered and we have 2 production lines
available-

*Line 1 has 40 operators having 85% efficiency.

*Line 2 has 35 operators having 85% efficiency.

Make a Gantt chart based on the mentioned information.

4(a) List out the name of the parts of a space suit.  05

4(b) Write about the fabrics and sewing threads used for manufacturing firefighter's turnout  10
gear.

4(c) Discuss the theories of fashion movement.  13

4(d) Mention the responsibilities of a fashion merchandiser. What is fashion forecasting?  07

# SECTION-B

5(a) Define the term merchandising. State the flowchart of a factory merchandiser's activities.    17

5(b) What is a tech pack? Explain each point, on how a tech pack can help executing an order.    12

5(c) Name the documents required for conducting apparel shipment process.    06


6(a) Draw and explain L/C cycle operation in apparel sector.    15

6(b) What is compliance? Narrate the code of conduct for garment workers in Bangladesh.    15

6(c) State the importance of Back to back L/C for suppliers.    05


7(a) Prepare a cost sheet for a basic T-shirt based on following parameters:    32

Item: Men's short sleeve T-shirt; Fabrication: 100% Cotton Single Jersey; 180 GSM (in mixed color ratio)

| | | Sizes | | | |
|---|---|---|---|---|---|
| | | S | M | L | XL |
| Parameters | Body length | 70 | 72 | 74 | 76 |
| | ½ Chest | 50 | 52 | 54 | 56 |
| | Sleeve length | 24 | 24 | 25 | 25 |
| | Bottom hem | 2 | 2 | 2 | 2 |

Consider:

Per kg fabric price is $5.25; Total stitch quantity of an embroidery design is 18000 and rate/ unit is $0.24

Factory total expenditure per month is $40000

Total number of machines in factory is 800 pcs.

Total number of machines required to complete the T-shirt is 25

Target output is 180 pcs/hour

Total working days/month is 26 days; Total working hours per day is 08 hours

Test cost/dzn is $2.5

Accessories price/dzn $2.5

Documentation cost/dzn $0.25

7(b) What are the differences between FOB, CIF and FAS?    03


8(a) What is Global Sourcing? Illustrate Global Sourcing cycle process for fabric procurement.    13

8(b) Present the common format of an inventory report.    10

8(c) List out the information that a B/L and CI normally include.    12


----END----

KHULNA UNIVERSITY OF ENGINEERING &TECHNOLOGY
*Department of Textile Engineering*
B. Sc. Engineering 4th Year 2ndTerm Examination, 2017
**TE-4225**
(Machine Maintenance, Materials Handling and Safety)
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)   Describe the objectives and economic aspects of maintenance.                    12

1(b)   Discuss the following elements of maintenance:                                   12

       i)      Inspection or checkups

       ii)     Planning and scheduling

       iii)    Records and analysis

1(c)   A weaving factory has 200 looms and the maintenance engineer supervises the repair     06
crews who repair malfunctioning looms. The maintenance policy is to repair the broken
down looms and bring back in the production within 2 hours on the average. If average
breakdown rate is 3.5 looms/hour and each crew can repair 0.25 looms/ hour on the
average, how many repair crews are required to carry out the maintenance activities?

1(d)   State the requirements of good maintenance.                                      05


2(a)   What is CMMS? Describe the problems associated with CMMS.                        10

2(b)   Mention the wastes that are eliminated in TPM with brief description.            10

2(c)   Define Overall Equipment Efficiency and Uptime %.                               08

2(d)   Distinguish between centralized and decentralized maintenance management system. 07


3(a)   Depict the important checking points for preventing leakages of textile and other    10
machinery.

3(b)   Suppose, a textile equipment contains 1000 similar parts. When any one of the parts   20
fails, it is replaced. The cost of replacing a part individually is BDT 10.00. If all the
parts are replaced at the same time, the cost per part is BDT 3.00. The percent
surviving. $S_i$ at the end of the month $i$ is given below-

| $i$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|-----|-----|-----|-----|-----|-----|-----|-----|
| $S_i$ | 100 | 96 | 89 | 68 | 37 | 13 | 0 |

What is the optimum replacement plan? If group replacement policy is optimal, then at
what intervals should all the parts be replaced?

