Code: 4PE521

M. Tech. II-Semester Regular Examinations Oct/Nov 2015
Advanced Optimization Techniques
(Common to CAD/CAM & Machine Design)

Max. Marks: 60   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)
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UNIT-I

1.   Maximize $z = 2x_1 + 3x_2$

Subject to:

$x_1^2 + x_2^2 \leq 20$

$x_1 x_2 \leq 8$

$x_1, x_2 \geq 0$

Use Kuhn- tucker conditions   12M

OR

2. a) The total profit (z) of a firm depends upon the level of output (Q) and the advertising expenditure (A). Find the profit maximizing values of Q and A given the following relationship.

$z = 800 - 3Q^2 - 4Q + 2QA - 5A^2 + 48A$ 6M

b) Explain Lagrangian method for solving non –linear programming problem   6M

UNIT-II

3.   Solve using two phase Simplex method:

Maximize z = $5x_1 + 8x_2$

Subject to the constraints:

$3x_1 + 2x_2$ 3

$x_1 + 4x_2$ 4

$x_1 + x_2$ 5

x_1 0; x_2 0   12M

OR

4.   A company has 5 jobs to be done. The following matrix shows the returns in rupees on assigning i_{th} machine to the j_{th} job. Assign the five jobs to the five machines so as to maximize the total profit

Machine/Jobs	A	B	C	D	E
1	5	11	10	12	4
2	2	4	9	3	5
3	3	12	5	14	6
4	6	14	4	11	7
5	7	9	8	12	5

12M

UNIT-III

5. $Minimize\ f(x_1, x_2) = x_1^2 - x_1 x_2 + 3x_2^2$ using Steepest descent method.

$Take\ starting\ point\ (1,2)$. Take tolerance $\epsilon = 0.1$ 12M

OR

6. Solve the following problem by using interior penalty function approach.

$Minimize\ f(x_1, x_2) = (x_1)^2 - 2x_1 - 1$

Subject to:

$1 - x_1 \geq 0$ 12M

UNIT-IV

7. a) List out the Applications of genetic algorithm   6M

   b) What are the Advantages and limitations of genetic algorithm   6M

OR

8. a) Find a tour of a given set of cities so that Each city is visited once and only once The total distance traveled is minimum

To From	1	2	3	4	5
1	-	3	6	2	3
2	3	-	5	2	3
3	6	5	-	6	4
4	3	2	6	-	6
5	3	3	4	6	-

12M

UNIT-V

9. Explain the steps to optimize cutting parameters in turning   12M

OR

10. Design the steps to optimize spring design   12M

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M. Tech. II-Semester Regular Examinations Oct/Nov 2015
Artificial Intelligence & Expert Systems
(CAD/CAM)

Max. Marks: 60   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)
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UNIT-I

1. a) Explain the concept of planning with state space search using suitable examples.
   b) Define Artificial Intelligence and mention some of its subfields

OR

2. a) What are the differences and similarities between problem solving and planning? And explain with an example
   b) Write a short report on various applications in the field of AI.

UNIT-II

3. a) Explain Artificial AO* algorithm with an example
   b) Explain the use of planning graphs in providing better heuristic estimates with suitable examples.

OR

4. a) Write Graph search algorithm and interpret it to an example
   b) Prove that the breadth first search is a special case of uniform cost search

UNIT-III

5. a) Describe in detail the steps involved in the knowledge Engineering process.
   b) What factors justify whether the reasoning is to be done in forward or backward reasoning?

OR

6. a) Explain substances and Objects in Knowledge representation in detail
   b) Discuss in detail the forms of learning in knowledge representation

UNIT-IV

7. a) List two applications of Hidden Markov model and explain any one application in detail
   b) Explain the need of fuzzy set and fuzzy logic with examples

OR

8 a) Explain the unification algorithm in detail
   b) Formulate these sentences, which are written in plain English (a natural language), in the language of predicate logic
      i. Every house owned by somebody
      ii. Sue owns a house
      iii. Somebody does not own a house
      iv. Every house is a physical object
      v. Some physical objects are houses

UNIT-V

9. a) With a neat diagram, explain the architecture and working of a typical rule based expert system
   b) List the steps in a generic genetic algorithm and explain in detail

OR

10. a) List various typical expert systems and explain any one of them in detail to represent domain knowledge
    b) Discuss about the following
       i) Intelligent Editors
       ii) Checker Playing examples

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M. Tech. II-Semester Regular Examinations Oct/Nov 2015
Robotics
(Common to CAD/CAM & Machine Design)

Max. Marks: 60   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)
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UNIT-I

1. a) Sketch and explain the four basic robot configurations classified according to the coordinate system.   8M
    b) Discuss on the applications of "tools" as robots and end effectors.   4M

OR

2. a) Compare the five basic robot configurations according to the work envelope, typical applications, and power sources.   8M
    b) How does the SCARA arm geometry differ from the vertical articulated arm?   4M
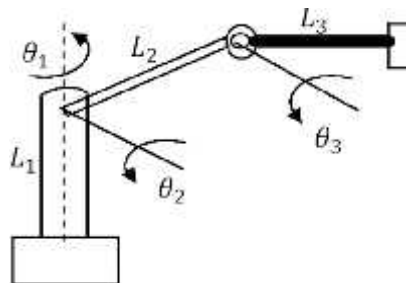
UNIT-II

3. What is a formed kinematics problem? Explain Denavit-Hartenberg convention for selecting frames of reference in robotic application.   12M

