

**B.Sc. Semester I (Honours) Examination, 2018-19****PHYSICS****Course ID : 12411****Course Code : SHPHS-101C-1(T)**

Course Title : Mathematical Physics I

**Time: 1 Hour 15 Minutes****Full Marks: 25***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.***Section-I**

1. Answer *any five* questions of the following: 1×5=5
- (a) Find a vector perpendicular to both  $\vec{A} = 2\hat{i} - \hat{j} - 4\hat{k}$  and  $\vec{B} = 3\hat{i} - \hat{j} - \hat{k}$ .
- (b) Sketch  $\theta = \text{Constant}$  surface in spherical polar co-ordinate system.
- (c) If  $\vec{E} = -\vec{\nabla}\phi$ ,  $\phi$  is the scalar function, then find  $\oint_C \vec{E} \cdot d\vec{r}$  if C is any simple closed curve.
- (d) Find the value of  $\beta(\frac{1}{2}, \frac{3}{2})$ .
- (e) Determine the integrating factor for the differential equation  $y dx - x dy = 0$ .
- (f) State the condition for which  $x = x_0$  is a regular singular point of the differential equation  $P_1(x) \frac{d^2y}{dx^2} + P_2(x) \frac{dy}{dx} + P_3(x)y = 0$ .
- (g) By using Rodrigue's formula for Legendre's polynomial, show that  $P_2(x) = \frac{1}{2}(3x^2 - 1)$ .
- (h) Form the differential equation by eliminating the arbitrary function  $f$  and  $g$  from  $z = f(x + at) + g(x - at)$ .

**Section-II**

2. Answer *any two* questions of the following: 5×2=10
- (a) For a solenoidal vector  $\vec{A}$ , show that  $\vec{\nabla} \times [\vec{\nabla} \times \{\vec{\nabla} \times (\vec{\nabla} \times \vec{A})\}] = \nabla^4 \vec{A}$ .
- (b) Prove that  $\vec{\nabla}\phi$  points in the direction of maximum rate of increase of the scalar point function  $\phi(x, y, z)$ . 3+2=5
3. Represent the vector  $\vec{A} = Z\hat{i} - 2x\hat{j} + y\hat{k}$  in cylindrical co-ordinate system. 5
4. Solve:  $(\frac{d^2y}{dx^2} + 4y) = e^x \sin^2 x$ . 5
5. (a) Prove that  $P_n'(x) - xP_{n-1}'(x) = nP_{n-1}(x)$
- (b) Prove that  $\Gamma(\frac{1}{2}) = \sqrt{\pi}$ . 3+2=5

**Section-III**Answer *any one* question.

10×1=10

6. (a) Write down the two-dimensional Laplace's equation in polar co-ordinate.  
(b) Find the general solution of the above equation by the method of separation of variables.  
(c) Prove that  $\beta(m, m) \times \beta\left(m + \frac{1}{2}, m + \frac{1}{2}\right) = \frac{\pi}{m} (2)^{1-4m}$ . 2+5+3=10
7. (a) Evaluate  $\int_C \vec{A} \cdot \overrightarrow{dr}$  along the curve  $x^2 + y^2 = 1, z = 1$  in the positive direction from (0, 1, 1) to (1, 0, 1) if  $\vec{A} = (yz + 2x)\hat{i} + xz\hat{j} + (xy + 2z)\hat{k}$ .  
(b) Find the acute angle between the surfaces  $xy^2z = 3x + z^2$  and  $3x^2 - y^2 + 2z = 1$ . at the point (1, -2, 1).  
(c) Evaluate:  $\text{div} \left( \frac{\vec{r}}{r^3} \right)$  4+4+2=10
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**B.Sc. Semester I (Honours) Examination, 2018-19****PHYSICS****Course ID : 12412****Course Code : SHPHS-102C-2(T)**

Course Title : Mechanics

**Time: 1 Hour 15 Minutes****Full Marks: 25***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words  
as far as practicable.***Section – I**

1. Answer *any five* questions: 1×5=5
- What is meant by stable equilibrium?
  - State the work-kinetic energy theorem.
  - Which force is responsible for keeping an artificial satellite in its specified orbit?
  - How does the co-efficient of viscosity of liquid depend upon the temperature?
  - How does the length of the year of a planet depend upon its distance from the sun?
  - Write down the expression of the acceleration of a particle moving in a central force field.
  - What is Galilean invariance?
  - Write down the perpendicular axis theorem for a plane lamina body.

