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

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

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| **Code :** | **15EI2022** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SURGICAL ASSIST 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. | Define Robot. List the major components of a robotic system. Discuss about them. | CO1 | 10 |
| b. | What type of robotic system is used for the laparoscopic surgeries? Describe it. | CO3 | 10 |
| **(OR)** | | | | |
| 2. | a. | Identify the six degree of freedom of a rigid body. Describe about them. | CO1 | 5 |
| b. | Discuss the kinematics of robotic manipulators. | CO2 | 10 |
| c. | Identify the ways of classifying a robot. Describe in brief about them. | CO1 | 5 |
|  |  |  |  |  |
| 3. | a. | Discuss the different sensors used in Robotic systems. | CO1 | 10 |
| b. | Summarize the significance of various knowledge representation methods. | CO2 | 10 |
| **(OR)** | | | | |
| 4. | a. | Elaborate on the desired characteristics of sensors. | CO1 | 10 |
|  | b. | Describe the principle of ventilators with necessary illustrations. | CO3 | 10 |
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| 5. | a. | Explain in detail the various processes involved in a machine vision system. | CO1 | 10 |
| b. | Determine whether the given two expressions are logically equivalent, that is, for each interpretation they had the same value. Use the truth table to show the equivalence.  i) (P🡪R) and (~R 🡪~P) ii) (P 🡪 R) and (~P 🡪~R)  iii) (P🡪 R)˄(Q🡪 R) and (P˅Q)🡪R iv) (p🡪R)˄(P🡪Q) and P🡪(Q˅R) | CO2 | 10 |
| **(OR)** | | | | |
| 6. | a. | State the objective of robot programming. Identify the various languages used for programming robot. Explain about them in brief. | CO2 | 10 |
| b. | Briefly enumerate a chronology of historical events in the development of robotics. | CO1 | 10 |
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| 7. | a. | Enumerate the applications of robot assisted surgery. Describe their significance. | CO3 | 10 |
| b. | Differentiate between Human and Machine Intelligence. | CO2 | 10 |
| **(OR)** | | | | |
| 8. | a. | What are problem characteristics? Explain the algorithm of Depth First Search and Breadth First Search. | CO2 | 10 |
| b. | Elaborate the role and importance of robot in cardiac assistive surgery. | CO3 | 10 |
|  | | **Compulsory:** | | |
| 9. | a. | Illustrate and explain in detail the joint and links involved in the design of a robot. | CO1 | 10 |
| b. | Explain the applications of machine vision system in the robot. | CO2 | 10 |