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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **18ME3028** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ADVANCED INSTRUMENTATION IN THERMAL ENGINEERING** | **Max. Marks :** | **100** |

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| **Q. No.** | **Sub Div.** | **Questions** | **Course Outcome** | **Marks** |
| **ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)** | | | | |
| 1. | a. | The resistance of a certain size of copper wire is given as;  R = Ro[1+ α (T-20)], where Ro = 6Ω ± 0.3 percent is the resistance at 20 °C; α = 0.004 °C-1± 1 percent is the temperature coefficient of ressistance, and the temperature of the wire is T = 30 ± 1 °C. Calculate the resistance of the wire and its uncertainity. | CO2 | 10 |
| b. | What is meant by “regression analysis”? | CO1 | 6 |
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| 2. |  | Discuss the principle of operation of any four types of more widely used transducers. | CO2 | 16 |
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| 3. |  | Explain the method of measurement of viscosity using Rotating concentric cylinder apparatus and also using Saybolt viscometer. | CO3 | 16 |
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| 4. |  | Explain the technique for measuring products of combustion using  i) Gas Chromatograph ii) Non dispersive infrared absorption | CO4 | 16 |
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| 5. | a. | What are the major elements of data acquisition and processing systems? | CO5 | 6 |
| b. | Explain “ multi channel data acquisition system”. | CO5 | 10 |
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| 6. |  | A guarded hot plate apparatus is used to measure the thermal conductivity of a metal having k = 50 Btu/h. ft. °F. The thickness of the specimen is 0.125 ± 0.002 inches and the heat flux may be measured within 1 percent. Calculate the accuracy necessary on the ∆T measurement inorder to ensure an overall uncertainity in the measurement of k of 5 percent. If one of the plate temperatures is nominally 300 °F, calculate the nominal value of the other plate temperature and the tolerable uncertainity in each temperature measurement, assuming a nominal heat flux of 20,000 Btu/h. ft2. | CO3 | 16 |
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| 7. |  | Explain the working of i) Hot wire and Hot film anemometers  ii) Magnetic flow meters used in measurement of fluid flow. | CO4 | 16 |
|  | | **COMPULSORY QUESTION (1 x 20 = 20 Marks)** |  |  |
| 8. |  | Discuss different factors considered and the protocol used in design of experiments. | CO6 | 20 |