

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 4th Year 2nd Term Examination, 2018

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.

SECTION-A

- 1(a) Briefly describe the elements of maintenance. Shed some light on the cost considerations of maintenance. 20
- 1(b) How will you implement a Reliability Centered Maintenance (RCM) for a textile factory? 07
- 1(c) Assume we have an equipment that is operating in its mature phase and has the following failure history- 08
Time to failure (hours): 100-800-1280-2600.
i) What reliability can be expected from the equipment after 40, 300 and 1000 hours?
ii) If a minimum reliability of 0.9 can be accepted from the equipment, at what point would a service be required?
- 2(a) What are the problems associated with CMMS? Discuss them briefly. 08
- 2(b) Describe the different types of seals used in textile and other industry. 10
- 2(c) Sketch and describe the bathtub curve used to analyze the failure pattern of any equipment. 12
- 2(d) Define: i) Overall Equipment Efficiency, and ii) MTBF. 08
- 3(a) Suppose, a textile equipment contains 1000 similar parts. When any one of the parts fails, it is replaced. The cost of replacing a part individually is BDT 8.00. If all the parts are replaced at the same time, the cost per part is BDT 2.00. The percent surviving, S_i at the end of the month i is given below- 20
- | | | | | | | | |
|-------|-----|----|----|----|----|----|---|
| i | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| S_i | 100 | 94 | 87 | 65 | 35 | 11 | 0 |
- What is the optimum replacement plan between individual and group replacement policy? If group replacement policy is optimal, then at what intervals should all the parts be replaced?
- 3(b) Describe the test types for analysis. 10
- 3(c) Discuss Force and Repetition as two ergonomic risk factors. 05
- 4(a) Define viscosity, Fire point, and Acidity in case of lubricants. 06
- 4(b) What are the methods of circulating lubrication? Discuss briefly. 08
- 4(c) What are the important functions that should be performed while doing schedule maintenance of a sewing machine? 11

- 4(d) How does the choice of color play important role in designing industrial environment? Discuss from ergonomical point of view. 10

SECTION-B

- 5(a) What is plant layout? Write the importance of plant layout. 07
- 5(b) Mention the categories of layout. Which layout is suitable for production of one or more products is large and why? 10
- 5(c) What factors are considered for establishing a new factory? Explain. 12
- 5(d) Explain the Alfred Weber's theory of the location of industries. 06
- 6(a) A new textile industry will be set-up in three sites: (i) Tongi, (ii) Savar, and (iii) Gazipur. Which is the best location based on factory rating method? (Assume location factors, factor rating and scores) 12
- 6(b) "Scientific material handling reduces the product cost"-Explain this statement. 08
- 6(c) State the relationship between plant layout and material handling. 09
- 6(d) Mention some material handling tools used in textile industry. 06
- 7(a) What is safety culture? State need for house-keeping. 08
- 7(b) What are industrial hazards? How will you improve safety system by automation in textile industry? 10
- 7(c) Describe the provisions of safety mentioned in Bangladesh Factory Act. 12
- 7(d) Which items should be in a first aid box? 05
- 8(a) State the general safety rules according to Bangladesh Factory Act. 12
- 8(b) Present the scientific method of the investigation of an industrial accident. 06
- 8(c) Describe the types of safety inspection. 12
- 8(d) During the preliminary survey 200 observations were made and of these 50 were unsafe observations. Find out the no. of observations that would be required to ascertain the various unsafe practice and how many tours will be required for these observations? 05

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 4th Year 2nd Term Examination, 2018

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.

