UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Programme Name: B-Tech ADE   Semester   : VIII
Course Name   : **Rapid Prototyping and Tooling**   Time: 03 hrs.
Course Code   : **MEEL 413**   Max. Marks : 100
Nos. of page(s) : 2
Instructions:

	SECTION A (20 marks)		
S. No.		Marks	CO
Q 1	Q1.(a) SLS can be used for both metals and polymers (T/F). Q1.(b) …………………..materials can be processed using SLA. Q1.(c) Working temperature of Rapid Freeze Prototyping is…………. Q1.(d) EBM can melt any metal instantly.(T/F) Q1.(e) Direct Laser Melting is only used in horizontal orientation.(T/F) Q1.(f) LOM objects have……………………like appearance. Q1.(g) Solid ground curing is faster than SLA.(T/F) Q1.(h) Wire EDM is used for electrically conductive materials only.(T/F) Q1.(i) …………………..serve as a mask for Selective Metal Sintering. Q1.(j) Raw material and support material for RFP are………….. and …………..	10	CO1
Q2	Specify the raw materials used in rapid prototyping processes.	5	CO1
Q3	Comment on processing time and surface finish for Solid Ground curing.	5	CO2
	SECTION B (40 Marks)		
Q4.	Discuss advantage and limitation of rapid prototyping processes.	10	CO1
Q5.	Differentiate between additive manufacturing and non-additive manufacturing based rapid prototyping system with example.	10	CO3
Q6.	Distinguish between direct and indirect tooling. **OR** Relate the use of Reverse Engineering in context of rapid prototyping. Write steps and give applications.	10	CO2
Q7.	Comment on causes and remedies of following defects a) Defects in STL file b) Defects in FDM prototypes	10	CO4
	SECTION-C (40 Marks)		

Q8.	a) Explain Laser Engineering Net Shaping (LENS) process for additive manufacturing. b) Explain Rapid Freeze Prototyping with its application and drawbacks **OR** **a)** Describe principle and applications of solid ground curing. **b)** Inaccuracy of rapid prototypes is one of the limitations! Justify the statement by explaining the various sources of inaccuracy. What is the standard method of shrinkage compensation in SLS process?	**20**	**CO3**
Q9.	(a) Calculate the maximum feed rate (mm/minute) to build a cube of dimension 200mmX150mmX300mm using FDM if it is to build in 24 hours. Layer thickness is 200μm and track width is 1mm. (b) Calculate material deposition rate (kg/hour) of FDM machine if it uses a resistor of 10W as heating element. Specific energy consumption for raw material is $0.90J/mm^3$. Density of material is $1200kg/m^3$. Also, calculate the maximum feed rate (mm/s) if nozzle used for deposition has diameter of 1.15mm and layer thickness is 150μm.	**20**	**CO4**