Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M.E –I$^{st}$ SEMESTER–EXAMINATION – JULY- 2012**

**Subject code: 713101N** **Date: 05/07/2012**

**Subject Name: Medical System Design**

**Time: 2:30 pm – 05:00 pm** **Total Marks: 70**

## Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

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|---|---|---|---|
| **Q.1** | **(a)** | Give the assumptions taken during the analysis of LVDT. Explain the principle and working of the same with neat sketches. | **07** |
| | **(b)** | Explain ultrasonic flow meter with neat sketches. | **07** |
| **Q.2** | **(a)** | Explain the signal conditioning of thermocouple temperature measurement. | **07** |
| | **(b)** | Explain the signal conditioning requirement of electromagnetic flow meter. | **07** |
| | | **OR** | |
| | **(b)** | Enumerate the criteria for designing the multi channel high level data acquisition system. | **07** |
| **Q.3** | **(a)** | Analyze the five Op-Amp instrumentation amplifier for biomedical signals with necessary derivations for design and diagrams | **07** |
| | **(b)** | Explain the working of sample and hold devices in detail. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Give the design consideration and selection criteria for acceleration measurement. | **07** |
| | **(b)** | Design a power supply with following specifications:<br>Input voltage- 230V ± 10%, Input current 5Amp.maximum,<br>Output Voltage- 15 V, Output Current- 3 A | **07** |
| **Q.4** | **(a)** | Explain the measurement of torque with neat sketches. | **07** |
| | **(b)** | Give the transformer design for forward converter. | **07** |
| | | **OR** | |
| | **(a)** | What are the factors creating the hurdles in design of precise AC current source. Give practical remedies for the same. | **07** |
| **Q.4** | **(b)** | Explain the scheme for surge current protection in biomedical circuits. | **07** |
| **Q.5** | **(a)** | Explain the scheme for measurement of velocity with neat sketches. | **07** |
| | **(b)** | Give design consideration and selection criteria for stress measurement. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Explain forward converter in detail. | **07** |
| | **(b)** | Explain any one active filter application for biomedical field. | **07** |

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