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

Question Paper Code: U7206

B.E. / B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Professional Elective

Mechanical Engineering

21MEV206 NEW PRODUCT DEVELOPMENT

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which tool is commonly used for monitoring New Product Development (NPD) timelines? CO1- U

   (a) Pareto chart (b) Gantt chart (c) Ishikawa diagram (d) Control chart

2. What is the main objective of Quality Function Deployment (QFD)? CO1- U

   (a) To reduce material costs in production

   (b) To translate customer requirements into technical specifications

   (c) To identify defects in manufacturing processes

   (d) To improve supplier relationships

3. Which manufacturing process involves pouring molten metal into a mold to form a part? CO1-U

   (a) Welding (b) Fabrication (c) Metal Casting (d) Machining

4. Which of the following tests is used to determine the chemical composition of materials? CO1-U

   (a) X-ray Fluorescence (XRF) (b) Charpy Impact Test

   (c) Rockwell Hardness Test (d) Bending Test

5. Which phase focuses on developing an initial product concept and defining its feasibility? CO1-U

(a) Production phase (b) Concept design phase

(c) Packaging phase (d) Disposal phase

6. What is the purpose of PPAP (Production Part Approval Process)? CO1-U

(a) To increase production cost

(b) To ensure that manufacturing processes meet customer requirements

(c) To generate random reports

(d) To reduce the quality control process

7. In new product development, which technique is commonly used for detecting subsurface defects in castings? CO1- U

(a) Magnetic Particle Testing (MPT) (b) Dye Penetrant Testing (DPT)

(c) Ultrasonic Testing (UT) (d) Hardness Testing

8. What is the significance of "Lesson Learned" in New Product Development (NPD)? CO1- U

(a) To document past mistakes and best practices for future projects

(b) To identify supplier issues

(c) To create a new marketing strategy

(d) To improve operator skill levels

9. Why is a Standard Operating Procedure (SOP) important on the shop floor? CO1- U

(a) It standardizes work procedures to ensure consistency and quality

(b) It replaces the need for skilled labor

(c) It helps reduce raw material costs

(d) It eliminates the need for quality inspection

10. Which of the following is NOT a benefit of concurrent engineering? CO1- U

(a) Faster time to market

(b) Improved product quality

(c) Reduced cross-functional team collaboration

(d) Lower product development costs

PART – B (5 x 2= 10 Marks)

11.	What is Critical Path Analysis (CPA) in project management?	CO1- U	
12.	What is the key difference between DFMEA and PFMEA?	CO2- U	
13.	What is the role of a Cross-Functional Team (CFT) in product development?	CO1 -U	
14.	How does risk analysis improve new product development (NPD)?	CO4 -U	
15.	How does 3D printing benefit the production of resin models?	CO5 -U	

PART – C (5 x 16= 80 Marks)

16.	(a)	What is a Gantt chart, and how is it used in monitoring New Product Development (NPD)?	CO2- U	(16)
		Or		
	(b)	Explain the basics of Management Information Systems (MIS) software and their applications in industries	CO2- U	(16)
17.	(a)	Explain and give some examples of the material specification standards DIN, JIS and EN in manufacturing and engineering processes.	CO1- U	(16)
		Or		
	(b)	Explain the fundamentals of DFMEA and PFMEA and their role in improving product design and manufacturing processes	CO1- U	(16)
18.	(a)	Identify the functions of a Cross Function Team (CFT) to resolve a design and manufacturing conflict during the development of an automotive component	CO3- App	(16)
		Or		
	(b)	Apply layout marking techniques in a tool-making process, ensuring precise dimensional control and minimal material wastage.	CO3- App	(16)
19.	(a)	Identify critical ultrasonic testing (UT) parameters for detecting subsurface defects in forged and welded components.	CO4- App	(16)
		Or		
	(b)	Identify key factors affecting X-ray imaging for internal defect detection in critical engine components.	CO4- App	(16)
20.	(a)	Apply the Production Part Approval Process (PPAP) by explaining its 18 elements of reporting and their role in ensuring product quality in a manufacturing environment.	CO4- App	(16)

Or

(b)	Identify the key principles of Concurrent Engineering (CE) and its role in reducing development lead time and time-to-market in New Product Development (NPD).	CO4- App	(16)