Register Number: ……………………..

B.TECH DEGREE EXAMINATIONS: APRIL/MAY 2014

(Regulation 2009)

Sixth Semester

TEXTILE TECHNOLOGY

TTX219**:** Smart Textiles

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. _____ smart materials will sense and react to the conditions or stimuli.

   a) Passive   b) Very

   c) Active   d) Both Passive and Active

2. Polypyrrole is an example for _____.

   a) Photoconductive polymer   b) electroconductive polymer

   c) Thermoconductive polymer   d) Electrostrictive polymer

3. _____ produce endothermic and exothermic effects without a change in state at temperatures far below the melting point of the substance.

   a) 2,2-Dimethyl-1,3-propanediol   b) Polyethylene Glycol

   c) PTMG   d) n-hexadecane

4. _____ undergo solid-to-solid thermal transitions.

   a) dimethyloldihydroxy-ethyleneurea   b) Polyethylene Glycol

   c) Polyhydric alcohols   d) dimethylolethyleneurea

5. _____ can be used as particulate fillers in the molten polymer for producing heat generating polyester, polyamide, polyethylene, polypropylene and other functional fibres.

   a) Manganese   b) Aluminium

   c) Zirconium   d) Silica

6. 3M company developed a product _____, which is a waterproof/breathable laminated fabric that is highly resistant to contamination by detergents or perspiration.

   a) Thinsulate   b) Thintech

   c) Thermoloft   d) Thermolite

7. It is a specific property of the ionic NIPA gel (containing a small amount of sodium acrylate) to drastically shrink at temperatures higher than_____.

   a) 7°C   b) 17°C

   c) 37 °C   d) 27°C

8. An important precondition for the shape memory effect of polymers is_____.

   a) strength   b) Melting point

   c) elasticity   d) Melt flow index

9. Wool pretreated by gas chlorination is termed as _____ process.

   a) Perzym   b) Sanforizing

   c) Hercosett   d) Chlorzym

10. _____treatment is done in lyocell/tencel and rayon, where it improves softness, drapeability, pilling tendencies and post-laundry appearance.

    a) Pectin   b) Amylase

    c) Cellulase   d) biopolishing

PART B (10 x 2 = 20 Marks)

11. What are smart materials and structures?

12. What are the peculiarities of polymer gel actuator?

13. Mention three types of heat storage.

14. How phase change material keeps the feet comfortable in ski boots?

15. How do you calculate the total heat conduction of a polymeric material?

16. What is breathable fabric?

17. What is thermally induced 'one-way' shape memory effect?

18. How do you determine the shape memory effect quantitatively?

19. What are the main factors contributing to the directional frictional effect (DFE) in wool fibre?

20. What is the basis of biopolishing done in cotton fibre?

PART C (5 x 14 = 70 Marks)

21. a) (i) Discuss the various components of smart or intelligent clothing system.   (7)

       (ii) Elaborate the role of polymer materials as actuators.   (7)

(OR)

    b) (i) Elaborate the functioning of various triggers for polymer and/or gel actuation.   (9)

       (ii) Elaborate about electro-active polymer gels.   (5)

22. a) (i) Explain briefly about the various Latent heat-storage materials.   (10)

       (ii) Compare the basic and dynamic thermal resistance of coated fabrics.   (4)

(OR)

    b)   Elaborate the various methods of manufacturing of heat-storage and thermo-regulated textiles and clothing.

23. a) (i) Elaborate about various Thermal storage and thermal insulating fibres. (10)

       (ii) What is radiation curing? Mention its advantages over conventional methods. (4)

(OR)

   b) (i) How do you calculate thermal resistance of a textile fabric as a function of the (4) actual thickness of the material?

       (ii) Elaborate the various factors influencing the design of fabric assemblies for cold (10) weather environments.

24. a) (i) Explain briefly the concept of biodegradable shape memory polymers. (10)

       (ii) With the help of graph, show the hydrolytic degradation of various shape (4) memory polymers

(OR)

   b) (i) Explain briefly the synthesis of degradable thermoplastic elastomers having (7) shape memory materials.

       (ii) Explain briefly the synthesis of polymer networks with shape memory (7) properties.

25. a) (i) Explain briefly about the designing of snow clothing using wearable technology. 8

       (ii) Elaborate about the bio-processing done in smart textiles and clothing. 6

(OR)

   b) (i) Explain in detail about the various enzymatic treatments done in wool. (7)

       (ii) Explain in detail about the various enzyme treatments done in cotton. (7)

****