Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

SECOND SEMESTER M.Tech. (CS) DEGREE END SEMESTER EXAMINATION
May/June 2016
SUBJECT: PC BASED INSTRUMENTATION (ICE-564)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

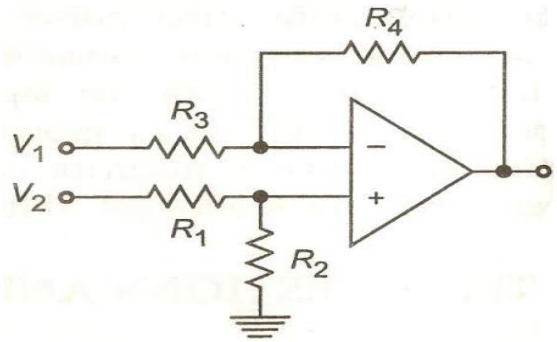
- Answer **ANY FIVE FULL** the questions.
- Missing data may be suitably assumed.

1A. With the help of a neat block diagram, explain the important functions of data acquisition system. **5**

1B. Describe the three filtering methods used to remove radio frequency noise from measurement signals. **3**

1C. Draw the schematic of a bridge circuit used for measuring pressure in industrial applications and write the expression of output voltage for the same. **2**

2A. Derive an expression for the output of the differential amplifier circuit shown in the figure below. Compute common mode rejection ratio (CMRR) if all resistors except R_2 are equal and R_2 mismatches the others by 0.1%. The differential gain of the circuit is 1. **5**



2B. Design a filter to eliminate undesired frequencies lesser than 1000 hertz to a limit of 20%. **3**

2C. What is the need of isolation amplifier in signal conditioning applications? Illustrate with an example. **2**

3A. State the working principle of strain gauge with the help of neat diagram and derive the expression for the gauge factor of strain gauge. **5**

3B. Calculate the temperature at -45°C using the following table, assuming a linear relation between temperature and resistance : **3**

Temperature, T in °C	Resistance, R in Ω
-51.92	104.96
-49.45	106.85
-47.80	107.53
-46.02	108.22
-44.77	109.30
-42.56	110.38

3C.	List any four differences between hybrid and digital communication	**2**
4A.	What happens to a signal if it is sampled at a frequency less than twice of its highest frequency component? Explain it with respect to time domain and frequency domain analysis	**4**
4B.	Define Resolution of a DAC. With the help of a neat diagram, discuss the working of weighted resistor DAC technique.	**4**
4C.	A dual slope integrating ADC has an internal clock of frequency 12 kHz and a reference source of 200 mV. It integrates the input signal for a period of 1000 counts. Find the integration period of the reference and count for a signal input which is 60% of the reference source voltage.	**2**
5A.	What is a programmable gain amplifier? Design an instrumentation amplifier whose gain can be programmed to 1, 2, 5 and 10.	**4**
5B.	Explain the functioning of a general PCI system with the help of block diagram.	**3**
5C.	Describe the structure of a GPIB interface with the necessary block diagram.	**3**
6A.	With the help of neat block diagram, explain the technique for turbine speed calculation and valve actuation of a hydraulic turbine.	**5**
6B.	Mention the measuring points and sensors for calculating flow, level, pressure and temperature in a thermal power plant. With a neat diagram, describe the functions of different equipments in thermal power plant operation.	**5**

****