3(c)   Mention the system applications of ultrasonic analysis.                         05

| 4(a) | Mention the important maintenance points of a carding machine. | 06 |
| 4(b) | Discuss the types of lubrication. What are the methods of fresh lubrication? | 10 |
| 4(c) | What are ergonomic risk factors? Describe them briefly. | 13 |
| 4(d) | Define: i) Viscosity index ii) Pour point and iii) Flash point of lubricants. | 06 |

# SECTION-B

| 5(a) | What is safety culture? Explain the characteristics of a safety culture. | 10 |
| 5(b) | Describe the types of safety culture briefly. | 06 |
| 5(c) | Introduce the plant-housekeeping. Mention the need for house-keeping. | 08 |
| 5(d) | What measures are adopted for preventing accidents of a factory? Explain. | 11 |

| 6(a) | Define and explain the types of accidents. | 05 |
| 6(b) | Describe the effects and causes of an accident. | 06 |
| 6(c) | Describe the provision of safety under factory acts of Bangladesh. | 12 |
| 6(d) | Mention the importance of safety education and training for industrial workers. | 06 |
| 6(e) | An undertaking with 500 workers, working 50 weeks of 48 hours each, had 60 accidents during one year. Owing to illness, accidents and other reasons the workers were absent during 5% of the aggregate working time. The number of days lost due to 60 accidents along were 1200. Calculate the frequency and severity rate. | 06 |

| 7(a) | Which items should be in a first aid box? | 08 |
| 7(b) | Present a Primary Accident Report (PAR) of an accident. | 04 |
| 7(c) | List a scientific method of an industrial accident investigation. | 06 |
| 7(d) | Describe the types of safety inspection. | 12 |
| 7(e) | During the preliminary survey 200 observations were made and of these 50 were unsafe observations. Calculate, how many observations and tours will be required to ascertain the various unsafe practices. | 05 |

| 8(a) | Define industrial toxicology. What types of biological hazards commonly occur in industry and how it can be prevented? | 15 |
| 8(b) | What is PPD? Why is it necessary for industrial workers? | 05 |
| 8(c) | Draw a board check list for plant inspection. | 08 |
| 8(d) | "Material handling is a composite activity"- Justify the statement with suitable examples. | 07 |

----END----

| | | |
|---|---|---|
| KHULNA UNIVERSITY OF ENGINEERING &TECHNOLOGY | | |

### KHULNA UNIVERSITY OF ENGINEERING &TECHNOLOGY
### *Department of Textile Engineering*
B. Sc. Engineering 4th Year 2ndTerm Examination, 2017

**TE-4237**

(Waste Management and Pollution Control in Textile)

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 atmosphere? Mention the composition of atmosphere. | 05 |
| 1(b) | What is greenhouse effect? How it adversely affects our environment? | 12 |
| 1(c) | Describe different layers of atmosphere with mentioning the relationship between altitude and temperature. | 12 |
| 1(d) | Define below terms: <br> i)Weather ii) Climate iii) Pollution | 06 |
| | | |
| 2(a) | How heavy metals contaminate water? | 06 |
| 2(b) | Describe point and non-point sources of water pollution. | 06 |
| 2(c) | How aquatic life is hampered due to eutrophication? | 06 |
| 2(d) | Discuss the secondary and tertiary water treatment process with relevant figure. | 12 |
| 2(e) | Write short notes on: <br>     i)      Bioaccumulation <br>     ii)     Biomagnification | 05 |
| | | |
| 3(a) | What is global warming potential? Write down the causes and effects of global warming potential. | 12 |
| 3(b) | How air pollution contributes to acid rain? | 07 |
| 3(c) | How the energy is trapped and causes global warming? | 10 |
| 3(d) | How the air pollution can be controlled? | 06 |
| | | |
| 4(a) | What is noise pollution? Write down the effects of noise at different decibel levels. | 08 |
| 4(b) | Write down the differences between sound and noise. | 05 |
| 4(c) | Describe different techniques of noise prevention. | 12 |
| 4(d) | How overall pollution can be controlled in different sections of textiles industry? | 05 |
| 4(e) | Define below terms: <br>     i)      Impulsive noise <br>     ii)     Meterology | 05 |

## SECTION-B

5(a) What is meant by dyebath replenishment technique? For which types of dye, dye bath replenish technique is feasible?  07

5(b) Why supercritical $CO_2$ dyeing is called eco-friendly technique? Describe the technology of supercritical $CO_2$ dyeing with diagram.  12