SECTION-A

- 1(a) Define Angle of wind and Net winding speed. 05
- 1(b) Prove that, unlimited amount of yarn can be wound if flanged stays perpendicular to beam barrel. 10
- 1(c) Describe the conditions for uniform building of cone. 15
- 1(d) Calculate the number of warper's beams and the length of warp that can be made from 440 bobbins, each of which contains 1.5 lbs. of 60's yarn. The number of ends of warp required is 2200. Allow 5% for waste and yarn left on the bobbin. 05
- 2(a) Briefly describe the multi-cylinder drying process with advantages and disadvantages. 15
- 2(b) Which sizing ingredients are suitable for spun rayons, filament yarn and synthetic fiber yarn? 10
- 2(c) A warp containing 3000 yds. of 46's sized to 8.5%. If the sized warp wt. 150 lbs., calculate the length of the sized warp and total length of sized yarn. 10
- 3(a) Write the working principle of shirley picking mechanism with neat sketch. 10
- 3(b) Show that, with the increase of sley eccentricity sley remains towards the back side for a longer duration. 10
- 3(c) State the principle of direct weft insertion method. 10
- 3(d) What will be the number of ends per inch in a reed of $3/72^S$ stockport and Bradford system? 05
- 4(a) What are the requirements of selvages? 05
- 4(b) Write a short note on Project balancing approach of a weaving shed. 08
- 4(b) Prove that, warp strain reduces with the increase in shed length. 12
- 4(c) Calculate the maximum and minimum weaver's load from the data given below: 10

| SL. No. | Occurrence (x) | No. of x/loom/hr. | Time for each repair in second |
|---------|----------------|-------------------|--------------------------------|
| 1 | Warp break | 1.25 | 48 |
| 2 | Weft break | 0.30 | 09 |
| 3 | Shuttle trap | 0.25 | 20 |
| 4 | Trimming | 03 | 13 |
| 5 | Pirn change | 04 | 15 |

SECTION-B

- 5(a) Sketch the fabric construction of a multi-axial fabric. 07
- 5(b) List the disadvantages of multi-axial fabric. 05
- 5(c) How can you produce multi-axial fabric in Raschel knitting machine? 15
- 5(d) Write down the features of 3D fabric. 08
-
- 6(a) Describe the concept of making a true seamless pullover. 12
- 6(b) What is meant by spacer fabric? How can you produce spacer fabric in warp knitted machine? 15
- 6(c) Write down the importance of automation in knitting industry. 08
-
- 7(a) Why knitting program is a crucial step in knitting industry? 08
- 7(b) Classify the industrial fabric. 08
- 7(c) Mention the properties of braided fabric. 12
- 7(d) Differentiate between elasticated braid and elasticated tape. 07
-
- 8(a) What is meant by multiple shuttle loom? State the picking system of a multiple shuttle loom with neat sketch. 15
- 8(b) State the features of needle loom. 05
- 8(c) Describe the different methods of lamination. 10
- 8(d) What are the quality requirements of laminated fabric for garments? 05

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 4th Year 2nd Term Examination, 2018

TE 4201

(Yarn 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.

SECTION-A

- 1(a) What are the main problems of the new spinning process? Give five examples of new spinning process. 09
- 1(b) State the principle of Electrostatic spinning. 10
- 1(c) What are the problems associated with Electro-spinning? 08
- 1(d) Narrate the operating principle of Airvortex spinning. 08
- 2(a) Write down the tasks of the rotor spinning machine 05
- 2(b) State the operating principle of rotor spinning machine mentioning the technical data. 12
- 2(c) Write short notes on: i) Back doubling, and ii) Wrapping fibers. 06
- 2(d) Why rotor diameter is so important? How rotor groove influences on yarn? 06
- 2(e) Compare the rotor yarn with the ring yarn. 06
- 3(a) Why rotor spinning is called breakage spinning? 05
- 3(b) In a rotor spinning, rotor speed=80,000 rpm. Fiber, sliver and yarn linear density are 0.20 tex, 4000 tex and 25 tex respectively. Find out the following: 10
- i) Production/shift/frame in kg.
- ii) Total draft.
- iii) Twist/meter.
- iv) No. of fibers in yarn cross-section.
- (TM=4500; No. of rotors/frame=120)
- 3(c) Write down some features of rotor bearing. Write about Navel briefly. 06
- 3(d) Which raw materials can be processed in rotor spinning machine? 06
- 3(e) Discuss the false twisting process of ParafIL system. 08
- 4(a) State the Dref-2 process with the necessary diagram. 12
- 4(b) Discuss the operating principle of wrap spinning. 12
- 4(c) Describe a process of manufacturing Core-spun yarn. 11

