STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 86
(For candidates admitted from the academic year 2023 – 2024 & thereafter)

B.Sc. DEGREE EXAMINATION, APRIL 2026
BRANCH IV – CHEMISTRY
FOURTH SEMESTER

COURSE : MAJOR-ELECTIVE
PAPER : POLYMER CHEMISTRY
SUBJECT CODE : 23CH/ME/PL45
TIME : 3 HOURS MAX. MARKS: 100

Q. No.	SECTION A **Choose the correct answer: (15 x1 = 15 Marks)**	CO	KL
1.	Polystyrene is a _____ plastic at room temperature. a) Ductile b) Brittle c) Malleable d) Soft	CO1	K1
2.	Cross linked polymers formed from bi-and trifunctional groups in which cross-linkage in three dimensions via few chemical bonding across linear chains occur imparts to the polymer _____ properties. a) Thermoplastic b) Thermosetting c) Elastomeric d) Brittleness	CO1	K1
3.	The molecular weight of polyvinyl chloride (PVC), if its degree of polymerisation is 600 is a) 13500 b) 51600 c) 49200 d) 50800	CO1	K1
4.	Initiator used in anionic polymerization is _____ a) Butyl lithium b) orthophosphate c) AIBN d) glycol	CO1	K1
5.	Which one of the following is a synthetic polymer? a) Cellulose b) Cellulose acetate c) Polyvinyl alcohol d) Starch	CO1	K1
6.	Which of the following polymerizations is also known as pearl polymerization? a) bulk polymerization b) suspension polymerization c) emulsion polymerization d) solution polymerization	CO1	K1
7.	Teflon is a) Phenol formaldehyde b) An inorganic polymer c) Polytetrafluroethylene (PTFE) d) A monomer	CO1	K1
8.	Addition polymerisation is not involved in the manufacture of a) Low density polythene b) Poly vinyl chloride c) Polystyrene d) Polyhexamethylene adipamide	CO1	K1
9.	Vulcanisation of rubber decreases its a) Tensile strength b) Resistance to organic solvents c) Tackiness d) Working temperature range	CO1	K1

10.	Natural plant fiber among the following is _____. a) Hemp b) Wool c) Silk d) Cashmere	CO1	K1
11.	Identify the catalyst used in cationic polymerisation – a) H_2SO_4 b) $TiCl_4$ and water c) Naphthalene + Na d) peroxide	CO1	K1
12.	Low pressure Zeigler process for the manufacture of polythene uses a catalyst which is a) Ni b) V_2O_5 c) Fe d) $Al(C_2H_5)_3 + TiCl_4$	CO1	K1
13.	Ebonite is a/an a) Highly vulcanised rubber b) Natural rubber c) Unvulcanised raw rubber d) Adhesive	CO1	K1
14.	The role of the solvent in solution polymerization is to a) reduce the viscosity gain b) increase the rate of reaction c) cause chain transfer d) All the above options	CO1	K1
15.	Commercial production of polypropylene employs _____ polymerisation. a) Emulsion b) Suspension c) Solution d) Bulk	CO1	K1
Q. No.	**SECTION B (15 x 1 = 15 Marks)** **Fill in the blanks:**	**CO**	**KL**
16.	Polymers consisting of identical monomers are called ____.	CO2	K2
17.	The commonly used initiator in the free radical polymerisation of alkene is _____.	CO2	K2
18.	Degree of polymerisation is given by _____.	CO2	K2
19.	An example of inorganic polymer is _____	CO2	K2
20.	The mathematical equation for viscosity molecular weight is _____.	CO2	K2
Q. No.	**Match the following:**	**CO**	**KL**
21.	Protein fiber a. cotton	CO2	K2
22.	Natural fiber property b. Rayon	CO2	K2
23.	Plant fiber c. Wool	CO2	K2
24.	Synthetic fiber d. Insulation	CO2	K2
25.	Synthetic fiber property e. biodegradability	CO2	K2

