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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

TEST - 1

Even Semester: 2018-19

Course Code: MEC 211

Course Name: Metrology & Mechanical Measurements

Programme & Sem: B.Tech (MEC) & IV Sem

Date: 06 March 2019

Time: 1 Hour

Max Marks: 40

Weightage: 20%

Instructions:

- (i) **All questions are compulsory**
- (ii) **Use scientific calculator wherever required**
- (iii) **Support your answer with labelled figure wherever required.**

Part A

Answer **all** the Questions. **Each** question carries **four** marks. (3Qx4M=12)

1. With a neat sketch explain wringing phenomenon of slip gauge.
2. Define metrology. Brief the need of inspection. Explain the process of measurement.
3. What do you understand by End standards in measurement system? State its underlying features.

Part B

Answer **both** the Questions. **Each** question carries **six** marks. (2Qx6M=12)

4. Using M112 slip gauges build the following dimension keeping minimum number of slip gauges.

(i) 78.3665 (ii) 68.208

5. Define meter in terms of wavelength standard and discuss the important features of using wavelength as the standard.

Part C

Answer **both** the Questions. **Each** question carries **eight** marks. (2Qx8M=16)

6. What are Airy points? Where is the airy point located in a 600mm bar for a simply supported beam?
7. Give the reasons for the occurrence of controllable errors. With a neat plot explain how systematic errors differs from random errors.



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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

TEST - 2

Even Semester: 2018-19

Course Code: MEC 211

Course Name: Metrology and Mechanical Measurements

Program & Sem: B.Tech & IV Sem

Date: 16 April 2019

Time: 1 Hour

Max Marks: 40

Weightage: 20%

Instructions:

- (i) Read the question properly and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** Question carries **six** marks. (3Qx6M=18)

1. What are shrinkage, snug and freeze fits? Explain briefly.
2. Explain : Taylors principle of gauge design, Hole and shaft basis system.
3. Calculate all the relevant dimensions of 35H7/f8 fit, dimension 35 mm falls in the step of 30-50 mm. fundamental deviation of H hole is zero. The fundamental deviation for f shaft(in microns) is $- 5.5D^{0.41}$, i (in microns)= $0.45(D)^{1/3}+0.001D$, IT7=16i and IT8=25i. Calculate the actual maximum and minimum sizes of the hole and shaft.

Part B

Answer **both** the Question. The Question carries **seven** marks. (2Qx7M=14)

4. How are inner and outer diameters of external thread are measured? Explain with sketches.
5. Explain 3-wire method of measurement of effective diameter of external threads (with derivation)

Part C

Answer **both** the Questions. The Question carries **four** marks. (2Qx4M=08)

6. Explain dial guage with a neat sketch.
7. Draw the neat sketch of back pressure type pneumatic comparator.



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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF EXAMINATION

END TERM FINAL EXAMINATION

Even Semester: 2018-19

Date: 24 May 2019

Course Code: MEC 211

Time: 3 Hours

Course Name: METROLOGY & MECHANICAL MEASUREMENTS

Max Marks: 80

Program & Sem: B.Tech, IV SEM

Weightage: 40%

Instructions:

(i) *Write Sketches using pencil only*

Part A

Answer **all** the Questions. **Each** question carries **1** marks. (20Qx1M=20M)

- The difference between the lower and higher values that an instrument is able to measure is called
(a) accuracy (b) sensitivity (c) range (d) error
- The aim of calibration is to
(a) meet customer requirement (b) detect deterioration of accuracy
(c) comply with ISO 9000 standard requirements (d) practise measurement procedures
- Systematic errors are
(a) controllable errors (b) random error (c) uncontrollable errors (d) none of these
- When airy points support a length standard at two points, they will be apart by a distance of,
(a) 0.577L (b) 0.575L (c) 0.757L (d) 0.775L
- Wringing of slip gauges is used in
(a) line measurement (b) primary standards (c) both line and end measurements (d) end measurement
- In the hierarchical classification of standards, the accuracy in the standards,
(a) is degraded (b) is improved (c) does not change (d) is not related to hierarchical classifications
- A line standard is transferred to an end standard by using
(a) a composite line standard (b) a built-in datum (c) workshop standard (d) airy points
- In a line standard, distance is measured between
(a) two flat parallel surfaces (b) two engraved lines
(c) two points (d) two inclined surfaces
- The relationship that results between the two mating parts before assembly is called,
(a) tolerance (b) allowance (c) limit (d) fit.
- According to Taylor's principle, GO gauges are designed to check
(a) maximum metal condition (b) minimum metal condition
(c) both of these (d) none of these
- In a shaft basis system, the upper deviation of the size of shaft is
(a) 1 (b) less than 0 (c) not related to size (d) 0

12. NO GO gauges are designed
 (a) for maximum passability (b) for maximum impassability
 (c) without any specified conditions (d) without attaching any importance to them
13. The preferred instrument for measuring holes, grooves, and recesses is,
 (a) plain scale (b) vernier calliper (c) slip gauge (d) depth gauge
14. A selection of slip gauges is required to build a height of 48.155 mm. Propose the best combination of gauges using the 112-gauge set _____
15. An LVDT works on the principle of,
 (a) mutual inductance (b) mutual capacitance (c) mutual resistance (d) magnetic induction
16. The angle between the line of action and the common tangent to the pitch circles is known
 (a) flank angle (b) tooth angle (c) included angle (d) pressure angle
17. In a two-wire method, diameter of the best-size wire is given by,
 (a) $d = (p/2) \cdot \sec(\theta/2)$ (b) $d = (p/4) \cdot \sec(\theta/2)$ (c) $d = (p/2) \cdot \operatorname{cosec}(\theta/2)$ (d) $d = (p/2) \cdot \cot(\theta/2)$
18. Abbreviation of LVDT is _____
19. A 40 mm diameter shaft lies in the range of 30 to 50 mm, its standard diameter is ___ mm.
20. An allowance is defined as _____

Part B

Answer **all** the Questions. **Each** question carries **6** marks. (5Qx6M=30M)

21. Explain proving ring with a neat sketch & equations.
22. Explain the construction and principle of Pirani gauge with a neat sketch.
23. What are Thermocouples? State the principle on which thermocouple works.
24. Define Sensitivity and also Derive an expression for sensitivity of equal arm balance
25. Write the generalized measuring system and explain any two of its stages.

Part C

Answer **all** the Questions. **Each** question carries **10** marks. (3Qx10M=30M)

26. Define pyrometers and explain the working principle of optical pyrometer with a neat sketch.
27. Define Dynamometers, state its classifications. And explain Mechanical Dynamometer with a neat sketch.
28. Explain the procedure for bonding of strain gauges.