

निशिक्षक वैद्यप्रापनशास्त्र गट-ब मुख्य परीक्षा - 2023

दि. ४ फेब्रुवारी, 2024 पेपर - II



2023

T18

BOOKLET NO.

600576

**Legal Metrology
Paper - II**

Time Allowed : Three Hours

Maximum Marks : 200

Medium : English

Type of Paper : Conventional

Question Paper Specific Instructions

Please read each of the following instructions carefully before attempting questions :

1. There are **EIGHT** questions divided in two Sections, out of which **FIVE** are to be attempted.
2. Questions no. 1 and 5 are compulsory. Out of the remaining questions, **THREE** are to be attempted choosing at least **ONE** question from each Section.
3. The number of marks carried by a question/sub question is indicated against it.
4. Keep in mind the word limit indicated in the question if any.
5. Wherever option has been given, only the required number of responses in the serial order attempted shall be assessed. Unless struck off, attempt of a question shall be counted even if attempted partly. Excess responses shall not be assessed and shall be ignored.
6. Candidates are expected to answer all the sub-questions of a question together. If sub-question of a question is attempted elsewhere (after leaving a few page or after attempting another question) the later sub-question shall be overlooked.
7. Any page or portion of the page left blank in the Answer Booklet must be clearly struck off.
8. Unless otherwise mentioned, symbol and notation have their usual standard meanings. Assume suitable data, if necessary and indicate the same clearly.
9. Neat sketches may be drawn, wherever required.
10. The medium of answer should be mentioned on the answer book as claimed in the application and printed on admission card. The answers written in medium other than the authorized medium will not be assessed and no marks will be assigned to them.

Note - 1. Candidates will be allowed to use Scientific (Non-programmable type) calculators.

SEAL

P.T.O.



SECTION – A

Q1. Answer any five of the following.

- (a) What are the fundamental quantities ? State their S.I. and C.G.S. units. 8
- (b) Define the dimensions formula of a unit of the physical quantity. Write the dimensions of the length, area of the square, area of the circle, velocity, acceleration and kinetic energy. 8
- (c) Fill in the blanks by converting the physical quantities into different units. 8
- 1 kilometer = _____ meter
- 1 km² = _____ m²
- 1 m/sec. = _____ cm/sec.
- 1 ton = _____ kg
- 1 Newton = _____ dyne
- 1 Joule = _____ erg
- 1 Kilo watt = _____ watt
- 1 horse power = _____ watt
- (d) Explain the important requirement of precise measurement of angles. Explain the use of a universal bevel protractor. 8
- (e) Define temperature. Write the different scales used to measure the temperature and the relation between them. Explain measurement of temperature using thermocouple by one method. 8
- (f) Explain pressure and its importance. Explain the relationship between absolute, gauge and barometric pressure. 8
- (g) Write any four physical and four mechanical properties of the materials with their applications. 8
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- Q2. (a) Define and explain in brief the concept of Force, Torque, Stress, Strain with their measurement units. 15
- (b) Explain the nature of errors associated with the measurements, its types and brief explanation. 15
- (c) What is a vacuum ? Explain the working of McLeod Gauge and Pirani Gauge to measure the vacuum. 10
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- Q3. (a) What are the common methods employed for making measurements ? Explain any five methods of measurement. 15
- (b) Explain with suitable diagram the construction and working of platinum resistance thermometer. Derive equation to determine temperature by using it. 15
- (c) What are the thermistors ? What are the applications and advantages of it ? 10
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- Q4. (a) Following are the units of mass and pressure. Fill in the blanks with their conversion factor. 15
- 1) 1 Pascal = _____ N/(Metre)²
- 2) 1 atm = _____ mm of Hg
- 3) 1 mm of Hg = _____ Torr
- 4) 1 Torr = _____ atm
- 5) 1 bar = _____ Pascal
- 6) 1 gm = _____ kg
- 7) 1 gm = _____ ton
- 8) 1 gm = _____ milligram
- (b) Define kinetic energy, potential energy and relation between them. Write the relation between work done and power and their units. 15
- (c) Explain the working of strain gauge, its types and discuss its applications. 10
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SECTION – B

Q5. Answer **any five** of the following.

- (a) Write the rights and obligation of National Accreditation Board for Testing and Calibration Laboratories (NABL) India. 8
 - (b) Explain with suitable diagram working of Infrared Thermometers. 8
 - (c) State the importance of the measurement of torque and explain the working of one dynamometer. 8
 - (d) Explain the construction and working of the vernier caliper. How it is used to measure inner dimension, outer dimension and depth measurement. 8
 - (e) Explain constructions and working of single pan optical balance. 8
 - (f) Explain the use of piezoelectric type transducer used to measure pressure with suitable diagram. 8
 - (g) Explain with suitable diagram construction and working of industrial u tube manometer. 8
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- Q6.**
- (a) Define metrology and its significance. Also explain legal metrology, dynamical metrology and deterministic metrology. 15
 - (b) Define density and explain the factors on which it depends. Explain how to determine the density of solid and liquid. 15
 - (c) With the help of neat sketch explain the working of analytical balance and platform balance. 10
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- Q7.**
- (a) Describe various tests to be carried out of electronic balance and checklist for descriptive marking on balance. 15
 - (b) Explain any two instruments used to measurement of fluid flow. 15
 - (c) Explain assessment programme, issuing of the certificate and its validity by NABL India. 10
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- Q8.**
- (a) Derive Archimedes law of lever which became the working principle of scales and balances. Explain with suitable diagram working of spring balance. 15
 - (b) Explain micrometer as a hand held measuring instrument. Describe any four types of micrometer. 15
 - (c) Write the rights and obligations of Conformity Assessment Bodies (CAB) in India. 10
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