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Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U9975

B.E./B.Tech. DEGREE EXAMINATION, NOV 2025

Open Elective

21UCH975-PLASTIC MATERIALS FOR ENGINEERS

(Regulations 2021)

(Common to ALL branches)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which industry extensively utilizes plastics for molding and shaping products CO1-U

   a) Construction b) Textiles c) Automotive d) Agriculture

2. Plastics are widely used in packaging due to their CO1-U

   a) Fragility b) Biodegradability c) Versatility and durability d) High cost

3. Which industry commonly uses polyesters for the production of textiles due to their durability, wrinkle resistance, and ease of care? CO1-U

   (a) Automotive (b) Electronics (c) Construction (d) Fashion and apparel

4. Which industry commonly uses polyesters for their versatility, moisture resistance, and recyclability in producing films and packaging materials? CO1-U

   (a) Healthcare (b) Automotive

   (c) Construction (d) Packaging and printing

5. Phenol-formaldehyde resins are used in the production of _____ CO1-U

   (a) Cooking utensils (b) Clothing fibers

   (c) Laminates and countertops (d) Plastic bags

6. What is the main environmental concern associated with the production of phenol-formaldehyde resins? CO1-U

   (a) The release of harmful chemicals during production

   (b) High energy consumption

   (c) Low recyclability

   (d) Excessive water usage

7. What is the main advantage of using expanded Polystyrene (EPS) in packaging and insulation? CO1-U

(a) High chemical resistance (b) Lightweight and good thermal insulation properties

(c) High impact strength (d) High transparency

8. Which plastic is commonly used in making reusable water bottles due to its resistance to cracking and shattering? CO1-U

(a) Polyethylene Terephthalate (PET) (b) Polycarbonate (PC)

(c) Polystyrene (PS) (d) Polypropylene (PP)

9. How does the environmental impact of PLA compare to that of traditional petroleum-based plastics? CO1-U

(a) PLA has a significantly higher environmental impact.

(b) PLA has a similar environmental impact.

(c) PLA has a lower environmental impact, especially in terms of carbon footprint.

(d) PLA has no environmental impact.

10. Which process is used to compost PLA under industrial composting conditions? CO1-U

(a) Chemical recycling (b) Aerobic digestion

(c) Incineration (d) Mechanical recycling

PART – B (5 x 2= 10 Marks)

11. Why are plastics often chosen for medical devices and equipment? CO1-U

12. Mention any one industrial use of polyimides. CO1-U

13. Explain the role of curing agents in the hardening process of epoxy resins. CO1-U

14. Mention two properties of ABS that make it suitable for automotive parts. CO1-U

15. What is a common use of PLA bioplastics in the 3D printing industry, and why is it favored for this purpose? CO1-U

PART – C (5 x 16= 80Marks)

16. (a) How do the plastic materials influence the choice of 3D printing technology and the quality of the printed products? Explain briefly CO1-U (16)

Or

(b) Describe the advantages and disadvantages of plastic materials in various sectors. What strategies can industries implement to tackle the challenges associated with plastic use? CO1-U (16)

17.	(a)	Describe the manufacture, properties, and uses of polyimides, thermoplastic polyurethanes (TPUs) Why are they suitable for high-temperature applications?	CO2-App	(16)
		Or		
	(b)	Explore innovations in material development, applications, and sustainability initiatives shaping the future of polyester-based products.	CO2-App	(16)
18.	(a)	Investigate the environmental and health concerns associated with urea-formaldehyde resins. What measures can be implemented to reduce exposure and improve safety?	CO5-Ana	(16)
		Or		
	(b)	Compare and contrast the mechanical properties of common thermosetting plastics such as epoxy, phenolic, and polyurethane. How do these properties influence their respective uses.	CO5-Ana	(16)
19.	(a)	Analyze the role of copolymerization in enhancing the properties of TFE-based polymers like ETFE and FEP	CO5-Ana	(16)
		Or		
	(b)	High energy absorbing polymers are used in impact-resistant applications. Critically evaluate their performance with examples and limitations.	CO5-Ana	(16)
20.	(a)	Analyze the role of bio-based polymers in the automotive industry. What advantages do they offer for vehicle production, and what challenges are involved in their integration?	CO6-Ana	(16)
		Or		
	(b)	Analyze the environmental footprint of bio-based polymers from production to disposal. How does it compare to that of traditional plastics?	CO6-Ana	(16)