SECTION-B

- 5(a) Write down the methods of mixing and blending. Which is more popular in Bangladesh and why? 07
- 5(b) Describe the process parameters for blending polyester-cotton in cotton spinning machine. 23

- 5(c) Find out the cotton sliver hank; when P/C blending ratio=65/35; no. of polyester sliver = 4 and polyester sliver hank = 0.15. 05
- 6(a) What is fancy yarn? Describe the different types of fancy yarn. 15
- 6(b) What is texturising? Explain the different process of texturising. 15
- 6(c) Write down the end uses of rope and twine. 05
- 7(a) State the objects of twist setting in yarn. 05
- 7(b) Describe the two-for-one twisting machine. 10
- 7(c) A ply yarn count is 31.5^s . Its single yarn count is 72^s . Find out the other single yarn count. 05
- 7(d) Differentiate between ring spinning frame and twisting frame. 05
- 7(c) What is balance twist? Explain the effects of twist on fabric structure. 10
- 8(a) Describe a method of producing twines mentioning the limitations. 12
- 8(b) What is twistless spinning? Describe a twistless spinning method. 12
- 8(c) Describe the procedure of wrap spinning with sketch. 11

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 4th Year 2nd Term Examination, 2018

TE 4205

(Wet Processing 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.

SECTION-A

- 1(a) What is bio-scouring? Write down the working principle of bio-scouring with proper diagram. 10
- 1(b) What are the reasons of using solvents in textile sector? Solvent such as trichloroethylene is used for both solvent scouring and solvent dyeing. Do you think does it perform same function? Explain. 08
- 1(c) What is meant by color temperature? When color temperature of any light source is 3000K and 4100K, it is called warm and cool light source respectively. Explain it in your own language. 06
- 1(d) What is metamerism index? If metamerism index of two dyed samples is greater than 1, analysis the possible roots of this problem. 07
- 1(e) Write down the functions of cone. 04
- 2(a) What is chromaticity diagram? Derive the CIE tristimulus values (XYZ) at wavelength λ by considering necessary parameters. 10
- 2(b) Discuss the $L^*c^*h^*$ color space with standard equation and color difference formula. 11
- 2(c) How does dual beam reflectance spectrophotometer measure the shade of dyed fabric? Describe it with neat sketch. 10
- 2(d) Write short note on Munsell color order system. 04
- 3(a) Formulate the Lambert-Beer law by considering necessary parameters of a liquid solution. 13
- 3(b) "CMC color tolerancing system gives instrumental values of a shade that 95% matches with visual assessment whereas CIE $L^*c^*h^*$ tolerancing system provides 85% agreement"-Explain this argument with necessary diagram and equation. 12
- 3(c) Write down the basic requirements of successful recipe prediction. Briefly describe the procedure of color match prediction method with recipe. 10
- 4(a) State the different continuous dyeing processes of woven fabric and their possible applications. 08
- 4(b) Depict the Cold-pad-batch dyeing process. 10
- 4(c) Make a comparative analysis of Cold-pad-batch dyeing process over jet dyeing process. 07

- 4(d) "Infra-red pre-drying is most important for controlling the dye migration at woven dyeing process"-What is meant by dye migration? What can happen due to dye migration and why IR drying system is necessary instead of other drying system? Explain. 10

