M.E.Mech (P.D.D. Engg.)

Master Of Engineering

Question Papers Nov-Dec 2019

Sem–I & II

ME|Mech|PDD|Choice Based|Sem-I 4|12|2019

(3 Hours) [Total Marks : 80]

N.B. : 1) Solve **any four** questions.
2) Assume suitable **data** if **necessary**.
3) **Figures** to the **right** indicate **full** marks.

1. a Explain five step method of concept generation for a product with suitable illustration. 10
   b What is TRIZ and How can it be used in Problem Solving. 10

2. a Explain simulation based design optimization method. 10
   b For what types of products would the initial focus of the concept generation activity be on the form and user interface of the product and not on the core technology? Describe specific examples. 10

3. a State the five steps involved in Design For Manufacturing Process? Explain all the sub steps involved in each of the steps in DFM with an example. 10
   b What is Ergonomics? What is its importance for Product Development and Design? 10

4. a What is Industrial Design? Lists five critical goals that industrial designers can help a team to achieve when developing new products. 10
   b Explain Design of experiment and Taguchi robust design. 10

5. a What is function phase in value engineering? Give some typical verbs and nouns used commonly for defining function. Illustrate the usage of the same with suitable example. 10
   b Discuss the conditions that need to be fulfilled to patent an invention. 10

6. a Explain various economic qualitative and quantitative methods. 10
   b Explain the concept of sustainable design with suitable illustration. 10

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ME/Mech/ PDD/ Choice Based/ Sem – I 9/12/2019

(3 Hours) [Total Marks: 80]

N.B: (1) Question **No.1** is Compulsory.
(2) **Attempt any three Questions** out of remaining **five questions.**
(3) Figures to the right indicate full marks.
(4) Assume any suitable data if necessary and justify the same.

Q1	A)	Explain in detail (LENS) Laser Engineered Net Shaping of Powder based Rapid Prototyping Systems?	**10**
	B)	Take case study based on Wind-Tunnel Testing with RP Models.	**10**
Q2	A)	Draw and explain in detail about Stereolithography of Liquid based Rapid Prototyping Systems?	**10**
	B)	What is Multi-Jet Modelling (MJM) System of Solid based Rapid Prototyping Systems?	**10**
Q3	A)	Sequential operation in LOM (Laminated Object Manufacturing) System of Solid based Rapid Prototyping Systems?	**10**
	B)	Step by step process in (MJS) Multiphase Jet Solidification of Powder based Rapid Prototyping Systems?	**10**
Q4	A)	Elaborate Micro-stereolithography of Liquid based Rapid Prototyping Systems also explain various applications?	**10**
	B)	Importance of Slicing and Scan Path Generation Algorithms in Rapid prototyping?	**10**
Q5	A)	What are the various Rapid Prototyping Process Chain?	**10**
	B)	Write short note on a) Two Photon Process for Micro/Nano Fabrication b) 3D Modeling Softwares	**10**
Q6		Write short note a) Data Conversion and Transmission b) Explain the Historical Development of Rapid Prototyping? c) Reverse Engineering Process and Applications.. d) Advantages and disadvantages of Model Maker and Pattern Master	**20**

M. E. Mech-I Choice Base 13/12/2019 Sem-I

(3 Hours) [Total Marks : 80

NB: - 1) Solve any four questions.
2) Figures to the right indicate full marks.
3) Assume suitable data wherever necessary.

Q1 **a)** What are sweep surfaces? Discuss different methods of generating sweep surfaces **10**

b) Explain the polygon fill using boundary fill algorithm. **10**

Q2 **a)** Generate a line $y = 2x + 10$ using Bresenham's line generation algorithm. **10**

b) Describe the transformations used in magnification and reduction with respect to the origin. Find the new co-ordinates of the triangle A(0,0) B(1,1) C(5,2) after it has been(a) magnified twice its size and (b) reduced to half its size **10**

Q3 **a)** Write Short note on Product Data Exchange format. **10**

b) Explain the Z buffer algorithm in detail. **10**

Q4 **a)** Explain in detail Cohen – Sutherland line clipping algorithm. **10**

b) What is geometric mapping? Compare geometric transformation and geometric mapping. **10**

Q5 **a)** The coordinates of four data points P_0, P_1, P_2, P_3 are: (2,2,0), (2,3,0), (3,3,0), (3,2,0) respectively. Find the equation of the Bezier curve and determine the coordinates of ten different values of u. **10**

b) Explain in detail ray tracing. **10**

Q6 Write short note on **20**
a) Benefits of Computer Aided Design
b) Wire frame versus solid modeling
c) 3-D windowing and clipping
d) Anti-aliasing

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ME/ Sem I / Mech / PDD / CBCS / 17/12/19

(3 Hours) (Marks: 80)

N.B. : (1) Answer any four questions out of the six questions.
(2) Figures to the right indicate full marks.
(3) Answers to the questions should be grouped and written together.
(4) Assume suitable data if required.

