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

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**End Semester Examination – Nov/Dec– 2018**

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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. | Analyze the functions of various components of robot. | CO1 | 10 |
| b. | Enumerate on the different types of controllers used in Robotics. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Classify the various sensors used in Robotic systems. | CO1 | 10 |
| b. | Analyze the characteristics of different types of sensors. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | The mechanism connecting the wrist assembly is a twisting joint which can be rotated through 7.5 revolutions from the start to end position. It is desired to have control resolution of rotation of ± 0.34° at the least. What is the number of bit storage capacity to achieve this resolution? | CO2 | 5 |
| b. | Explain the Lagrange equation involved in modeling. | CO2 | 5 |
|  | c. | Elaborate the methods to programme the robot’s work cycle. | CO1 | 10 |
| (OR) | | | | |
| 4. |  | Categorize the various types of robots according to the standard, broad and general classifications. | CO1 | 20 |
|  |  |  |  |  |
| 5. | a. | Summarize the requirements of a Robot Programming Language. | CO1 | 10 |
| b. | Elaborate on the working principle and construction of tactile sensors. | CO2 | 10 |
| (OR) | | | | |
| 6. | a. | For the following rotation matrix determine the axis of rotation and the angle of the rotation about the same. | CO2 | 5 |
| b. | Sketch the block diagram of a ventilator and explain. | CO3 | 15 |
|  |  |  |  |  |
| 7. | a. | Differentiate between the different types of grippers. | CO2 | 10 |
| b. | Describe the various techniques involved in range sensors. | CO2 | 10 |
| (OR) | | | | |
| 8. |  | Narrate the current trend of artificial intelligence in medical field. | CO3 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Brief the working principle of various types of non-contact proximity sensors. | CO2 | 10 |
| b. | Analyze the concept of Embedded Robotics. | CO3 | 10 |