STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2015-16 & thereafter)

SUBJECT CODE: 15CH/PE/PM14

M.Sc. DEGREE EXAMINATION, NOVEMBER 2019
BRANCH IV- CHEMISTRY

COURSE : ELECTIVE
PAPER : POLYMER MATERIALS AND APPLICATIONS
TIME : 3 HOURS **MAX.MARKS : 100**

SECTION – A

ANSWER ALL QUESTIONS: **(20 x 1 = 20)**

CHOOSE THE CORRECT ANSWER:

1. Which of the following is a polymer
   a) Phospholipids b) Steroids c) Enzymes d) Vitamins
2. Which of the following is a condensation polymer?
   a) Acrylonitrile b) Neoprene c) Teflon d) Dacron
3. Which of the following thermal methods can be used to determine Tg
   a) TGA b) DTA c) TMA d) DSC
4. Which of the following polymerisation technique offers the problem of heat dissipation
   a) Solution b) Bulk c) Suspension d) Emulsion
5. Which of the following techniques yield number average polymer molecular weight
   a) Viscometry b) Light scattering c) Osmometry d) Ultracentrifugation

FILL IN THE BLANKS:

6. Liquid crystals show _____ behavior.
7. _____ polymers can be obtained by polymerizing a monomer in the presence of a polymer.
8. Polymer microstructures can be examined by _____ spectroscopy.
9. The hardening of plastics is often associated with cross linking and is called _____.
10. _____ polymerisation is a very useful technique employed for the preparation of tailor made block copolymers.

MATCH THE FOLLOWING:

11. Natural Rubber latex	-	Nylon
12. Ropes and Fibres	-	Neoprene
13. Polyester fabric	-	Melamine Formaldehyde resin
14. Synthetic rubber	-	Dacron
15. Unbreakable Crockery	-	cis-polyisoprene

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ANSWER IN ONE SENTENCE:

16. What are silicone polymers?
17. What is Ziegler Natta catalyst?
18. Give the expression for Mark – Houwink equation.
19. What is viscoelasticity?
20. What is ASTM method?

SECTION – B

ANSWER ANY FIVE QUESTIONS: (5 x 8 = 40)

21. i) Describe bulk polymerisation technique. (4)
    ii) Write a note on thermally stable polymers. (4)
22. i) What are addition and condensation polymers? Explain each one with suitable example
    ii) Explain Photodegradation of polymers. (4 +4)
23. In a polymer sample 30% molecules have molecular mass 20,000, 40% have molecular mass 30,000 and the rest 30% have molecular mass 60,000. Calculate the number average and weight average molecular weight.
24. Define Tg. Discuss the factors affecting Tg.
25. Explain Maxwell & Voigt model for viscoelasticity.
26. Explain the determination of molecular weight using GPC method.
27. How are polymers characterized using NMR spectroscopy

SECTION – C

ANSWER ANY TWO QUESTIONS: (2 x 20 = 40)

28. i) What are natural polymers? Discuss the structure properties and application of cellulose. (10)
    ii) Explain the mechanism of free radical polymerisation (10)

29. Write notes on the following (4 x 5 = 20)
    i) Flory Higgins theory
    ii) Suspension polymerisation
    iii) Spherulites
    iv) Conducting polymers

30. i) Describe the Newtonian and Non-Newtonian behavior of polymers (10)
    ii) Elaborate on any two moulding process (5 + 5)

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