SECTION-B

- 5(a) Mention the purpose of drying & classify it. 06
- 5(b) Write down the working principle of radio frequency dryer with proper sketch. 12
- 5(c) If any fabric will be brushed during finishing, is it necessary to keep the fabric color (shade) slightly darker before unloading from dyeing machine? 05
- 5(d) Mention the finishing sequence (operation) of tubular and open width fabric. 06
- 5(e) Write short notes on the followings: 06
- i) Automatic clipping, and ii) Burner & blower
- 6(a) What is low wet pick-up finishing? Write down the advantages of low wet pick-up finishing. 06
- 6(b) Mention the considerable factors of low wet pick-up finishing. 07
- 6(c) Describe the working principle of vacuum extractor for low wet pick-up finishing. 10
- 6(d) How many ways OBA (Optical brightening agent) can be applied on fabric? Explain the mechanism of OBA to increase the reflectance. 12
- 7(a) Describe the application procedure of High density printing. 10
- 7(b) Write down the name and functions of chemicals used in print paste preparation of burn out printing. 06
- 7(c) Why burn out printing can't be used for the purpose of AOP (All Over Print)? Explain. 07
- 7(d) How does capillary action play important role for drop on demand inkjet printing? 06
- 7(e) Write short notes on below items: 06
- i) Suede ii) Print motif and iii) Flocks
- 8(a) Describe the mechanism of sublimation transfer printing. 12
- 8(b) Explain the preparation procedure of gelation plate of gel printing. 06
- 8(c) Write down the reasons of different faults in printing. 08
- 8(d) Write short notes on below items: 04
- i) Uvitex BSB and ii) Na-alginate
- 8(e) What is puff printing? Why adjustment of heating is necessary for puff printing? 05

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 4th Year 2nd Term Examination, 2018

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.

SECTION-A

- 1(a) Define Production planning, Production control and Production management. 06
- 1(b) Compare Single Factor Productivity and Total Factor Productivity. 06
- 1(c) What is 5s? How 5s can improve and establish effective quality processes in textile production? 12
- 1(d) Discuss the steps of balancing a garment production line. 11
- 2(a) What is Unit Production System? Describe the working methodology of a Unit Production System. 12
- 2(b) What is SMV and SAM? Mention the components of SMV. 10
- 2(c) Calculate SMV for the operations tabulated as below- 13

| No. | Element | Observed Rating | Observed Time | Frequency |
|-----|---------------------------------------|-----------------|---------------|-----------|
| 1 | Pick up and sort bundle | 95 | 0.18 | 1/10 |
| 2 | Align first sleeve to opening | 100 | 0.08 | 1/1 |
| 3 | Overlock and attach first sleeve head | 90 | 1.12 | 1/1 |
| 4 | Re-Position | 95 | 0.03 | 1/1 |
| 5 | Align Second Sleeve | 90 | 0.09 | 1/1 |
| 6 | Overlock attached sleeves | 100 | 1.1 | 1/1 |
| 7 | Aside garment | 110 | 0.06 | 1/1 |
| 8 | Close bundle and complete ticket | 90 | 0.60 | 1/10 |

(Assume other necessary parameters, and all parameters must be usual)

- 3(a) Why price negotiation is so much important in garments trade? 07
- 3(b) Prepare a Gantt chart for the following delivery schedule- 15

Date: 16 September 2017

| Style | Qty. | SMV | Delivery Date |
|-------|-----------|-------|---------------|
| X | 1000pcs. | 20.15 | 05-11-2017 |
| Y | 5000pcs. | 30.50 | 30-10-2017 |
| Z | 10000pcs. | 16.15 | 25-10-2017 |

We have 3 lines-

- Line A has 40 operators having efficiency of 80%
- Line B has 40 operators having efficiency of 85%
- Line C has 40 operators having efficiency of 85%.

Absenteeism 10% and working hours 9 hours.

