COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)
SHIVAJI NAGAR, PUNE - 411 005

END Semester Examination

(IE-205) Electrical Measurement and Instrumentation

Course: B.Tech Branch: Instrumentation and Control Engineering

Semester: Sem III

Year: 2014-2015 Max.Marks:60

Duration: 3 Hours Time:- 10.00 to 1.00 p.m Date:- 28 NOV 2014

Instructions: MIS No. | | | | | | | | | |

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data if necessary.
6. Write your MIS Number on Question Paper

Q. 1 A A signal is coming at the rate of 72 pulses/min. Design a digital instrument to measure and display frequency of this signal. 10

B Temperature sensor is placed to measure temperature of rocket engine. Design a complete system to control reverse counter at the time of rocket launching with respect to engine temperature. (Sensor used is pt1000 (1000 ohms at 0 °C and 138.4 ohms at 1000 °C), temperature set point 450°C). 10

C State the importance of Q-factor measurement. Also state the method for tuning the Q-meter. 5

Q. 2 A Define resolution of ADC. What should be resolution of ADC for the following conditions? (Given:- V_{ref+} is 5V and V_{ref-} is 0V) 5

a) Input analog voltage range is 0V to 2.25V and min change that should be detected is 4mv.
b) Input analog voltage range is 1.5V to 2.5V and min change that should be detected is 1mv.

B Design a signal generator for following specifications:- 5

1) Frequency 100KHz to 10MHz
2) Output waves:-sine

Output voltage level(variable) ±12V

C Derive balanced Kelvin`s double bridge equation. 5

Q. 3 Solve any four 20

A A 500μA meter movement with an internal resistance of 50Ω is to be converted into a 0-1mA and 0-2V. Calculate the value of shunt resistance and series resistance required. What is sensitivity of the meter?

B What is total harmonic distortion? Explain fundamental suppression analyzer with the help block diagram.

C Write a short note on Arbitrary function generator.

D Design a shunt type ohmmeter. The movement to be used requires 0.5mA for full scale deflection and has an internal resistance of 50Ω. The internal battery has a voltage of 1.5V. The desired value of full scale resistance is 10KΩ. Calculate the values of shunt resistance.

E Derive balanced equation of Maxwell bridge. List any four applications of Maxwell bridge.

F Explain working of electrodynamometer as wattmeter.