



**B.E. DEGREE EXAMINATIONS: APRIL 2018**

(Regulation 2014)

Eighth Semester

**AUTOMOBILE ENGINEERING**

U14AUTE17: Rapid Prototyping Tooling and Manufacturing

**COURSE OUTCOMES**

**CO1:** Understand the stages of product development

**CO2:** Understanding the concepts of STEREO LITHOGRAPHY AND DIRECT METAL LASER SINTERING processes

**CO3:** Understanding the concepts of FUSION DEPOSITION MODELING AND LAMINATED OBJECT MANUFACTURING and the machine details

**CO4:** Understanding the concepts of SOLID GROUND CURING and 3D printing processes and the machine details

**CO5:** Understanding the concepts of Rapid Tooling and the medical applications of RPT

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions: -**

**PART A (10 x 1 = 10 Marks)**

1. Match the appropriate item from the RHS with those on LHS

CO2 [K<sub>3</sub>]

LHS		RHS	
A. Fusion Deposition Modelling		i. Solid based RP system	
B. Solid Ground Curing		ii. Liquid based RP system	
C. Laminated Object Manufacturing		iii. Powder based RP system with max part weight of 240 kg	
D. Selective Laser Sintering		iv. Powder based RP system with max part weight of 148 kg	

	A	B	C	D
a)	i	ii	iii	iv
b)	ii	iii	iv	i
c)	iii	iv	i	ii
d)	iv	i	ii	iii

2. One of the main strength and its achievement of using Laminated Object Manufacturing (LOM) technology is: CO3 [K<sub>2</sub>]
- A. High precision
- B. The feature-to-feature accuracy can be achieved is usually better than 0.127 mm
- a) Both A and B are true b) A is true and B is false
- c) Both A and B are false d) A is false and B is true
3. For producing accurate silicone tools, the widely used RTV moulding is CO5 [K<sub>2</sub>]
- a) Vacuum casting b) 3 D printing
- c) Investment casting d) LOM
4. Rapid prototyping process is a CO1 [K<sub>2</sub>]
- a) Subtractive process b) Compressive process
- c) Additive process d) Drawing process
5. The process of making tools and moulds to produce prototypes is CO5 [K<sub>3</sub>]
- a) Rapid Tooling b) Rapid Transferring Process
- c) Reverse Engineering d) Re- Engineering
6. The File format STL stands for CO2 [K<sub>2</sub>]
- a) Standard Text Language b) Standard Triangle Language
- c) Shortened Text Link d) Simplified Text Line
7. Consider the following geometric modelling techniques: CO1 [K<sub>3</sub>]
1. Wireframe modelling 2. Solid modelling 3. 2D geometrical modelling 4. Surface modelling
- The correct sequence of geometric modelling techniques is:
- a) 1-2 - 3 - 4 b) 3-1- 4 – 2
- c) 1- 3- 4- 2 d) 1 - 4 – 3 - 2
8. In Thermo jet printers (3D system), the parts are constructed from CO4 [K<sub>2</sub>]
- a) Nylon b) Tin based alloy
- c) Nickel based alloy d) Thermoplastic material
9. A. In thermo jet printer, parts is constructed from a thermoplastic material. CO4 [K<sub>2</sub>]
- B. In Sander's model maker, parts is constructed from a thermoplastic material
- a) A is true and B is false b) A is false and B is true
- c) Both A and B are true d) Both A and B are false

10. In Laminated Object Manufacturing, the completed parts must be sealed by CO3 [K<sub>3</sub>]
- a) Resin b) Urethane  
c) Thin sheet d) Metal powder

**PART B (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

11. What are the benefits of Rapid prototyping? CO1 [K<sub>3</sub>]
12. What do you mean by detail design? CO1 [K<sub>2</sub>]
13. What are the process parameters involved in Stereo lithography? CO2 [K<sub>2</sub>]
14. Explain the various application of SLM method. CO2 [K<sub>3</sub>]
15. Mention any four materials used in FDM process. CO3 [K<sub>3</sub>]
16. State the basic principle of LOM. CO3 [K<sub>2</sub>]
17. What are the advantages and Limitations of Solid Ground Curing? CO4 [K<sub>3</sub>]
18. What is the principle of Laser Engineered Net Shaping? CO4 [K<sub>2</sub>]
19. Compare between rapid tooling with conventional tooling. CO5 [K<sub>4</sub>]
20. What are mimics in RPT? CO5 [K<sub>2</sub>]

**Answer any FIVE Questions: -**

**PART C (5 x 14 = 70 Marks)**

**(Answer not more than 300 words)**

**Q. No. 21 is Compulsory**

21. Relate the computer tools used to support product development and their roles during the various phases of the development process. CO1 [K<sub>3</sub>]
22. Enumerate in detail about the current limitations of RPT and List down product data exchange formats used in RP. CO1 [K<sub>4</sub>]
23. With a neat sketch explain the Selective Laser Sintering (SLS) process. CO2 [K<sub>2</sub>]
24. Enumerate in detail about the Fusion Deposition Modelling (FDM) with process parameters also its applications using sketch. CO3 [K<sub>4</sub>]

25. Discuss the principle, process parameters process details of 3 – Dimensional printers and state its applications. CO4 [K<sub>3</sub>]
26. (i) What are the indirect methods available for rapid tool production? (4) CO5 [K<sub>3</sub>]  
(ii) Explain RTV Tools and Epoxy Tools. (10) CO5 [K<sub>3</sub>]
27. Enumerate in detail about the various application of Rapid Prototyping Technology in medical field. CO5 [K<sub>3</sub>]

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