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

13

| Colors/Sizes | S | M | L | XL | XXL |
|--------------|----|----|----|----|-----|
| Red | 21 | 42 | 21 | 21 | 42 |
| Blue | 42 | 42 | 84 | 42 | 21 |
| Green | 21 | 42 | 84 | 42 | 21 |

Consider : i) Maximum ply height is 42

ii) Number of garments per marker = 5

- 4(a) Write down the functions of the fabric layers of a fire fighters turnout gear. 07
 4(b) List out the parts of a modern space suit. 08
 4(c) What is Fashion? Illustrate and explain a typical fashion cycle. 13
 4(d) Define Fashion forecasting? What parties are involved in fashion forecasting? 07

SECTION-B

- 5(a) Write down the schematic steps involved in a proto sample development in an apparel industry. 08
 5(b) What is the purpose of a work order? Suppose you got a baby set order from, 100% cotton single jersey (160GSM) t-shirt and short pant from 100% cotton twill fabric ($\frac{130 \times 70}{32 \times 32} \times 57''$). Formulate a fabric work order for both woven and knit items. 12
 5(c) Imagine you have been working as a merchandiser in a factory and encountered a problem with fabric shortage at the eleventh hour of the shipment. What are the key steps you should take to avoid the upcoming shortage in shipment quantity? 08
 5(d) What is a tech pack? List out the contents of a tech pack. 07
 6(a) Illustrate the sequential steps in conducting a final inspection. 12
 6(b) Draw and explain LC cycle operation in apparel sector. 15
 6(c) Define 'Red Clause LC'. If the issuing bank fails to make the payment to advising bank, which bank will come forward to claim the payment to beneficiary? Explain. 08
 7(a) Calculate a denim pant cost (FOB)/Pcs based on following parameters- 25
 ▪ Inseam length=32", 1/2 Thigh=12", Front rise=14", Back rise=17", No. of Back pocket=02, Back pocket length=8", Back pocket width=7", No. of Front Pocket=02, Front pocket Bag length=8", Front pocket bag width=6", 1/2 waist width=32", waist band height=2", Total loop no.=05, Belt loop length=1.5", Belt loop width =0.5", Fabric width=58".
 ▪ Stitch quantity of embroidery is 6,000 and rate/unit of embroidery is US \$0.24.
 ▪ Fabric price for body (Denim) is US \$3.50/yds., Fabric price for pocketing is US \$ 2.00/yds., accessories cost per dozen is US \$ 2.50, Cost of manufacturing is US \$ 15/dozen, Wash cost is US \$ 8.00/dozen.
 Assume other parameters (e.g. wastage%, allowance) if necessary.
 7(b) Why appropriate material booking is important? Show a booking format for overseas accessories. 10
 8(a) List out the documents required for conducting apparel shipment process 10
 8(b) What are the differences between proforma invoice and commercial invoice? 05
 8(c) What is industrial compliance? Shed light on the WRAP Certification for apparel industries. 12
 8(d) Define strategic sourcing. How to choose a better supplier? 08

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 4th Year 2nd Term Examination, 2018

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.

SECTION-A

- 1(a) State the key features of nonwoven fabric. 08
- 1(b) Make a list of different fibrous matters that are used to produce nonwoven fabrics. 10
- 1(c) How nonwoven fabrics are used in agro- textiles and filtration textiles? Explain. 10
- 1(d) "Nonwoven textiles are those which are neither woven nor knit" justify this statement. 07
- 2(a) Draw the manufacturing sequence of nonwoven fabric. 05
- 2(b) Describe the spun brading and melt blowing of nonwoven manufacturing process with neat sketch. 15
- 2(c) Differentiate between dry laid web and wet laid web formation technique. 07
- 2(d) State the economical advantages of non-woven fabric over normal fabric. 08
- 3(a) What is meant by air laying technique to produce nonwoven fabric? 06
- 3(b) Describe the various methods of joining cotton and thermal bonded nonwoven fabric with neat sketch. 12
- 3(c) State the thermal bonding process to produce nonwoven fabric. 05
- 3(d) Write short notes on the followings: 12
- i) Maliwatt fabric.
- ii) Malivlies fabric.
- iii) Medical textiles.
- 4(a) How plasma treatment is done on nonwoven fabric surface? 08
- 4(b) Describe the method of lamination of nonwoven fabric. 08
- 4(c) How many critical tests are necessary for nonwoven fabric? Briefly discuss about those critical tests? 14
- 4(d) Write short note on water repellent finish of nonwoven fabric. 05

