B.Sc.-CBCS/IS/PHS/H/C2P/17
(Pr.)

2017

PHYSICS

[Honours]

(CBCS)

(Practical)

PAPER – C2P

Full Marks : 20

Time : 2 hours

Answer any **one** question

The figures in the right hand margin indicate marks

Experiment : 15, Laboratory Note Book : 2, Viva-voce : 3

1. To study the vertical oscillation of a spring-mass system and to determine the modulus of rigidity and spring constant. (mass and total length of the

spring wire and radius of the spring are to be supplied).

(*a*) Working Formula. 3

(*b*) Data for radius of the spring wire by screw gauge (determine least count and take at least three readings). 1 + 2

(*c*) Data for m_L-T^2 graph (for five different loads). 5

(*d*) Drawing m_L-T^2 graph 2

(*e*) Calculation of rigidity modulus and spring constant from graph. 2

2. To determine the Moment of Interia of a Flywheel.

(*a*) Working formula (with or without measuring number rotations before friction energy loss). 3

(*b*) Data for the radius of the shaft by slide callipers (determine vernier constant and take at least three readings). 1 + 2

(*c*) Data for *h*(length of the thread/height of the bottom of the hanger from ground by meter scale). 1

(*d*) Data for time of fall three different loads. 3

(*e*) Data for number of rotation of the flywheel after it gets maximum speed by complete unwinding of the thread and before it stops for the above three loads. 3

(*f*) Calculation of moment of inertia in each case and determining the mean. 2

Or

(*d*) Data for $m\left(\frac{g}{f}-1\right) vs \frac{1}{f}$ graph [or any suitable graph] for five different loads. 5

(*e*) Drawing graph. 2

(*f*) Calculation of moment of intertia from graph. 1

3. To determine coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method). [Radius of the bore and length of the capillary tube care to be supplied].

   (*a*) Working formula (including formula for critical height). 3

   (*b*) Calculation of critical height (approximate value of η is to be supplied). 1

   (*c*) Data for h-V graph for six different *h*. [least count of measuring cylinder and stopwatch are to be noted]. 6

   (*d*) Drawing graph. 2

   (*e*) Calculation of η from graph. 1

   (*f*) Calculation of maximum proportional error. 2

4. To determine the elastic Constants of a wire by Searle's method. Length and breadth/depth of the bars are to be supplied].

   (*a*) Working formula for *Y*, *n* and σ. 4

(*b*) Data for the radius of the wire be screw gauge (determine least count and take at least three readings). 1 + 2

(*c*) Data for the length of the wire between the bars by meter scale. 1

(*d*) Data for time periods of horizontal and vertical oscillations (T_1 and T_2) of the bars (three observations for vertical oscillations and three for horizontal; 20 oscillations each observation). 5

(*e*) Calculation of Y, n and σ. 2

5. To determine the value of g using Bar Pendulum.

(*a*) Working formula. 3

(*b*) Data for T vs. d graph. [d, the distance of the edge of holes which are far from the cerntre of the bar, is measured by meter scale; measure time for at least 10 oscillations for measuring T]. 7

(*c*) Drawing Data for T *vs.* d graph 3

(*d*) Calculation of g from T *vs.* d graph. 2

6. To determine the value of g using Kater's Pendulum.

   (*a*) Working formula. 3

   (*b*) Preliminary records of times of oscillations during adjustment of positions of the cylinders. 5

   (*c*) Data for final time periods T_1 and T_2. 3

   (*d*) Data for the distances l_1 and l_2. 2

   (*e*) Calculation of g. 2

7. To determine the Modulus of Rigidity of a Wire by Maxwell's needle. (Length of the wire is to be supplied).

   (*a*) Working formula. 3

   (*b*) Data for the radius of the wire by screw gauge (determine least count and take at least three readings). 1 + 2

   (*c*) Data for mass of solid and hollow cylinders by spring/electronic balance. 2

   (*d*) Data for time periods for solid cylinders

outside the needle and inside the needle (T_1 and T_2). [Measure time for at least 10 oscillations for measuring time periods, three observations for each of T_1 and T_2]. 6

(*e*) Calculation of rigidity modulus. 1

8. To determine the Young's Modulus of a Wire by Optical Lever method. (Length of the wire and length of the arm of the optical lever are to be supplied).

(*a*) Working formula. 3

(*b*) Data for the radius of the wire by screw gauge (determine least count and take at least three readings). 1 + 2

(*c*) Distance between the mirror and the scale. 1

(*d*) Data for load depression graph with the help of optical lever arrangement (for *five* loads). 5

(*e*) Drawing load depression graph. 2

(*f*) Calculation of *Y* from graph. 1

9. To measure the external diameter of a tube by slide callipers, screw-gauge and travelling microscope.

   (*a*) Data for vernier constant and zero error of slide callipers. 1

   (*b*) Data for diameter by slide callipers (at least 5 readings). 3

   (*c*) Data for least count and zero error of screw gauge. 2

   (*d*) Data for diameter by screw gauge (at least 5 readings). 3

   (*e*) Data for vernier constant of microscope. 1

   (*f*) Data for diameter by microscope (at least 3 readings for each of horizontal and vertical diameter). 5

10. Determine the height of a building or vertical distance between two points using sextant.

   (*a*) Theory 2

   (*b*) Vernier constant or least count 2

(*c*) Reading of scale for lower marked point (base point) and vertically higher marked point for four different horizontal distance(d) (to be measured by metre scale or measuring tape) $1\frac{1}{2} \times 4$

(*d*) Table for $\tan\theta$ *vs.* $\frac{1}{d}$ graph 1

(*e*) $\tan\theta$ *vs.* $\frac{1}{d}$ graph 2

(*f*) Calculation of h from graph 1

(*g*) Accuracy. 1

11. Determination of acceleration due to gravity (g) and velocity of a free-falling body using digital timing technique. (for two different masses).

(*a*) Theory 2

(*b*) Recording of height and time of free falling for five different heights for first body. 3

(*c*) Recording of same for second body of different mass. 3

(*d*) Graphs of height(h) versus square of time of

falling (*tr*) and finding 'g' from the graphs for two sets. 2 + 2

(*e*) Calculation of velocity of falling when touches the surface for both masses (for any *h*). $\frac{1}{2} + \frac{1}{2}$

(*f*) Comment on the results about the effect of mass in free falling. 1

(*g*) Accuracy. 1

[Instructions to the Examiners]

1. Second chance of drawing card may be allowed without deducting marks. However, third chance onward, 10% marks ie. 1.5 marks to be deducted for each chance.

2. If theory experiment is found wrong before starting the experiment, the examine may asked to make it correct in front of examiners without panalising. Otherwise working formula should be supplied with deduction of marks alloted for it.

3. If an examine is provide help for performing an experiment (data recording, focussing etc), the nature of help provided showed be written on the answer script and marks should be deducted accordingly.

4. At least two readings for each experiment should be checked and signed by the examiners during experiment.

5. In Laboratory Note Book 1/4 marks for each properly signed experiment may be allowed. Show for 08 experiments onward full marks 02 should be awarded.
