The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Textile and Apparel Technology

Study Programme	: Advanced Certificate in Apparel Technology
Name of the Examination	: Final Examination
Course Code and Title	**: TAZ2587/TAZ2535/TTZ1235 Mathematics & Science for Textile Technology**
Academic Year	: 2019/20
Date	: 29th July 2020
Time	: 0930-1230hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Eight (8)** questions in **Five (5)** pages.
3. **Answer Question 01, which is compulsory** and additional **Five (5)** questions only. Question 01 carries 25 marks and questions 2 to 8 carries fifteen (15) marks each.
4. Answer for each question should commence from a new page.
5. Answers should be in clear hand writing.
6. **You should clearly show the steps involved in solving problems.**
7. **No marks are awarded for the mere answers without writing the necessary steps.**

(Take g=10 ms^{-2})

Compulsory Question

(1)

(i) Mass of a Cotton fibre sample in the atmosphere is 32.50g. Its oven dry mass is 30.00g. Calculate the "percentage moisture content" and "percentage moisture regain" **(02 marks)**

(ii) State how you obtain the vector sum of two vectors. **(02 marks)**

(iii) Distinguish "mass" and "weight" **(02 marks)**

(iv) A fibre has a circular cross-section and diameter of 14μm. What is the area of cross-section of the fibre? **(03 marks)**

(v) Write the following figures in standard form. **(02 marks)**
(i) 0.00000054 (ii) 1,80,000

(vi) Determine the gradient of the straight line passing through the points P (2,3) and Q (4,8). **(03 marks)**

(vii) Current of 1.0 mA flows through a conductor for two hours. What is the electric charge passing through the conductor in the given time period? **(03 marks)**

(viii)A car moving with 10 ms^{-1} accelerates at a rate of 2ms^{-2}. Calculate the distance travelled by the car in 5 s. **(02 marks)**

(ix) A person carries a bag of weight 100N to a vertical height of 5.0 m in 1 minute.
(a.) Calculate the work done by the person.
(b) Determine the rate at which the work done. **(04 marks)**

(x) Determine the gram molecular weight of Ethyl Alcohol C_2H_6O
(C =12, O=16, H=1) **(02 marks)**

Answer any five (05) questions from following seven (07) questions

(2) (a). Define following terms.

(i) Absolute Humidity (ii) Relative Humidity **(06 marks)**

(b) Discuss the impact of humidity on Textile industry.

(09 marks)

(3) (a) In the case of a metal wire or a rod, the thickness can be expressed by it's diameter. But in the case of textile yarn and fibre, you cannot consider diameter as the measure of thickness. Describe why?

(06 marks)

(b) Tex count is defined as the weight in grams of 1000m of yarn. Calculate the mass of a 5000 m of a yarn which has the Tex count 12.

(06 marks)

(c) Calculate the mass of a 10 m^3 of a metal block, which has the density 8000 kgm^{-3}

(03 marks)

(4) (a) Use the **theory of indices** to simplify the following expressions.

(i) $(0.027)^{2/3}$ (ii) $(256/81)^{1/4}$

(iii) $(625)^{0.25}$ **(03 marks)**

(b) Simplify the following

$$\left(\frac{4}{9}\right)^{-1/2} \times \left[\frac{8}{27}\right]^{2/3} \times [10]^0$$ **(06 marks)**

(c) Determine the value of 'x' in the following equation.

$$3^x \times 27^{(x+1)} = 729$$ **(06 marks)**

(5) (a) Solve the following equations

(i) $x + 2y = 46$

$4x - y = 13$

(ii) $\frac{3x-1}{7} - \frac{2x+1}{3} = 5 - \frac{5x}{6}$ **(10 marks)**

(b) The length of a rectangular factory hall is 8m less than twice of it's breadth. Its perimeter is 68m. Calculate the length and breadth of the hall.

(05 marks)

(6) (a)What are the **S.I units** of the following quantities. **(02 marks)**

(i) Electrical Energy (ii)Density

(iii) Gravitational Force (iv) Frequency

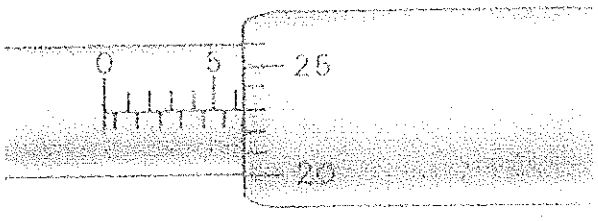
(b) Convert following into SI Units. **(09 marks)**

(i) 60 μm (ii) 18 Km/h (iii)10 days

(iv) 100 ml (v) 50kW (vi) 10 gcm^{-1}

(c) Following diagram shows a micrometre with a screw pitch of 0.5mm.The circular scale has 50 divisions on it. What would be the reading of the instrument?

(04 marks)



(7) (a) State the Newton's Laws of motion. **(03 marks)**

(b) Starting from the Newton's second law derive the formula F=ma **(04 marks)**

(c) An object of mass 5 kg is accelerating at 4 ms^{-2}. What would be the force acting on it? **(05 marks)**

(d) Write three applications of Newton's third law. **(03 marks)**

(8) (a) Describe the following terms

(i) Atomic number (ii) Mass number
(iii) Atomic structure (iv) Atoms and ions **(04 marks)**

(b) Define "Percentage Concentration" and "Molar Concentration" of a solution. **(04 marks)**

(c) Determine the gram molecular weight of H_2SO_4. (S = 32, O=16, H=1) **(03 marks)**

(d) 196 grams of H_2SO_4 contain in 5 litres of solution. Determine the Molar concentration of H_2SO_4 solution. **(04 marks)**