

## ANNAMACHARYA INSTITUTE OF TECHNOLOGY &amp; SCIENCES :: RAJAMPET

(AUTONOMOUS)

*M.Tech. II Semester Regular Examinations, December 2013****Mechatronics*****( CAD/CAM )****Max. Marks: 60****Time: 03 Hours**

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**Answer any five questions****All Questions carry equal marks (12 Marks each)**

1. a. Explain what is meant by a system and discuss the elements of measurement systems. 6M  
b. Describe the working of a mechatronic system with an application. 6M
2. a. Sketch and explain the working principle of a linear variable differential transformer. 6M  
b. Discuss the working of a float and a differential pressure sensor. 6M
3. a. Describe the working of a double acting cylinder. 6M  
b. Explain the principle of brushless permanent magnet d.c. motor. 6M
4. a. Describe the basic structure of a microprocessor system. 6M  
b. Discuss the PLC ladder programming with an example. 6M
5. a. Discuss about open loop and closed loop control systems. 6M  
b. Explain deterministic and stochastic control systems. 6M
6. a. Describe the working of a digital control system. 6M  
b. Explain proportional plus derivative control. 6M
7. a. Sketch and explain the working of any three logic gates. 6M  
b. Discuss the operation of a decoder. 6M
8. a. Explain parallel and serial data transmission methods. 6M  
b. Discuss the role of computers in product design, manufacturing and process planning. 6M

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**Rapid Prototyping**  
( CAD/CAM )

Max. Marks: 60

Time: 03 Hours

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Answer *any five* questions

All Questions carry equal marks (12 Marks each)

1. a. Discuss the role of RP in reducing product development time. 6M
- b. Explain the classification of Rapid Prototyping systems 6M
2. a. With a neat sketch explain the working of SLA RP system. Mention specifications of the SLA machine 8M
- b. What is photo-polymerization process? Explain with a neat sketch 4M
3. a. Explain the working of FDM RP process with a neat sketch. Also mention the advantages and limitations of it. 8M
- b. Compare and Contrast FDM with SLA RP process 4M
4. a. Illustrate the working of SGC RP process with a neat sketch. Also mention the applications of it. 8M
- b. Distinguish between LOM and SGC process 4M
5. a. Describe the working of SLS RP process with a neat sketch. Mention the advantages and limitations of it. 8M
- b. Compare SLS with SLA process. 4M
6. a. What are concept modelers? Explain the working of 3-D printing process with a neat sketch. 8M
- b. Describe the working principle of thermal Jet Printer 4M
7. a. Describe LENS RP process with a neat sketch. Mentions how it is different from SLS process. 8M
- b. Define Rapid Tooling and discuss the classification of rapid tooling process. 4M
8. a. Explain Vacuum Casting and surface digitizing process and mention their applications. 8M
- b. Discuss surface generation from point cloud technique. 4M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET  
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M.Tech II Semester Regular December, 2013

*Robotics*  
( CAD/CAM )

Max. Marks: 60

Time: 03 Hours

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Answer *any five* questions

All Questions carry equal marks (12 Marks each)

1. a. Define robot workspace. Explain the various components of a robot. 6M
- b. What are the various characteristics of a robot? Give its applications. 6M
2. Define the rotation matrices to indicate a rotation of an angle  $\alpha$  about the OX axis, followed by a translation of b units of distance along the OZ axis, followed by a rotation of  $\phi$  about the OY axis. 12M
3. Explain the forward and inverse kinematic equations for position and orientation of a robot arm. 12M
4. State the differential motions of a robot and its hand frame. Explain the calculation of jacobian and inverse jacobian. 12M
5. What is Lagrangian mechanics? Write the dynamic equations for a multi degree of freedom robot. 12M
6. Differentiate path and trajectory. State and explain the different types of joint space trajectory planning. 12M
7. What are the desirable features of sensors used in robotics? Explain the working of position and velocity sensors. 12M
8. What are the different types of robot languages? Explain the structures used in robot languages. 12M

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Max. Marks: 60

Time: 03 Hours

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Answer any five full questions

All Questions carry equal marks (12 Marks each)

1. a. The total weekly revenue (in dollars) of a workshop realized in manufacturing and selling roll-top desks is given by :

$$R(x, y) = -0.2x^2 - 0.25y^2 - 0.2xy + 200x + 160y$$

where 'x' denotes the number of finished units and y denotes the number of unfinished units manufactured and sold per week. The total weekly cost (in dollars) attributable to the manufacture of these desks is given by:

$$C(x, y) = 100x + 70y + 4000$$

Determine how many finished units and how many unfinished units the company should manufacture per week in order to maximize its profit. What is the maximum profit realizable?

