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

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

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| **Code :** | **17BM3015** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ROBOTICS IN SURGERY** | **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. | Analyse the various mechanism of joints and links in surgical robots. | CO2 | 10 |
| b. | State the necessity of determining degrees of freedom in designing a robot. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Depict lagrangian formulation of various dynamics. | CO1 | 10 |
| b. | Differentiate langrangian and euler dynamics in robot design. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Enumerate path planning and path tracking in robotic motion. | CO2 | 10 |
| b. | Classify various controllers used in robotic motion and tracking. | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Describe the construction and working of tactile sensors. | CO2 | 10 |
| b. | Comment on the significance and applications of proximity sensors in robotics. | CO3 | 10 |
|  |  |  |  |  |
| 5. | a. | Write short notes on machine vision. | CO3 | 5 |
| b. | Suggest suitable methods were machine vision can be applied in surgical robots. | CO3 | 15 |
| (OR) | | | | |
| 6. | a. | Explain the various programmable controllers in autonomous robots. | CO4 | 10 |
| b. | With a case study describe the application of design of robots using embedded controllers. | CO4 | 10 |
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| 7. | a. | Comment on the principle of collision detection in interacting with real world. | CO5 | 8 |
| b. | Discuss the various safety aspects that are significant to human factors in designing interactive robot systems. | CO5 | 12 |
| (OR) | | | | |
| 8. | a. | Comment on the application of artificial intelligence in the field of robotic surgery. | CO3 | 12 |
| b. | Narrate the working principle of haptic robots. | CO6 | 8 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Differentiate microrobots and nanorobots. | CO6 | 12 |
| b. | Discuss the significance and application of nanorobots at cell level. | CO6 | 8 |