SECTION-B

- 5(a) What is nano? 03
- 5(b) What is meant by polymer nanotubes? 08
- 5(c) Describe the most important key advantages of ZnO application as nano particle . 08
- 5(d) Mention the contribution of different scientists in nanotechnology. 06
- 5(e) Write short notes on: (i) CNT, and (ii) Graphene. 10

- 6(a) What is nano-fiber? Briefly describe the nano-fiber synthesis. 12
- 6(b) Draw the basic set-up of electro-spinning. 06
- 6(c) Describe the process parameters and morphology of electro spun fibers. 12
- 6(d) Mention some raw materials (solution and melt form) used in electro-spinning for nano-fibers spun. 05
- 7(a) Explain the Top-down approach and Bottom-up approach for nano-fiber process. 10
- 7(b) Write the properties and end uses of nano-fibers. 08
- 7(c) Point out the tools and techniques for characterization of nano-fiber properties. 12
- 7(d) Write short notes on : 05
- i) Nanolithography, and ii) Etching process
- 8(a) Specify the applications of nano-technology in textiles. 05
- 8(b) Mention the advantages of TiO_2 as a photo-catalyst. Illustrate the photo-catalytic mechanism of TiO_2 . 10
- 8(c) Describe the water repellency and anti-static properties of nano-textiles. 12
- 8(d) Write short notes on followings: 08
- i) Nano-dry, ii) Nano-pel, iii) Nano-touch, and iv) Sol-gel method.

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 4th Year 2nd Term Examination, 2018

IPE 4223

(Operations Management)

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) A ratio assembly plant produces two models, H_iF_i-1 and H_iF_i-2 , on the same assembly line. The assembly line consists of three stations. The assembly times in the workstations are-

| Workstation | Minutes per unit of | |
|-------------|---------------------|------------|
| | H_iF_i-1 | H_iF_i-2 |
| 1 | 6 | 4 |
| 2 | 5 | 5 |
| 3 | 4 | 6 |

Each workstation has a maximum availability of 480 minutes per day. However, the workstations require daily maintenance, which amount to 10%, 14% and 12% of the 480 minutes daily availability for stations 1,2 and 3 respectively. The company wishes to determine the daily units to be assembled of H_iF_i-1 and H_iF_i-2 to minimize the sum of unused (idle) times at all three workstations.

Formulate linear programming model for the above problem.

- 1(b) Show the influence of method and time study on production activities with a figure. 15
- 1(c) Explain in brief how does 'Bad design of the product' add excess work content for the management team? 10
- 2(a) Find the optimal solution of the problem: 20
Maximize, $Z=3x_1+2x_2+5x_3$
Subject to, $x_1+2x_2+x_3 \leq 430$
 $3x_1 + 2x_3 \leq 460$
 $x_1+4x_2 \leq 420$
 $x_1, x_2, x_3 \geq 0$
- 2(b) "Mere increase in production may or may not contribute to increase in productivity". Comment. 10
- 2(c) Define work study. What are the components of work study? 05
- 3(a) What is job recording? Write down the purposes of job recording. 10
- 3(b) Let, you have to make 2 holes on a job by a drill machine. You have to collect the job from the store and also keep at the same place after the operation completed. 13
Now draw a flow process chart for this operation.
- 3(c) What is two handed process chart? Draw a two handed process chart to make sharp a pencil by using a sharpener. 12
- 4(a) What are therbligs? When it is used? What are the advantages of micro-motion study? 10
- 4(b) Write short notes on: 10
i) Interference allowance
ii) Contingency allowance

- 4(c) Evening shift resident doctors in a government hospital work five consecutive days and have two consecutive days off. Their five days of work can start on any day of the week and the schedule rotates indefinitely. The hospital requires the following minimum number of factors working. 10

| Sun. | Mon. | Tues. | Wed. | Thurs. | Fri. | Sat. |
|------|------|-------|------|--------|------|------|
| 35 | 55 | 60 | 50 | 60 | 50 | 45 |

No more than 40 doctors can start their five working days on the same day. Formulate the general linear programming model to minimize the number of doctors employed by the hospital.

