

लोक सेवा आयोग

नेपाल इन्जिनियरिङ्ग सेवा, मेट्रोलेजी समूह, राजपत्राङ्कित प्रथम श्रेणी, सहसचिव वा सो सरह पदको खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र :- प्राविधिक विषय

1. **Metrology in General**

Global Legal, Industrial, Scientific and Chemical measurement system & its status in Nepal

2. **Mass standards** – Types and classes; mass comparators; Industrial weighing systems namely mechanical, electrical, pneumatic, hydraulic and electrical systems;

Accuracy classes of balances; Calibration of electronic balances/ single pan, two knife edge balances and including direct reading electronic precision balances

3. **Calibration of weights** by direct comparison and using weighing designs

4. **True Mass, Apparent Mass and Conventional Mass** value, buoyancy corrections, Estimation of air density, errors due to non-correction for buoyancy;

5. **Measurement of Temperature**

Thermodynamic Scale/Practical temperature Scales; International Temperature Scale of 1990, ITS 90, Industrial Thermometers, Calibration of Liquid in Glass Thermometer Calibration of Thermocouples

6. **Measurement of Force and Pressure**

Characteristics of Force Measuring devices, Proving Ring, Verification of Tensile and compressive Testing machines, Verification of Pressure Gauge

7. **Measurement of Electrical Parameters**

Calibration of multifunction Calibrator
Calibration of digital multimeters
Calibration of analogue multimeters

8. **Uncertainty of Measurement**

Errors and uncertainty in measurement and their statistical analysis:

Calibration of 1 kg weight with buoyancy corrections,

Determination of the uncertainty of the value of a test mass,

Determination of the volume of a cylinder,

Calibration of a digital thermometer,

Determination of combined standard uncertainty and effective degrees of freedom

Expanded uncertainty

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9. **Conformity Assessment (CA): CA Infrastructure, Proficiency testing**
SAARC Agreement on Multilateral arrangement on Recognition of Conformity Assessment; SAARC agreement on Implementation of Regional Standards
ISO/IEC 17043 Conformity Assessment – General requirements for Proficiency testing
Proficiency testing bodies; laboratories; Accreditation Bodies; Reference material producers; Regulators Standard Bodies; Professional bodies (for educational value of PT), Proficiency Testing by interlaboratory comparisons; Development and operation of Proficiency Testing Schemes; Selection and use of proficiency testing Schemes by Laboratory Accreditation Bodies
10. **General requirements for the competence of testing and calibration laboratories (ISO /IEC 17025)**
Management requirement, technical requirement, test and calibration methods and method validation, Equipment, Calibration, Testing, Reference standards and reference material; Test reports and calibration certificates
11. **Quality Management Systems ISO 9001**
General requirement; Documentation requirements, Quality policy; Quality objectives; Quality manual
12. **Environmental Management System**
General requirements, Environmental policy and planning

---The End---

Sample Questions

1. Distinguish between Proficiency Testing bodies, Accreditation bodies and professional bodies.
2. Classify industrial thermometers. What instrument do you suggest for accurate and precise measurement of liquid metal in foundry workshop? Justify your answers with logical reasons.