**Section – II**Answer *any two* questions. 5×2=10

2. A sphere of mass  $M$  and radius  $r$  is rolling down freely, without slipping, along a plane inclined at an angle  $\theta$  with the horizon. Show that the acceleration of the sphere is given by the equation.

$$f = \frac{g \sin \theta}{\left(1 + \frac{k^2}{r^2}\right)}$$

when  $g$  = acceleration due to gravityand  $k$  = radius of gyration 5

3. A force is given by  $\vec{F} = (2xy + z^2)\hat{i} + x^2\hat{j} + 2xz\hat{k}$  Newton. Show that it is a conservative force field. Calculate the amount of work done by the force in moving a particle from (0, 1, 2) to (5, 2, 7). 3+2=5
4. A particle of unit mass moves according to the equation  $\vec{r} = \hat{i}(2 + 3t^2) + \hat{j}5t^2 + \hat{k}t$ . Find the force acting on it, torque ( $\vec{N}$ ) and angular momentum ( $\vec{L}$ ) about the origin. Hence verify  $\vec{N} = \frac{d\vec{L}}{dt}$

5. (a) Write down the general differential equation of motion under central force field.  
(b) The motion of a particle under the influence of a central force is described by  $r = a \sin \theta$ .  
Find the expression for force. 1+4=5

**Section – III**

Answer *any one* question. 10×1=10

6. (a) Deduce Poiseuille's equation for the rate of steady flow of liquid through a narrow tube clearly mentioning the conditions to be satisfied for the deduction of the equation.  
(b) What are the limitations of the equation?  
(c) A large bottle is fitted with a siphon made of capillary glass tube. Compare the times taken to empty the bottle, when it is filled with water and petrol of specific gravity 0.8. The co-efficient of viscosity of water and petrol are 0.01 and 0.02 poise respectively at the given temperature. 5+2+3=10
7. (a) Prove that the total angular momentum of a system of particles about any point 'O' equals the angular momentum of the total mass assumed to be located at the centre of mass plus the angular momentum about the centre of mass.  
(b) State the postulates of the special theory of relativity.  
(c) If  $V_0$  is the rest volume of a cube of side  $l_0$ , then show that  $V_0 \sqrt{1 - \beta^2}$  is the volume viewed from a reference frame moving with uniform velocity  $v$  in a direction parallel to an edge of the cube. Here  $\beta = \frac{v}{c}$ ,  $c$  is the speed of light. 5+2+3=10
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SH-I/Physics/103GE-1(T)/19

**B.Sc. Semester I (Honours) Examination, 2018-19****PHYSICS****Course ID : 12414****Course Code : SHPHS-103GE-1(T)****Course Title: Mechanics Electrostatics and Sound****Time: 1 Hour 15 Minutes****Full Marks: 25**

*The figures in the right hand side margin indicate marks.  
Candidates are required to give their answers in their own words  
as far as practicable.*

*দক্ষিণ প্রান্তস্থ সংখ্যাগুলি প্রশ্নের পূর্ণমানের নির্দেশক।  
পরীক্ষার্থীদের যথাসম্ভব নিজের ভাষায় উত্তর দিতে হবে।*

**Section-I****1. Answer any five questions:**

1×5=5

যে কোনো পাঁচটি প্রশ্নের উত্তর দাও :

(a) Write down the dimension of free space permittivity ( $\epsilon_0$ ).

শূন্য মাধ্যমে তড়িৎভেদ্যতার মাত্রা লেখো।

(b) What is the value of  $\vec{\nabla} \cdot \vec{r}$  ? $\vec{\nabla} \cdot \vec{r}$ -এর মান কত?

(c) Write down the differential equation of simple harmonic motion.

সরল দোলগতির অবকল সমীকরণটি লেখো।

(d) Write down the difference between Newton's relativity and Einstein's relativity.

নিউটনের আপেক্ষিকতাবাদ এবং আইনস্টাইনের আপেক্ষিকতাবাদের মধ্যে মূল পার্থক্য কী?

(e) A particle is executing simple harmonic motion with frequency ' $f$ '. Write down the frequency of change of its maximum kinetic energy.একটি কণা ' $f$ ' কম্পাংকে সরলদোলগতিতে আন্দোলিত হচ্ছে। কণাটির সর্বোচ্চ গতিশক্তির পরিবর্তনের কম্পাংক কত?

(f) Write down Stoke's theorem.

স্টোকসের উপপাদ্যটি লেখো।

(g) A thin wire and a thick wire of same length are made of same material. Which one will have more torsional rigidity?