- 4(d) How standard time is computed? 05

SECTION-B

- 5(a) Differentiate between production management and operations management. 06
- 5(b) Define inventory. "Inventory is used as a tool to protect against stock outs". Justify that statement. 08
- 5(c) List down the major assumptions of Economic production Quantity (EPQ) model. 06
- 5(d) Define Quantity Discount. A small manufacturing firm uses roughly 3400 pounds of chemical dye a year. Currently the firm purchases 300 pounds per order and pays \$3 per pound. The supplier has just announced that orders of 1,000 pounds or more will be filled at a price of \$2 per pound. The manufacturing firm incurs a cost of \$ 100 each time it submits an order and assigns an annual holding cost of 17% of the purchase price per pound. 15
- (i) Determine the order size that will minimize the total cost.
- (ii) If the supplier offered discount at 1500 pounds instead of 1,000 pounds, what order size would minimize the total cost?

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

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

- 6(b) Define the following terms: 06
 i) Job flow time, ii) Job lateness, and iii) Make span
- 6(c) Write short notes on: 08
 i) Process layout, and ii) Fixed position layout
- 6(d) Define project. From PERT & CPM, what are the things that the managers are able to obtain? 06

- 7(a) Define the following terms: 06
 i) Network diagram, and ii) Critical path
- 7(b) Using the computing algorithm, determine the slack times for the following network diagram. Identify the activities that are on the critical path. 14

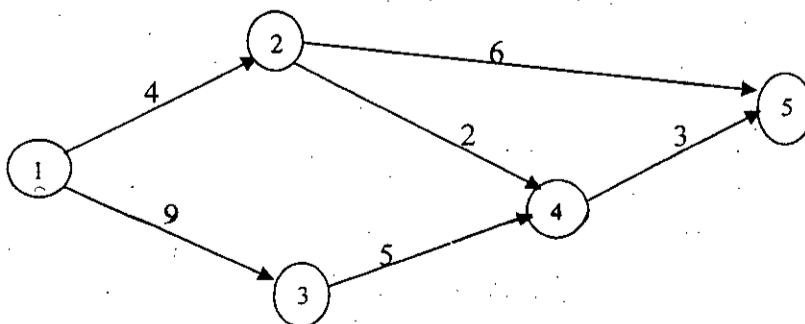


Figure: 7(b)

- 7(c) The management of Grapho-Tronics, Inc., has decided to build a new plant, and the special group assigned to evaluate alternative locations has proposed three sites A, B and C. Services and quality of life have been identified as the most important subjective factors that differ in these sites. Annual operating cost C_i have been estimated as follows: 15

| Site | A | B | C |
|------------------------------|-------|------|------|
| Annual cost C_i (millions) | \$ 10 | \$ 9 | \$ 8 |

Management feels that services (factor 1) are as important as the quality of life (factor 2). The results from a forced pairwise comparisons of sites for each subjective factor are as follows:

| Site | Factor 1: Services pairwise comparison | | | Factor 2: Quality of life pair wise comparison | | |
|------|----------------------------------------|---|---|------------------------------------------------|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 |
| A | 0 | 1 | 0 | 0 | 1 | |
| B | 1 | 1 | | 1 | | 1 |
| C | | | 1 | | 1 | 0 |

Furthermore, management considers objective factors to be twice as important as subjective factors. Select the optimum location for the new plant.

- 8(a) What is the goal of line balancing? What happens if a line is unbalanced? 10
- 8(b) The tasks shown in the following precedence diagram are to be assigned to workstations with the intent of minimizing idle time. Management has designed an output rate of 275 units per day. Assume, 440 minutes are available per day. 15
- Determine the appropriate cycle time.
 - What is the minimum number of stations possible?
 - Assign the tasks to work stations.
 - Compute efficiency.

