Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

Manipal University, Manipal – 576 104

III SEMESTER B.TECH (BME) DEGREE MAKE-UP EXAMINATIONS DEC/JAN 2015-16

SUBJECT: BIOMEDICAL INSTRUMENTATION (BME 205)

(REVISED CREDIT SYSTEM)

Tuesday, January 05, 2016: 9.00 am- 12.00 noon

TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

1. **Answer any FIVE full questions.**
2. **Draw labeled diagram wherever necessary**

1. (a) Differentiate between active and passive transducer? Give one example for each. Explain any one type of pressure transducer in detail. (2+1+7)

   (b) (i) Define gauge factor. What does it signify? Specify the gauge factor of metal and semiconductor material. (2)

   (ii) Explain the construction and working of semiconductor temperature transducer in detail. (6)

   (c) Determine the total change in the length of a strain indicator wire in a strain gauge, when the gauge factor = 3, original wire resistance = 0.5Ω, final strained wire resistance=0.7Ω and the pre-strained wire length is 50mm. (2)

2. (a) With suitable figures, explain the different types of surface electrodes in detail. (10)

   (b) (i) Explain two methods for manufacturing the Ag/ AgCl electrode. (6)

   (ii) Explain any two applications of an inverting amplifier. (4)

3. (a) With a neat figure, explain the Plethysmographic method for blood volume measurement. (10)

   (b) (i) What are the characteristic waves that can be observed in an EEG recording? Explain the features of each of these waves. (6)

   (ii) List the different types of microphones that can be used to detect the heart sounds. Explain the principle of working of each of them. (1+3)

4. (a) (i) Explain the atrial synchronous pacemaker in detail. (8)

(ii) What is the voltage provided by Lithium batteries? (1)

(iii) What are the basic requirements of an implantable pacemaker? (3)

(b) Which type of defibrillator would be ideal to treat the condition of tachycardia? Justify your answer, and explain the type in detail. (2+6)

5. (a) Explain one type of gaseous laser in detail. Also, give the energy level diagram of its transitions. (5+5)

(b) List the different types of recorders that work on the PMMC (Permanent Magnet Moving Coil) principle. Explain one type of recorder that is not based on the PMMC principle. (2+8)

6. (a) Differentiate micro shock and macro shock. (2)

(b) Explain the principle behind the 'grounding' technique used to prevent electrical accidents. Illustrate with an example, the importance of grounding. (5+5)

(c) What are the precautions to minimize the electric shock hazard? (8)