একটি সরু তার এবং সমদৈর্ঘ্যের একটি মোটা তার একই উপাদানে তৈরি। কোন তারে ব্যবর্ত দৃঢ়তা বেশি এবং কেন?

(h) An electric dipole of moment  $\vec{p}$  is kept in an electric field  $\vec{E}$ . What is the magnitude and direction of the torque acting on the dipole?

$\vec{p}$  ভ্রামক সম্পন্ন একটি তড়িৎ দ্বিমেরু  $\vec{E}$  প্রাবল্যের তড়িৎক্ষেত্রে আছে। দ্বিমেরুতে সৃষ্ট টর্কের মান এবং অভিমুখ কী?

### Section-II

Answer any two questions:

5×2=10

যে কোনো দুটি প্রশ্নের উত্তর দাও :

2. What do you mean by conservative force field?

Show whether the force field  $\vec{F} = \hat{i} 2xz + \hat{j}(x^2 - y) + \hat{k}(2z - x^2)$  is conservative or non-conservative. 1+4=5

সংরক্ষী ক্ষেত্র বলতে কী বোঝায়?

ক্ষেত্র বল  $\vec{F} = \hat{i} 2xz + \hat{j}(x^2 - y) + \hat{k}(2z - x^2)$  সংরক্ষী না অসংরক্ষী তা প্রমাণ করে দেখাও।

3. Distinguish between normal stress and shearing stress.

Find out an expression of elastic potential energy per unit volume of a wire in case of its longitudinal strain. 2+3=5

অভিলম্ব পীড়ন এবং কৃন্তন পীড়নের মধ্যে পার্থক্য উল্লেখ করো। অণুদৈর্ঘ্য বিকৃতির ক্ষেত্রে কোনো স্থিতিস্থাপক তারের একক আয়তনে সঞ্চিত শক্তির পরিমাণের রাশিমালা নির্ণয় করো।

4. What do you mean by intensity of wave. On which factors does it depend? What is the difference between bel and decibel? What is the intensity of a 60 dB sound? 1+1+1+2=5

তরঙ্গের তীব্রতা বলতে কী বোঝায়? এটি কোন কোন বিষয়ের ওপর নির্ভর করে? বেল এবং ডেসিবেলের মধ্যে পার্থক্য কী? একটি 60 dB শব্দের তীব্রতা কত হবে?

5. Prove that in central force field motion the angular momentum and areal velocity is constant. 2+3=5

প্রমাণ করো কেন্দ্রীয় বল ক্ষেত্রে গতিশীল কণার কৌণিক ভরবেগ ও ক্ষেত্রীয় বেগ ধ্রুবক থাকে।

### Section-III

Answer any one question:

10×1=10

যে কোনো একটি প্রশ্নের উত্তর দাও :

6. Write down the definition of gravitational potential and field. Find out an expression of gravitational potential at an external and internal point due to a solid spherical body. 1+1+(3+5)=10

মহাকর্ষীয় বিভব এবং প্রাবল্যের সংজ্ঞা লেখো। একটি নিরেট গোলকের দরুন গোলকের বাইরে এবং ভিতরের কোনো বিন্দুতে মহাকর্ষীয় বিভব নির্ণয় করো।

7. (a) Write down the properties of electric lines of forces.

তড়িৎ বলরেখার ধর্মগুলি লেখো।

- (b) Show that the electric lines of forces falls on an equipotential surface normally.

দেখাও যে তড়িৎ বলরেখাগুলি সমবিভব তলকে লম্বভাবে স্পর্শ করে।

- (c) What is the unit of electric dipole moment? Is it a scalar or vector quantity?

তড়িৎ দিমেরুর একক কী? এটি ভেক্টর না স্কেলার রাশি?

- (d) Find out an expression of electric field intensity at a point on the perpendicular bisector of an electric dipole. 2+2+2+4=10

তড়িৎ দিমেরুর লম্ব সমদ্বিখণ্ডকের উপরিস্থ কোনো বিন্দুতে ক্ষেত্রপ্রাবল্য নির্ণয় করো।

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**B.Sc. Semester I (General) Examination, 2018-19****PHYSICS****Course ID : 12418****Course Code : SPPHS-101C-1A****Course Title : Physics - I****Time: 1 Hour 15 Minutes****Full Marks: 25***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.**দক্ষিণ প্রান্তস্থ সংখ্যাগুলি পূর্ণমান নির্দেশক।  
পরীক্ষার্থীদের যথাসম্ভব নিজের ভাষায় উত্তর দিতে হবে।***1. Answer any five questions:****1×5=5***যে কোনো পাঁচটি প্রশ্নের উত্তর দাওঃ*(a) Find the value of  $-5\hat{j} \cdot (\hat{k} \times \hat{i})$ . *$-5\hat{j} \cdot (\hat{k} \times \hat{i})$ -এর মান কত?*

(b) What is conservative force?