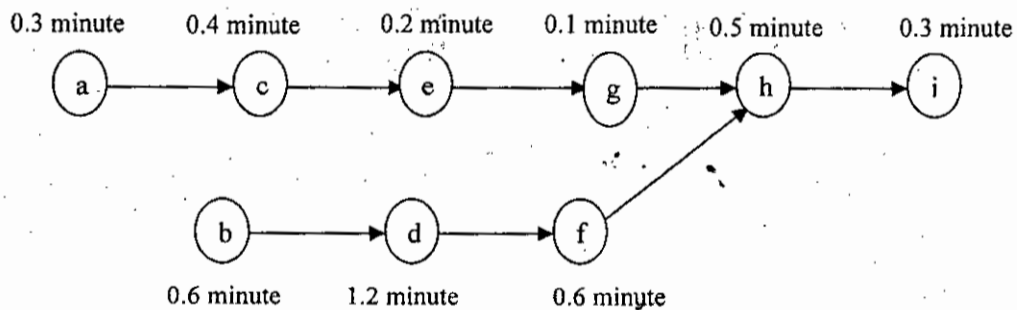


Figure: 8(b)

- 8(c) Briefly describe the push-pull view of supply chain process. 10

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 4th Year 2nd Term Examination, 2018

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.

SECTION-A

- 1(a) What is atmosphere? Mention the atmospheric structure with its attitude, temperature and certain molecules. 10
- 1(b) What is greenhouse effect? How does it adversely affect our environment? 10
- 1(c) What is environment segment? Narrate the various environment segments. 15
- 2(a) Describe the types of water pollution. 10
- 2(b) What is eutrophication? Describe the causes and effects of eutrophication. 10
- 2(c) What are the causes of acid rain? Write down the effects of acid rain on environment. 10
- 2(d) Write down the effects of detergent on fresh water. 05
- 3(a) What is air pollution? State the causes and effects of air pollution. 15
- 3(b) What steps are to be considered for solution of air pollution? 10
- 3(c) Describe the different systems used in textile for air pollution control. 10
- 4(a) What is global warming potential? Write down the causes and effects of global warming potential. 10
- 4(b) Describe the different techniques of noise prevention. 10
- 4(c) Write down the differences between sound and noise. 08
- 4(d) Briefly describe the resources required for water quality monitoring. 12

SECTION-B

- 5(a) Illustrate the flow chart of biological effluent treatment plant. Why sludge return tank and ozone chamber are necessary in this plant? Explain. 08
- 5(b) Which chemicals are used in reaction tank of physio-chemical treatment plant? Write down the working principle of these chemicals for removing effluent solution. 08
- 5(c) Describe the mechanism of dye degradation by photo-catalyst TiO_2 with necessary reactions and diagram. 14
- 5(d) Why indirect oxidation method with chlorine is the best method for removing color of waste water? Explain. 05
- 6(a) Compare the characteristics among micro-, ultra-, and reverse osmosis filtration for waste water treatment. 10

- 6(b) Mention the limit of eco-parameters for finished garments. 08
- 6(c) Describe the various processes for reducing the unused dyes and chemicals in dyeing process. 09
- 6(d) Describe the working principle of caustic recovery system with figure. 09
- 7(a) What is meant by mutagen and carcinogen? How azo dyes can create negative effect in human body? 10
- 7(b) What are the basic reasons of introducing foam processing technology in textile sector? Describe any foam application procedure on textile fabric with figure. 10
- 7(c) "Among different dyeing machines air flow dyeing machine is becoming more popular for minimizing waste water load"-Explain this argument with machine working principle and proper diagram. 10
- 7(d) Mention the names of dyestuffs that contain different metals in their structure. Why do dyestuffs contain metal in their structure? Explain. 05
- 8(a) What is dewatering of sludge? Briefly discuss the chemical and mechanical dewatering process of sludge. 10
- 8(b) What is recycling? Write down the advantages of recycling. 06
- 8(c) Briefly describe the ways of handling the waste according to waste management. 10
- 8(d) What is meant by sustainability in textiles? Briefly discuss the sustainability issues in textile production. 08

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