

M. PRODUCTION ENGINEERING 1ST YEAR 2ND SEMESTER EXAMINATION, 2017

INTELLIGENT MANUFACTURING SYSTEMS

Time: Three hours

Full Marks: 100

ANSWER ANY FIVE QUESTIONS

- 1.a) What do you mean by Intelligent Manufacturing Systems? Explain. 10
b) Outline the distinguishing attributes between lean and agile manufacturing. 10
- 2.a) What do you mean by holonic manufacturing system (HMS)? Explain. 12
b) Make comparison between computer integrated manufacturing (CIM) and HMS. 8
3. The production department at XYZ Co. has narrowed the search for a perspective method to four advanced technologies AT₁, AT₂, AT₃ & AT₄. The final selection is based on three criteria: quality (Q), productivity (P), and environment (E). Make an eclectic decision. (Assume that you are an expert in the said area.) 20
- 4.a) What is artificial intelligence (AI)? Explain. 6
b) Differentiate among domains, predicates and clauses through an example known to you. 8
c) Discuss the importance of AI in manufacturing domain. 6
5. A manufacturing organization is going to install a robotic system in the material handling division of the plant. Elucidate the procedural steps for the performance evaluation of robotic system through fuzzy TOPSIS. 20

- 6.a) What do you mean by gray and binary images in vision processing? What is segmentation? 3+2
- b) Discuss different techniques of segmentation in vision processing. 6
- c) State how the following features can be extracted for an object after segmentation:
 i) perimeter ii) centroid 1+2
- d) Discuss different techniques of object recognition in vision processing. 6
- 7.a) What do you mean by artificial neural network (ANN)? What is meant by activation function and what are the different activation functions used in ANN? 2+4
- b) Explain the single-layer and multi-layer feed-forward neural network architectures with necessary diagrams? 4
- c) Discuss the procedure for 'back-propagation' learning of a multi-layer feed-forward neural network using 'gradient descent' learning. 10
- 8.a) What do you mean by supervised and unsupervised learning methods in ANN? 4
- b) What is associative memory? Distinguish between auto-associative and hetero-associative memories. 2+4
- c) Describe the operations in a hetero-associative memory to form a correlation matrix from a set of bipolar pattern pairs, and then to retrieve an associated pattern from any input pattern. Indicate how this method may be applied for some pattern recognition problem. 6+4