<table>
<tr><td></td><td>Answer in a line or two:</td><td>CO</td><td>KL</td></tr>
<tr><td>26.</td><td>What is heat distortion temperature ?</td><td>CO2</td><td>K2</td></tr>
<tr><td>27.</td><td>Give any two uses of Silicones.</td><td>CO2</td><td>K2</td></tr>
<tr><td>28.</td><td>What is Polydispersity index (PDI) ?</td><td>CO2</td><td>K2</td></tr>
<tr><td>29.</td><td>Give one example for Polymer tacticity.</td><td>CO2</td><td>K2</td></tr>
<tr><td>30.</td><td>What is copolymer?</td><td>CO2</td><td>K2</td></tr>
<tr><td>Q. No.</td><td>SECTION C
Answer any SIX of the following: (6 x 5 = 30 Marks)</td><td>CO</td><td>KL</td></tr>
<tr><td>31.</td><td>Give an account of the following polymerisation techniques: bulk polymerisation and emulsion polymerisation.</td><td>CO3</td><td>K3</td></tr>
<tr><td>32.</td><td>Differentiate biodegradable and non-biodegradable polymers.</td><td>CO3</td><td>K3</td></tr>
<tr><td>33.</td><td>Discuss the factors affecting the crystalline melting point of a polymer.</td><td>CO3</td><td>K3</td></tr>
<tr><td>34.</td><td>Explain the mechanism of vulcanization of rubber.</td><td>CO3</td><td>K3</td></tr>
<tr><td>35.</td><td>Give an account of the rheology and mechanical properties of a polymer.</td><td>CO3</td><td>K3</td></tr>
<tr><td>36.</td><td>Discuss the classification of polymers based on structure.</td><td>CO3</td><td>K3</td></tr>
<tr><td>37.</td><td>a) Explain any one method for the molecular weight determination of polymers.
b) Calculate the weight average, number average molecular weight, and polydispersity index for the following polymer –
<table>
<tr><th>% by mass</th><th>Molecular weight</th></tr>
<tr><td>30</td><td>50,000</td></tr>
<tr><td>10</td><td>25,000</td></tr>
<tr><td>25</td><td>1,00,000</td></tr>
<tr><td>35</td><td>2,00,000</td></tr>
</table></td><td>CO3</td><td>K3</td></tr>
<tr><td>Q. No.</td><td>SECTION D
Answer any FOUR of the following (4 x 5 = 20 marks)</td><td>CO</td><td>KL</td></tr>
<tr><td>38.</td><td>Give the Mark Houwink equation. Explain the terms in it.
Intrinsic viscosity of polyisobutylene is 160 cm^3 /gm and the Mark Houwink constants K is 3.750×10^{-2}, α is 0.64. Calculate the molecular weight of polyisobutylene.</td><td>CO4</td><td>K4</td></tr>
<tr><td>39.</td><td>Explain the thermal degradation of polymers.</td><td>CO4</td><td>K4</td></tr>
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40.	Distinguish between thermosetting and thermoplastic polymers.	CO4	K4
41.	Discuss the synthesis of graft and block copolymers	CO4	K4
42.	Explain the coordination polymerization.	CO4	K4
Q.No.	**SECTION E** **Answer the following: (2x 10 = 20 Marks)**	**CO**	**KL**
43.	What is the glass transition temperature? Discuss in detail the factors affecting the same.	CO5	K5
	OR		
	Discuss with respect to structure, properties and applications of PVC and PMMA. (5+5)	CO5	K5
44.	Discuss in detail the kinetics of free radical chain polymerization. Also derive a relation for kinetic chain length.	CO5	K5
	OR		
	Explain the following reactions of polymers with an example: Aminolysis, Hydrolysis, Cyclisation, Acidolysis, and Addition reaction. (2x5=10)	CO5	K5

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