

B. E. Power Engineering 4th yr. 1st Sem. Examination, 2019

**Subject: Experimental Techniques and Measurements**

Time: Three hours

Full marks: 100

**Answer question no. 1 and any four from rest**

No. of questions		Marks																												
1.	<p>In an experiment, measuring area of 100 sq.cm. with a planimeter the following reading were recorded</p> <table border="1"> <thead> <tr> <th>Sl. no.</th> <th>Area (sq. cm.)</th> <th>Sl. no.</th> <th>Area (sq. cm.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>100.3</td> <td>7</td> <td>101.1</td> </tr> <tr> <td>2</td> <td>101.7</td> <td>8</td> <td>98.5</td> </tr> <tr> <td>3</td> <td>101.3</td> <td>9</td> <td>99.6</td> </tr> <tr> <td>4</td> <td>101.9</td> <td>10</td> <td>106.9</td> </tr> <tr> <td>5</td> <td>102.4</td> <td>11</td> <td>101.5</td> </tr> <tr> <td>6</td> <td>104.5</td> <td>12</td> <td>99.4</td> </tr> </tbody> </table> <p>Estimate the mean value, mean deviation, standard deviation, Bessel's correction factor, adjusted standard deviation, internal estimation of error, external estimation of error.</p>	Sl. no.	Area (sq. cm.)	Sl. no.	Area (sq. cm.)	1	100.3	7	101.1	2	101.7	8	98.5	3	101.3	9	99.6	4	101.9	10	106.9	5	102.4	11	101.5	6	104.5	12	99.4	20
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2.	<p>Show that a manometer is a 2<sup>nd</sup> order system. A 2<sup>nd</sup> order instrument is subjected to a sinusoidal input. Undamped natural frequency is 3Hz and damping ratio is 0.5. Calculate the amplitude ratio and phase angle for an input frequency of 2 Hz.</p>	8+12																												
3.	<p>What should be the optimum characteristics of a strain gauge? Find out the steady state solution of a step input for a 2<sup>nd</sup> order instrument. A thermocouple having 1<sup>st</sup> order response characteristics is used to measure a single temperature pulse having a half wave sinusoidal shape. Find the output response of the thermocouple for (a) <math>T = 4t</math>.</p>	5+3+12																												
4.	<p>What do you mean by under damped, critically damped and over damped system? A venturimeter is fitted in a horizontal pipe of diameter 15cm, carrying a gas of density 1.15kg/m<sup>3</sup>, for the purpose of flow measurement. The differential pressure head indicated by a U-tube manometer containing oil of specific gravity 0.8 is 10cm. If the coefficient of discharge and diameter of nozzle are 0.8 and 5cm respectively, determine the flow of gas through the pipe line.</p>	6+14																												

5.	<p>What are the different techniques used in flow visualization in a fluid flow system?</p> <p>What are the advantages and disadvantages of sublimation technique of flow visualization?</p> <p>Discuss the difference between eddy-current transducer and electromagnetic transducer.</p>	5+7+8
6.	<p>What are different instruments used for the measurement of low pressure?</p> <p>What do you mean by inductive type sensor? How they are classified? Discuss one of them.</p>	6+14
7.	<p>Show that a seismic motion transducer is a 2<sup>nd</sup> order system</p> <p>Discuss with a neat sketch the principle of operation of Fery's total radiation pyrometer.</p>	8+12