B.E. (Electronics Engineering / Elect. & Telecommunication / Elect. & Communication Engineering) Eighth Semester (C.B.S.)

Elective-III : Robotics & Automation

P. Pages : 2 **NJR/KS/18/4695/4706**

Time : Three Hours * 0 8 1 6 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) Explain briefly about the real world navigation speech synthesis and recognition? **6**

b) List the fundamental tasks that must be performed by a computer vision system? **7**

OR

2. a) Give the comparison between the characteristics of human brain and digital computers? **7**

b) What are synapses and how do they respond like digital gates to nerve impulses. **6**

3. a) Define an expert system; what type of knowledge representation is utilized by most expert? **7**

b) What are the major parts of a production system? Explain how a production system performs backward reasoning? **7**

OR

4. a) Explain the difference between propositional and predicate logic. **4**

b) Prove that $\overline{A \cup B} = \overline{A} \cap \overline{B}$. **5**

c) Prove that $A \forall B = A \cdot \overline{B} \cup \overline{A} \cdot B$. **5**

5. a) Describe the major functional regions of a speech synthesizer that is designed to operate using the LPC code? **7**

b) Describe the difference between a voiced fricative and an anvoiced fricative. List various examples of each sound? **6**

OR

6. a) Describe the fundamental differences between PCM, delta modulation, DPCM & ADPCM. **9**

b) Suppose an 8 bit A|D converter is used to sample a speech waveform at a rate of 5000 sample per second. **4**

a) Calculate the data rate.

b) How many bytes of memory are required to store 10 seconds of speech using delta modulation.

7. a) Given a simple 4x4 picture matrix **7**

$$\begin{bmatrix} 9 & 9 & 9 & 3 \\ 9 & 9 & 3 & 3 \\ 9 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 \end{bmatrix};$$

smooth this matrix using the local averaging technique and a 3x3 pixel window.

b) Name and explain the main task that must be performed by an intelligent vision system. **6**

OR

8. a) What is a picture free and why is it useful? **6**

b) List and explain the main tasks that must be performed by an intelligent vision system. **7**

9. a) List non contact proximity sensors. Explain how capacitance can be used for proximity sensing? Explain how Hall devices are used for position sensing. **7**

b) Explain how capacitance can be used for proximity sensing? **6**

OR

10. a) List the ideal properties of a touch sensor? **6**

b) A commercial ultrasonic range finder is used with a 100 kHz, 8 bit counter? What is the maximum range of the system? **7**

11. a) Explain how sensing is carried out in robot programming. **7**

b) Explain in brief the characteristics of various robot programming language? **7**

OR

12. a) Write an ALP statement for defining a coordinate frame group which can be obtained by rotating the coordinate frame block through an angle of 65º about the y axis and then translating it 4 and 6 inches in the x & y axes respectively. **7**

b) Write an ALP to palletize none parts from a feeder to a tray consisting of a 3x3 array of bins. Assume that the locations of the feeder and tray are known. The program has to index the location for each pallet and signal the user when the tray is full? **7**

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