5(c) "Among the various dyeing machines, SCLAVOS dyeing machine is famous for low energy consumption"- Explain this statement with proper sketch.  10

5(d) Describe the reverse osmosis filtration with proper sketch.  06

6(a) What is pollutant? Write down the classification of pollutant.  08

6(b) Write short notes on BOD and COD.  06

6(c) How color can be removed by electro-oxidation process? Explain.  06

6(d) "Electro-coagulation is the combination of Oxidation, Flocculation, Flotation and metal removal process". Explain this statement with proper sketch and chemical reactions.  15

7(a) What is sedimentation? Sketch the sedimentation basin with mentioning functions of different zones.  08

7(b) What is dewatering of sludge? Write short notes on chemical and mechanical dewatering process of sludge.  10

7(c) How does micro-organism decompose the waste of biological effluent treatment plant? Explain with chemical reaction.  10

7(d) What is meant by flocculation? Which types of bonds are generated with waste by flocculating agent?  07

8(a) What is meant by recycling? Write down the advantages of recycling.  06

8(b) Briefly describe the ways of handling the waste according to waste management?  10

8(c) Write down the classification of recycling according to resources and technologies.  06

8(d) Mention the name of dyes which may contain metals in their structures. How do dyes contain metals in their structure?  06

8(e) Write down the implication of chemical processes on waste water load.  07

----END----

KHULNA UNIVERSITY OF ENGINEERING &TECHNOLOGY
*Department of Textile Engineering*
B. Sc. Engineering 4th Year 2ndTerm Examination, 2017
**TE-4245**
(Nonwoven and Nanotechnology in Textiles)
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 non-woven fabric? State the end uses of non-woven fabric.                    10

1(b)  Write the function of embossing roller.                                              05

1(c)  Write short note on micro-encapsulation and photo chromic dye.                       10

1(d)  Is there any effect of temperature on fabric and textile produced?- Justify your opinion.   10


2(a)  What is meant by E textile? "E textiles is a branch of Technical Textiles"- Justify the   12
      statement.

2(b)  What are the functions of smart textiles?                                            08

2(c)  Is it possible to produce energy from jacket?- Justify your opinion.                 10

2(d)  Write down some electronic fabrics brand name.                                       05


3(a)  Draw the non-woven fabric manufacturing process sequence.                            05

3(b)  Describe the Wet-laid web and Dry-laid web of non-woven manufacturing process        16
      with neat sketch.

3(c)  What are the properties of non-woven fabrics that are produced by using different     14
      fibrous matter?


4(a)  Describe Hydro-entangling and needle punching process for non-woven fabric            16
      manufacturing with neat sketch.

4(b)  What are the importances of finishing treatment for non-woven fabrics?               05

4(c)  Write short notes on:                                                                10

        i)      Wrenching of non-woven fabric

        ii)     Velouring of non-woven fabric

4(d)  Define the terms:                                                                    04

      E DANA nd DIN standards.

## SECTION-B

5(a)  What ;ant by CNT? What are the basic features of CNT?                                10

5(b)  Wh:: the end uses of CNT?                                                            03

5(c)  How water repellent property of textile fabric can be improved by nano-mechanism?    12
      Describe it in details.

5(d)  What is nano-technology? Specify the applications of nano-technology in textiles.    10

6(a) What are nano fibers? Evaluate its applications and properties. 10

6(b) How will you impart the anti-bacterial effect on the fabric by nano particles? Explain it with radical reaction. 15

6(c) State the Rayleigh's Scattering Theory. 05

6(d) Write the functions of the following nano particles: 05

     i) Nano-silver

     ii) Nano-silane

     iii) Silane gel

     iv) ZnO Whisker

     v) PTEE-Dupant's Teflon

7(a) What is electro-spinning? How will you produce a nano-fiber by electro-spinning? Describe its process. 15

7(b) Mention the methods for producing nano-fibers and make a comparative statement among the methods. 15

7(c) What is the difference between electro-spinning and spray equipment? 05

8(a) What is 3-D structure of electro-spinning machine? Where and how will you collect the output materials from the electro-spinning? 06

8(b) List some polymers (solution and melt form) used in electro-spinning for nano-fibers production. 08

8(c) Who is the father of nano-technology? Cite his comments about nano. 05

8(d) What isnano fabric? 04

8(e) Write short notes on: 12

     i) Nano-care

     ii) Nano-pel

     iii) Nano-dry

     iv) Nano-tough

----END----