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

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

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| **Code :** | **15EI2010** | **Duration :** | **3hrs** |
| **Sub. Name :** | **FUNDAMENTALS OF BIOMECHANICS** | **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. | A resistive strain gauge is used to determine the tensile loading on the material. The initial resistance of strain gauge Rsg =330 ohms.  i) Construct a circuit to indicate a resistance change of 10 ohms at the given gain of 100. ii) Determine the output voltage for the given load. | CO3 | 5+5 |
| b. | Illustrate the principle of strain gauge with sketches. Give its classifications and applications. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Explain the characteristics of stress and strain on a elastic material with suitable sketches. | CO1 | 10 |
| b. | A bone implant has been tested for the following conditions. The dimensions are given as:    Determine the stress in each section when subjected to an axial  tensile load of 20 kN. The central section is 30 mm square cross-section; the other portions are of circular section, their diameters being indicated.  i. Calculate the total extension of the implant material, for the Young’s modulus of the material E = 210GN/m2. | CO3 | 10 |
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| 3. | a. | Classify the types of fluids and give its characteristics and applications. | CO2 | 10 |
| b. | Explain the rheological properties of blood. | CO1 | 5 |
| c. | Brief the formation of thrombus and give its merits. | CO1 | 5 |
| (OR) | | | | |
| 4. | a. | Give the structure and properties of bones. | CO1 | 5 |
| b. | Detail the mechanism of fracture in bones with sketches. | CO1 | 15 |
|  |  |  |  |  |
| 5. | a. | Detail the merits of implants on human bones. Give its applications. | CO3 | 8 |
| b. | Elaborate the materials and their unique characteristics suitable for bone implants. | CO3 | 12 |
| (OR) | | | | |
| 6. |  | Illustrate the classification, construction and working of prosthetic heart valves with suitable sketches. | CO2 | 20 |
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| 7. | a. | Detail the design and working principle of exoskeleton for human. | CO3 | 15 |
| b. | Analyse its applications to the paraplegic subjects. | CO3 | 5 |
| (OR) | | | | |
| 8. | a. | Explain the needs and merits of orthopedic implants. Analyse significance and challenges of the materials. | CO3 | 15 |
| b. | Present the impact of DALY on human. | CO1 | 5 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Analyse the mechanism at various stages of Gait in humans with sketches. | CO3 | 15 |
| b. | Present the applications of assist devices to the disabled subjects. | CO3 | 5 |

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