OR

4. a) Explain forward and reverse kinematics of robot?   8M
    b) Explain the role of dexterity and degeneracy in robots.   4M

UNIT-III

5. Determine the manipulator Jacobian matrix for the 3D of articulated arm shown in figure below.

                                                                                        12M

OR

6. How Lagrange's equations apply to a simple robotic system.   12M

UNIT-IV

7. a) Explain the steps involved in trajectory planning.   6M
    b) Explain a 3-5-3 trajectory plan to represent a pick and place movement for an assembly operation.   6M

OR

8. a) What are position sensors? What are the different types of position sensors?   8M
    b) What are the conditions that determine the choice of a particular type of position sensor?   4M

UNIT-V

9. a) Explain robot programming languages?   8M
    b) Explain Textual Robot languages.   4M

OR

10. a) Explain modes of robot programming?   8M
    b) Explain Robot language structures.   4M

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R-14

Code: 4PE523

M. Tech. II-Semester Regular Examinations Oct/Nov 2015
Computer Integrated Manufacturing
(CAD/CAM)

Max. Marks: 60   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)
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UNIT-I

1. a) Explain concept of product life cycle   6M
    b) What is CIM? state the elements of CIM   6M

OR

2. a) Explain fixed automation, programmable automation, flexible automation systems   6M
    b) Explain difference between CNC and DNC systems.   6M

UNIT-II

3. a) NC coordinate system for turning centers   6M
    b) Compare NC,CNC,DNC   6M

OR

4.   Discuss
        (i) Adaptive control machining system
        (ii) Adaptive control optimization system   12M

UNIT-III

5. a) Describe Computer aided Process Planning and its approaches   6M
    b) Compare Generative and Retrieval CAPP systems   6M

OR

6. a) Discuss the role of Capacity Planning.   6M
    b) Discuss any one method of coding in Group Technology   6M

UNIT-IV

7. a) What is FMS? state its benefits   6M
    b)   Explain role of tool management in FMS.   6M

OR

8. a) Discuss the significance of modular fixturing   6M
    b) Discuss various methods of guidance in handling systems   6M

UNIT-V

9. a) compare of Lean and Agile manufacturing   6M
    b) Describe role of Kaizen for achievement of total productive maintenance   6M

OR

10. a) Describe action cycle diagram   6M
    b) Describe 5S system   6M

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Code: 4PE524

R-14

M. Tech. II-Semester Regular Examinations Oct/Nov 2015
Mechatronics
(CAD/CAM)

Max. Marks: 60   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)
****

UNIT-I

1. a) Describe in detail the working of a measurement system?   6M
   b) How are control systems classified? Explain in detail.   6M

OR

2. a) Elaborate the scope of mechatronics system in the present scenario?   6M
   b) Identify various factors considered while designing a mechatronics system?   6M

UNIT-II

3. a) Differentiate sensors and transducers in context to a mechatronics system?   6M
   b) Emphasize on the role of a proximity sensor with respect to a measurement system?   6M

OR

4. a) Discuss the factors to be considered while selecting sensors?   6M
   b) Write a short note on light sensors?   6M

UNIT-III

5. a) Enlighten the importance of hydraulic drive systems?   6M
   b) Elaborate the characteristics of mechanical actuators?   6M

OR

6. a) Contrast between Hydraulic and Pneumatic actuators?   6M
   b) Explain the working of a compound belt drive with a neat sketch?   6M

UNIT-IV

7. a) Classify various control systems based on control signal used?   6M
   b) Write a short note on Adaptive control system?   6M

OR

8. a) Explain the working of a PI controller with a neat sketch?   6M
   b) Differentiate analog and digital controllers?   6M

UNIT-V

9. a) What role is played by a Microcontroller in a CNC machine? Explain in detail.   6M
   b) What factors do you consider while selecting a PLC?   6M

OR

10. a) Explain the role of computer networks with respect to CIM? Emphasize on its advantages.   6M
    b) Discuss the role of encoders and decoders in a mechatronics system?   6M

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Code: 4PE525

M. Tech. II-Semester Regular Examinations Oct/Nov 2015
Rapid Prototyping
(CAD/CAM)

Max. Marks: 60   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 12 = 60Marks)
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UNIT-I

1. a) Describe the various stages in the development of rapid prototyping systems with highlighting the advantages and limitations.
    b) Write critical applications of photo typing

OR

2. a) What are the key aspects of RPT?
    b) Discuss the evolution of RP systems indicating the history and their growth rate in the industrial sector

UNIT-II

3. a) Explain the working principle of stereo lithography and effect of process parameters on the quality of product
    b) Write the few applications of stereo lithography system.

OR

4. a) Explain the working principle and details of process parameters of an FDM machine.
    b) What are the materials suitable for FDM process?

UNIT-III

5. a) Write short notes on Thermal jet printer.
    b) Write short notes on Genisys Xs printer HP system

OR

6. a) Explain the principle of LOM R.P process and its limitations
    b) Differentiate LOM and SGC processes.

UNIT-IV

7. a) With a neat sketch explain Selective Laser Sintering
    b) Explain the applications of SLS R.P system?

OR

8. a) Write short notes on Fused deposition modeling
    b) Write short notes on Laser Engineering Net Shaping (LENS).

UNIT-V

9   Describe the materials used in stereo lithography and selective laser sintering processes.

OR

10 a) Explain LENS rapid prototyping process with a neat sketch
    b) Differentiate silicon rubber tooling and spray metal processes

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