Roll No……..….. **Total No. of Printed Pages: 1**
Total No. of Questions: [11]

M. Tech. Textile (Part-Time) (Semester –3rd)
ADVANCES IN FIBRE PRODUCTION TECHNOLOGIES
Subject Code: MTEXS1201
Paper ID: [22201110]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It carries 16 marks. It consists of 4 questions of 4 marks each.
2. Section B consist of 4 questions of 8 marks each. The student has to attempt any 3 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(4 marks each)**

Q1. Explain the flow instabilities due to shear in the melt spinning and how different factors affect these flow instabilities

Q2. Why monomer purity is important in case of the step growth polymerization reaction.

Q3. Explain the different zone of melt extruder with neat sketch

Q4. Discuss the drawing and heat setting of manmade fibre production.

Section – B **(8 marks each)**

Q5. How the quenching is carried out in the case of the melt-spinning process explain the role of various design of the quenching chamber

Q6. A polymer melt having density of 1.38 g/cm^{-3}, is being spun through spinneret of 1000 holes. The mass throughput rate and take-up speed are 300 g/min and 300 m/min, respectively.

(a) The nominal denier of the filament is?

(b) The above as spun filament subjected to two stages drawing with a draw ratio of 1.5 and 2.0. the resultant denier of fibre would be? (**2×4 = 8 marks**)

Q7. Define the acrylic and modacrylic. What types of co-monomer are added during the acrylic fibre formation? How do these co-monomers affect the properties of fibre?

Q8. Describe the advancements in the production of microfibres and nanofibres. How are they produced, and what are their unique properties? Discuss their applications in industries.

Section – C **(10 marks each)**

Q9. In the case of the viscose fibre manufacturing process explain the following steps with their importance

(a) Steeping (b) Ageing (c) Xanthation (d) Ripening (**4×2.5 = 10 marks**)

Q10. (a) Discuss the chemistry of polymerization of polyester (PET) with different routes. What are the economical advantages of TPA routes over DMT routes?

(b) Discuss the chemistry of polymerization of Nylon 6 and Nylon 66. (**2×5 = 10 marks**)

Q11. Write a short note on

a) Discuss the role of zinc in the spinning bath of viscose fibre and how it affects the morphological structure of the fibre

b) How the viscosity of Newtonian and non-Newtonian fluid depends on shear rate?

c) How orientation and crystallinity influence the fibre properties?
d) Listed the difference between dry, wet and melt spinning process (**4×2.5 = 10 marks**)