1. (a) Solve the following Linear Programming problem by Simplex Method. 10

Maximize $z = 4x + 5y$
Subject to $2x + y \leq 6$
$x + 2y \leq 5$
$x + y \geq 3$
Such that $x \geq 0$ and $y \geq 0$

(b) What are the advantages and limitations of simulation? 10

2. (a) Solve the following problem by Big M method 10

Max $Z = -2X_1 - X_2$
Subject to
$3X_1 + X_2 = 3$
$4X_1 + 3X_2 \geq 6$
$X_1 + 2X_2 \leq 4$
$X_1, X_2 \geq 0$

(b) In a railway yard goods train arrive at a rate of 30 trains per day. Assuming that the inter arrival time follows an exponential distribution and the service time distribution is also exponential with an average 36 minutes. Calculate the following: 10

i. The average number of trains in the queue
ii. The probability that the queue size exceeds 10
iii. Expected waiting time in the queue
iv. The probability that the number of trains in the system exceeds 10
v. Average number of trains in the queue.

3. (a) Solve the following problem by two phase simplex method 10

Minimize $Z = 15/2\,X_1 - 3X_2$
Subject to
$3X_1 - X_2 - X_3 \geq 3$
$X_1 - X_2 + X_3 \geq 2$
$X_1, X_2, X_3 \geq 0$

(b) The profit for three markets as a function of sales effort expended, as given in the table. How will you distribute a given number of salesmen, so as to achieve maximum profit? 10

No. of salesmen	Markets		
	I	II	III
0	40	50	50
1	42	60	60
2	50	65	70
3	60	75	80
4	66	85	88

5	75	95	105
6	82	110	115
7	90	120	130

4. (a) Solve the following problem by dual simplex method 10

Minimize $Z = 3X_1 + X_2$

Subject to

$X_1 + X_2 \geq 1$

$2X_1 + 3X_2 \geq 2$

$X_1, X_2 \geq 0$

(b) A firm produces three products A,B,C and their unit contributions are Rs. 5/- ; Rs. 10/- & Rs.8/- respectively. Each unit of product A requires 3 kg of material, 5 machine hours and 2 labour hours; each unit of product B requires 4 kg of material, 4 machine hours and 4 labour hours and each unit of product C requires 2 kg of material, 4 machine hours and 5 labour hours. Every day 60 kg of material, 72 machine hours and 100 labour hours are available. From the above information formulate the linear programming problem. State the decision variables, constraints and Objective Function. 10

5. (a) A company has three factories X, Y, Z. It supplies goods to four warehouses W1, W2, W3 and W4. The production capacities of the factories and demand of the warehouses are as shown in the table. Determine the optimal solution of the problem. 10

		Warehouse				
		W1	W2	W3	W4	Production Capacity
Factory	X	19	30	50	12	7
	Y	70	30	40	60	10
	Z	40	10	60	20	18
Demand		5	8	7	15	

Solve the problem with any four methods for Initial Basic Feasible Solution.

(b) In a game of matching coins with two players, suppose one player wins Rs.2 when there are two heads and wins nothing when there are two tails; and looses Rs. 1 when there are one head and one tail. Determine the payoff matrix, the best strategies for each player and the value of the game. 10

6 (a) Find the sequence that minimizes the total time in hours required to complete the following tasks in the order $M_1M_3M_2$: 10

	Tasks						
	A	B	C	D	E	F	G
M 1	3	8	7	4	9	8	7
M 2	6	7	5	11	5	6	12
M 3	4	3	2	5	1	4	3

(b) The demand of an item is uniform at a rate of 25 units per month. The fixed cost is Rs. 15 each time a production run is made. The production cost is Rs.1 per item and the inventory carrying cost is Rs.0.30per item per month. If the shortage cost is Rs. 1.50per item per month, determine how often to make a production run and what size it should be? 10