

M. PRODUCTION ENGINEERING 1ST YEAR 2ND SEMESTER EXAMINATION, 2018

INTELLIGENT MANUFACTURING SYSTEMS

Time: Three hours

Full Marks: 100

ANSWER ANY FIVE QUESTIONS

- 1.a) What is industry 4.0? Explain. 8
- b) Explain how fuzzy set theory is utilized in intelligent manufacturing system (IMS) by minimizing uncertainty. 12
2. Write a program in PROLOG for the development of an expert system for selection of the NTM (non-traditional manufacturing) process for making a hole in HSTR alloy. 20
3. Explain the procedural steps for the selection of a 3-D printer to be installed in an automobile plant using Fuzzy MOORA. 20
4. Apply AHP and QFD integrated model for the performance evaluation of intelligent robotic system. 20
- 5.a) What is computer integrated manufacturing? 10
- b) What is PROSA – architecture? Explain. 10

- 6.a) Draw a schematic diagram to show the basic components of a machine vision system. What is binary image and how is it obtained from gray image? 2+2
- b) Discuss edge detection technique of segmentation in vision processing. 5
- c) Discuss briefly the following image processing steps in vision processing :
- i) Feature extraction ii) Object recognition 6+5
- 7.a) What is meant by artificial neural network (ANN)? Show a simplified model of an artificial 'neuron' in an ANN, and explain its function. 2+4
- b) What is associative memory? Distinguish between auto-associative and hetero-associative memories, and what are they used for? 1+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+3
- 8.a) Explain multi-layer feedforward neural network architecture with necessary diagram. 3
- b) What do you mean by supervised and unsupervised learning methods in ANN? What is 'gradient descent' learning? 4+1
- c) Discuss the procedure for 'back-propagation' learning of a multi-layer feed-forward neural network using 'gradient descent' learning. Comment on the effects of learning rate coefficient and momentum coefficient. 10+2