Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **17CS2041** | **Duration :** | **3hrs** |
| **Sub. Name :** | **INTELLIGENT SYSTEMS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Paraphrase the characteristics of the problems that has to be analysed before identifying a suitable search technique. | CO1 | 12 |
| b. | Enumerate the challenges faced in designing the search problems. | CO1 | 8 |
| **(OR)** | | | | |
| 2. | a. | Discuss the constraint satisfaction problem. Trace the constraint satisfaction procedure to solve the following cryptarithmetic problem. | CO2 | 10 |
| b. | Illustrate the working procedure of AO\* algorithm by solving 8 puzzle problem.  Initial State Goal State   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 1 | 2 | 3 |  |  |  | 2 | 8 | 1 | | 8 |  | 4 |  |  |  |  | 4 | 3 | | 7 | 6 | 5 |  |  |  | 7 | 6 | 5 | | CO2 | 10 |
|  |  |  |  |  |
| 3. | a. | Elucidate the various approaches adopted for knowledge representation. | CO2 | 12 |
| b. | What are the necessary steps required to select an initial structure in solving the problems? | CO4 | 8 |
| **(OR)** | | | | |
| 4. | a. | Consider the following axioms:   1. *Every child loves Santa.* 2. *Everyone who loves Santa loves any reindeer.* 3. *Rudolph is a reindeer, and Rudolph has a red nose.* 4. *Anything which has a red nose is weird or is a clown.* 5. *No reindeer is a clown.* 6. *Scrooge does not love anything which is weird.* 7. *(Conclusion) Scrooge is not a child.*   Represent these axioms in predicate calculus; skolemize as necessary and convert each formula to clause form. Prove the unsatisfiability of the set of clauses by resolution. | CO3 | 12 |
| b. | Explain the unification process. Justify the need for unification in knowledge representation. | CO1 | 8 |
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| 5. | a. | Consider the problem of finding clothes to wear in the morning. The knowledge available to make a decision are given below.  i) Wear jeans unless either they are dirty or you have a job interview  today.  ii) Wear a sweater if it’s cold. iii) It’s usually cold in the winter.  iv) Wear sandals if it’s warm. v) It’s usually warm in the summer.  Build a JTMS-style database of the necessary facts to solve the said problem. | CO3 | 10 |
|  | b. | Consider the following Knowledge based:   1. Convert these well formed formulae into Horn Clauses. 2. Convert the Horn Clauses into a PROLOG program. | CO3 | 10 |
| **(OR)** | | | | |
| 6. | a. | Why probability plays a significant role in statistical reasoning? What is the importance of incorporating Bayes theorem? How does it affect the importance of assumptions and the efficiency of the reasoning system? | CO4 | 10 |
| b. | Explain Dempster-Shafer theory with suitable examples. | CO4 | 10 |
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| 7. | a. | Discover the relationship using semantic net to disambiguate the word “bank” in the sentence*“John went downtown to deposit his money in the bank”.* The financial institution meaning for bank should be preferred over the river bank meaning.   1. Construct a semantic net that contains representations for the relevant concepts. 2. Show how intersection search could be used to find connection between the correct meaning for bank and the rest of the sentence more easily than it can find a connection with the incorrect meaning. | CO5 | 10 |
| b. | Write CD representations for each of the following sentences. Try to capture the differences in meaning between the two sentences of each pair .   1. ‘John slapped Bill’ vs ‘John punched Bill’ 2. ‘Sue likes Dickens’ vs ‘Sue adores Dickens’ | CO5 | 10 |
| **(OR)** | | | | |
| 8. | a. | Summarize logic and slot-and-filter structures. | CO5 | 10 |
| b. | Consider the following blocks world problem:   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | A |  | C |  |  | C |  | D |  | |  | B |  | D |  |  | B |  | A |  |  |  |  | | --- | --- | | *Start: ON(C,B) ⋀*  *ON(D,A) ⋀*  *ONTABLE (B) ⋀*  *ONTABLE (A) ⋀*  *ARMEMPTY* | *Goal: ON(C,B) ⋀*  *ON(D,A) ⋀*  *ONTABLE (B) ⋀*  *ONTABLE (A)* |  1. Show how STRIPS would solve this problem. 2. Show how TWEAK would solve this problem. | CO5 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Write briefly on Rote Learning. | CO6 | 05 |
| b. | Illustrate the steps of Candidate Elimination Algorithm. | CO6 | 05 |
| c. | Demonstrate the working principle of Explanation based learning with an example. | CO6 | 10 |