8M

- b. What are the necessary and sufficient conditions for the relative minimum of a function of a single variable?
2. Use (Big-M or 2-phase) simplex method to:

4M

Minimize

$$Z = x_1 + x_2 + x_3$$

12M

Subject to

$$x_1 - 3x_2 + 4x_3 = 5$$

$$x_1 - 2x_2 \leq 3$$

$$2x_2 + x_3 \geq 4$$

$$x_j \geq 0 \quad (j = 1, 2, 3)$$

3. A salesman wants to visit cities A, B, C, D and E. He does not want to visit any city twice before completing his tour of all the cities and wishes to return to the point of starting journey. Cost of going from one city to another (in rupees) is shown in table below. Find the least cost of route.

12M

	A	B	C	D	E
A	0	2	5	7	1
B	6	0	3	8	2
C	8	7	0	4	7
D	1	4	6	0	5
E	1	3	2	8	0

4. Minimize  $f = x_1^2 + 3x_2^2 + 6x_3^2$  by the Newton's method using the starting point as (2,-1,1)

12M

5. What are the three operations of genetic algorithms? Explain in detail. 12M
6. What are the steps involved in the solution of a problem using genetic programming? 12M
7. Explain the concept of Pareto Optimality. 12M
8. Explain the procedure of optimizing the sequence of operations in machining. 12M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET  
(AUTONOMOUS)

M.Tech II Semester Regular December, 2013

*Artificial Intelligence & Expert Systems*

(CAD/CAM)

Max. Marks: 60

Time: 03 Hours

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Answer *any five* questions

All Questions carry equal marks (12 Marks each)

1. Explain the State Space representation of Water-Jug problem and give solution for it. 12M
2. Discuss the A\* algorithm with suitable example 12M
3. Write a detail notes on Procedural Vs Declarative knowledge representations 12M
4. How to convert Wffs into clause form, give suitable examples 12M
5. Using Rule Based System, compute Certainty Factor[CF], MB and MD of  $h_1$ , given 12M  
3 observations Where  $MB[h_1, O_1]=0.5$ ,  $MB[h_1, O_2]=0.3$ ,  $MB[h_1, O_3]=0.2$
6. Draw a neat diagram of a General Expert System structure and explain the various 12M  
modules of it.
7. Discuss about General Learning process and performance measures. 12M
8. Write short notes on 6+6
  - (i). MYCIN
  - (ii). Genetic Algorithm

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET  
(AUTONOMOUS)**

**M.Tech II Semester Regular December, 2013**

***Computer Integrated Manufacturing  
( CAD/CAM )***

**Max. Marks: 60**

**Time: 03 Hours**

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**Answer any five questions**

**All Questions carry equal marks (12 Marks each)**

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| 1. a. Explain the following terms related line balancing:                                 | 4M |
| i. Cycle time   |    |
| ii. Line efficiency   |    |
| iii. Balanced delay   |    |
| iv. Total work content  |    |
| b. List out the reasons for justification of automation                                   | 8M |
| 2. a. What are the advantages and limitations of NC machine tools.                        | 8M |
| b. Explain the difference between CNC and DNC systems.                                    | 4M |
| 3. a. Explain the purpose of punch tape in NC   | 6M |
| b. Explain adaptive control optimization system   | 6M |
| 4. a. What are the benefits of computer aided process planning?                           | 6M |
| b. Explain the inputs required for Material Requirement Planning (MRP).                   | 6M |
| 5. a. With an example explain the concept of composite part in Group Technology.          | 6M |
| b. What are the benefits of Group Technology?   | 6M |
| 6. a. Explain the various layout configurations used in FMS                               | 9M |
| b. Explain the difference between dedicated FMS and Random order FMS                      | 3M |
| 7. a. How does kaizen and total productive maintenance help in achieving lean production. | 8M |
| b. Compare the lean and agile manufacturing paradigms.                                    | 4M |
| 8. a. What are the various elements of simulation?  | 6M |
| b. Define simulation and explain the need for simulation.                                 | 6M |

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