

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2064)

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B. Tech 4th Semester Examination

Man-Made Fibres (O.S.)

TE-4002

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt FIVE questions in all selecting one question from each section. Section E contains only one question which is compulsory.

SECTION - A

1. (a) Enumerate relative merits and demerits of man-made and natural fibres.
(b) Highlight the essential properties required for a fibre forming polymer.
(c) List the factors that influence the selection of a process for fibre formation and explain the features of melt spinning system. (5+5+10=20)
2. (a) List the functions of an extruder and a gear pump used in fibre forming process.
(b) How is fibre cross-section manipulated in dry spinning process?
(c) Compare dry spinning, melt spinning and wet spinning systems in terms of their merits and demerits. (5+5+10=20)

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SECTION - B

3. (a) Differentiate nylon 6 and nylon 66.
- (b) Outline the process of polymerization used for manufacture of polyester and polypropylene.
- (c) Discuss the effect of process parameters on structure and properties of solution dry spun filament. (4+8+8=20)
4. (a) What is the difference between acrylics and modacrylics?
- (b) Draw a flow chart to show the production of acrylonitrile/acrylic fibres and outline the process in brief. (5+15=20)

SECTION - C

5. (a) Outline the objectives of steeping, xanthation and ripening processes in reference to production of viscose.
- (b) How can you improve the strength of viscose under wet conditions?
- (c) Describe the role of different additives in coagulating bath used for spinning of viscose fibres. (6+4+10=20)
6. (a) Discuss the effect of process parameters on structure and properties of acrylic during wet spinning.
- (b) List the properties and end uses of high wet modulus rayon.
- (c) What is the significance of temperature of the regeneration bath of solution wet spinning? (8+4+8=20)

SECTION - D

7. (a) What is the importance of drawing and distribution of draw-ratio in different zones of a drawing operation?
- (b) Describe the phenomenon of neck formation in a drawing operation. How does it affect the structure and properties of fibres?

- (c) What should be the geometrical location of neck occurrence in a draw-line and how can it be stabilised?
(5+10+5=20)
8. (a) What are the objects of heat-setting?
(b) How can various parameters of heat setting affect the structure and properties of fibres?
(c) Discuss the role of spin finish and different spin finishes used for carbon fibres.
(4+8+8=20)

SECTION - E

9. (i) How is a multifilament yarn advantageous over a monofilament yarn?
(ii) How does ratio of surface tension and viscosity govern the stability of spin line?
(iii) Can a fibre be made from an anisotropic polymer having dissociation energy higher along the molecular axis than in the transverse direction?
(iv) What is melt fracture?
(v) What is dieswell ratio?
(vi) Name a few properties of fibres that are primarily dictated by the quantum of their amorphous zone.
(vii) How does wet spinning involve two-way mass transfer?
(viii) Why is spinning of monofilament carried out at lower speed as compared to equivalent multifilament yarn?
(ix) What is meant by "desulphurising" in reference to viscose fibre production?
(x) In which case DEG content is higher and why? PET obtained via PTA route or PET obtained via DMT route.
(10×2=20)