



**HEI-003-0491004** Seat No. \_\_\_\_\_

**B. Sc. / M. Sc. (Applied Physics) (Sem. I) (CBCS)  
Examination**

November / December – 2017

**Paper - 3 : Applied Physics - I  
(New Course)**

**Faculty Code : 003**

**Subject Code : 0491004**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.  
(2) Figures on the right side indicate marks.

**1** Attempt any **seven** short questions : (two marks each) **14**

- (1) Define:
  - (a) Ampere
  - (b) Kelvin
- (2) Write dimensions of
  - (a) Area
  - (b) Volume
- (3) What is a non-inertial frame?
- (4) Define: Modulus of rigidity ( $\eta$ ).
- (5) Write down important characteristics of fluids.
- (6) State suitable physical properties of the thermometric substance.
- (7) How does a bimetallic thermometer work?
- (8) What is free or natural vibrations? Give examples.
- (9) Compare: transverse waves and longitudinal waves.
- (10) Describe advantages of constant volume hydrogen thermometer.

- 2** (A) Write answers of any **two** : (Five marks each) **10**
- (1) What are the limitations of dimensional analysis.
  - (2) Explain: Newton's second law in detail.
  - (3) Explain: Uniform circular motion and derive an equation  $v = \omega r$ .
  - (4) Explain projectile motion and derive equation for time of flight.
- (B) Write answers of any **two** : (two marks each) **4**
- (1) What is Pseudo or fictitious force?
  - (2) Define :
    - (a) Meter
    - (b) Kilogram
  - (3) Write dimensions of
    - (a) Linear momentum
    - (b) Power
  - (4) What is an inertial frame?
- 3** (A) Write answers of any **two** : (Five marks each) **10**
- (1) Derive an equation for the rise(h) of liquid in a capillary tube having small radius  $r$ .
  - (2) State and prove Bernoulli's equation.
  - (3) Derive an equation of Young's modulus of the material of a wire.
  - (4) Derive an expression showing relation between Young's modulus  $Y$  and bulk modulus  $K$ .
- (B) Write answers of any **two** : (two marks each) **4**
- (1) Write down Pascal's law.
  - (2) Define: Surface tension of a liquid.
  - (3) Define: viscosity.
  - (4) Define: Modulus of rigidity ( $\eta$ ).

- 4 (A) Write answers of any **two** : (Five marks each) **10**
- (1) Describe a simple procedure to establish an empirical temperature scale.
  - (2) Explain construction and working of a constant volume hydrogen thermometer.
  - (3) Explain thermal conductivity in detail with necessary figure and equations.
  - (4) Derive Newton's law of cooling,  $T - T_0 = e^{(-kt+c)}$ .
- (B) Write answers of any **two** : (two marks each) **4**
- (1) State Prevost's theory of heat exchange.
  - (2) Explain : A perfect Black body.
  - (3) Describe use of thermistor as a thermometer.
  - (4) How does a bimetallic thermometer work?
- 5 (A) Write answers of any **two** : (Five marks each) **10**
- (1) Explain damped harmonic motion in detail.
  - (2) Write a note on forced oscillations and resonance.
  - (3) Derive displacement equation  $x = A \sin(\omega t + \theta)$  for simple harmonic motion.
  - (4) Explain: general characteristics of waves.
- (B) Write answers of any **two** : (two marks each) **4**
- (1) Describe simple harmonic motion in short.
  - (2) What is time period in simple harmonic motion? Write equation of time period.
  - (3) What is free or natural vibrations? Give examples.
  - (4) What are sound waves? Explain in short.
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