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



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

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| **Code :** | **18ME3051** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ADVANCED MECHANISM DESIGN** | **Max. marks :** | **100** |

**ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Define Grashof’s Law. State how is it helpful in classifying the four link mechanisims into different types. | CO1 | 8 |
| b. | For the Kinematic linkages shown in the figure, find the number of binary links (Nb), ternary links (Nt), total links (N), pairs (P) and degree of freedom (F).     1. (ii) | CO1 | 8 |
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| 2. |  | Explain the Hartmann construction to find the location of the centre of curvature of the locus of a point on a moving body and also derive the two forms of Euler Savary equation. | CO3 | 16 |
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| 3. | a. | Design a slider crank mechanism to coordinate three positions of the input link and the slider for the following angular and linear displacements of the input link and the slider respectively:  θ12 = 40̊, s12 = 180 cm, θ13 = 120̊, s13 = 300 mm.  Take eccentricity of the slider as 120 mm. | CO4 | 10 |
| b. | Locate all the I centres of the six link mechanism as shown in the figure below. | CO3 | 6 |
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| 4. | a. | A four- link mechanism with the following dimensions is acted upon by a force 80 < 150̊ N on the link DC AD = 500 mm, AB = 400 mm, BC = 1000mm, DC = 750 mm, DE = 350 mm.  Determine the input torque T on the link AB for the static equilibrium of the mechanism for the given configuration. | CO5 | 12 |
|  | b | Write the conditions for a body to be in equilibrium under the action of two forces, three forces and two forces and a torque. | CO5 | 4 |
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| 5. |  | Design a four-link mechanism to coordinate the motion of the input and the output links governed by a function y = log x for 0 < x ≤ 8 with an interval of 1. The range for θ is from 15̊ to 120̊ whereas for, φ it is from 20̊ to 150̊. | CO4 | 16 |
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| 6. |  | For the four link mechanism shown in the figure, calculate the angular velocities of the links BC and CD using instantaneous centre method. | CO2 | 16 |
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| 7. | a. | State and explain dynamic D’Alembert’s principle and explain equivalent offset inertia force. | CO5 | 4 |
| b. | Define static and dynamic unbalance in machinery. How can the balancing be done? | CO5 | 4 |
| c. | With an example, use bobilier theorem to show that the inflection circle can be drawn without requiring the curvatures of the centrodes. | CO3 | 8 |
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| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. | a. | Explain Denavit – Hartenberg parameters. | CO6 | 10 |
| b. | Explain transformation-matrix of position analysis and its transformation form of the loop-closure equation. | CO6 | 10 |