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

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

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| **Code :** | **17ME3021** | **Duration :** | **3hrs** |
| **Sub. Name :** | **INDUSTRIAL ROBOTICS** | **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. | | Briefly discuss the historical developments in the field of robotics. | CO1 | 6 |
| b. | | Explain various robots configurations with their merits, demerits and applications with neat sketches. | CO1 | 6 |
| c. | | List out the robot motions, explain them with practical applications. | CO1 | 8 |
| (OR) | | | | | |
| 2. | a. | | Define the term robotics as per RIA. | CO1 | 2 |
| b. | | State the laws of robotics. | CO1 | 6 |
| c. | | Discuss any three widely used electric drives in robot applications with a neat diagrams. | CO1 | 12 |
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| 3. | a. | | What are the types of control systems used in robotics and explain them with block diagrams. | CO2 | 6 |
| b. | | Elaborate briefly the following with neat diagrams:  Pneumatic Grippers, (i) Parallel grippers and (ii) Magnetic grippers. | CO2 | 9 |
| c. | | Discuss the working of gear type of hydraulic motor with neat diagram. | CO2 | 5 |
| (OR) | | | | | |
| 4. | a. | | Demonstrate the four types of robot joints with neat diagrams. | CO3 | 4 |
| b. | | Two points auvw = (4, 3, 2)T and buvw = (6, 2, 4)T are to be translated to a distance +5 along the OX axis and -3 units along the OZ axis. Using the appropriate homogeneous transformation matrix, determine the new point axyz and bxyz ? | CO3 | 5 |
| c. | | Derive the matrix that represents a pure rotation about x-axis of the reference frame with the assumptions and find the coordinates of a point P=(3,5,7)T relative to the reference frame after a rotation of 45 degrees about x-axis. | CO3 | 5 |
| d. | | Discuss the D-H Notation with neat sketch. | CO3 | 6 |
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| 5. | a. | Resolve the Forces and Moments in Wrist Sensor. | | CO4 | 4 |
| b. | Discuss the working of Inductive and Hall-Effect type  proximity sensor with a neat sketches. | | CO4 | 6 |
| c. | Explain the principle of operation of Optical Proximity sensor with a neat sketch. | | CO4 | 6 |
| d. | How the skin sensor works ? | | CO4 | 4 |
| (OR) | | | | | |
| 6. | a. | Describe in detail the components of a machine vision system with a suitable block diagram. | | CO4 | 8 |
| b. | Discuss the working principle of CCD Camera with neat sketch. | | CO4 | 4 |
| c. | Illustrate one practical application of the machine vision system with neat sketch. | | CO4 | 8 |
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| 7. | a. | Briefly explain the two basic types of robot Programming  methods and also list their capabilities and limitations. | | CO5 | 6 |
| b. | Explain VAL Language with example. | | CO5 | 4 |
| c. | Define AI. Write the components of AI program and knowledge representation of AI. | | CO5 | 6 |
| d. | Discuss the capabilities and limitations of various robot languages. | | CO5 | 4 |
| (OR) | | | | | |
| 8. | a. | Explain the application of robot in arc –welding. | | CO6 | 6 |
| b. | Discuss the applications of robots in assembly lines and painting industries. | | CO6 | 8 |
| c. | Elaborate the use of robots in medical and rehabilitation fields. | | CO6 | 6 |
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|  | | **Compulsory**: | |  |  |
| 9. | a. | Explain the machine loading and unloading application of robot in any three production operations with their design features. | | CO6 | 8 |
| b. | Illustrate the applications of robots in CIM environment. | | CO6 | 6 |
| c. | Discuss the use of robot in space and under water applications. | | CO6 | 6 |