*সংরক্ষী বল কাকে বলে?*

(c) Define: (i) radius of gyration and (ii) angular Momentum.

*সংজ্ঞা লেখো : (i) চক্রগতির ব্যাসার্ধ (ii) কৌণিক ভরবেগ*

(d) What is escape velocity?

*মুক্তিবেগ কাকে বলে?*

(e) Write the dimensional formulae of Young's modulus.

*ইয়ং-গুণাক্ষের মাত্রীয় সংকেতটি লেখো।*

(f) What is beat frequency?

*স্বরকম্প সংখ্যা কাকে বলে?*

(g) What is meant by electrical-dipole?

*তড়িৎ-দ্বিমেরু বলতে কী বোঝো?*

(h) Write down the relation between the torque and angular acceleration.

*টর্ক ও কৌণিক ত্বরণের মধ্যে সম্পর্কটি লেখো।***Answer any two questions:****5×2=10***যে কোনো দুটি প্রশ্নের উত্তর দাওঃ***2. (a) State the characteristics of S.H.M.****2***সরল দোলগতির বৈশিষ্ট্যগুলি লেখো।*(b) Is  $y = \sin\omega t + \cos\omega t$  an equation of SHM? If so, find the time period and amplitude.**3** *$y = \sin\omega t + \cos\omega t$  কি সরল দোলগতির সমীকরণ? যদি হয় তবে এর পর্যায়কাল ও বিস্তার নির্ণয় করো।*

3. (a) State Stoke's theorem in vector analysis. 2  
ভেক্টর বিশ্লেষণে স্টোকস উপপাদ্য বিবৃত করো।
- (b) Find the area of a triangle whose base is given by  $(\hat{i} + \hat{j} + \hat{k})$  and one of the other two sides by  $(2\hat{j} + 3\hat{k})$ . 3  
যে ত্রিভুজের ভূমি  $(\hat{i} + \hat{j} + \hat{k})$  ভেক্টর দ্বারা এবং একটি বাহু  $(2\hat{j} + 3\hat{k})$  ভেক্টর দ্বারা প্রকাশিত হয় তার ক্ষেত্রফল নির্ণয় করো।
4. Derive the formula for the variation of the mass of a particle with its velocity using Lorentz transformation. 5  
লরেঞ্জ রূপান্তর সমীকরণ ব্যবহার করে কণার গতিবেগের সাথে ভরের পরিবর্তনের রাশিমালা নির্ণয় করো।
5. (a) What is meant by capacitance of a conductor? 2  
কোনো পরিবাহীর ধারকত্ব বলতে কী বোঝায়?
- (b) Deduce an expression for the capacitance of a parallel plate capacitor with dielectric. 3  
পর্যাবৃত্তিক স্লাবযুক্ত সমান্তরাল পাত ধারকের ধারকত্ব নির্ণয় করো।

Answer any one questions:

10×1=10

নিচের প্রশ্নগুলি থেকে যে কোনো একটি প্রশ্নের উত্তর দাও:

6. (a) Find an expression for the work done in stretching a wire and hence find the energy per unit volume of the wire. 5  
একটি তারের বিকৃতির দরুন কৃতকার্যের রাশিমালা নিরূপণ করো এবং প্রতি একক আয়তনে সঞ্চিত শক্তি কত হয় দেখাও।
- (b) The modulus of rigidity and Poisson's ratio of the material of a wire  $2.87 \times 10^{11}$  dynes/sq.cm. and 0.379 respectively. Find out the value of Young's modulus. 3  
একটি তারের উপাদানের দৃঢ়তা গুণক ও পোয়াসঁর অনুপাতের মান যথাক্রমে  $2.87 \times 10^{11}$  dynes/sq.cm এবং 0.379, এর ইয়ং-গুণকের মান বার করো।
- (c) Show that the value of Poisson's ratio lies between  $-1$  and  $\frac{1}{2}$ . 2  
প্রমাণ করো যে, পয়সন অনুপাতের মান  $\frac{1}{2}$  এবং  $-1$  এর মধ্যে থাকে।
7. (a) Show that,  $\vec{F} = (3x^2y + z^2)\hat{i} + x^3\hat{j} + 2xz\hat{k}$  is a conservative vector field. 3  
দেখাও যে  $\vec{F} = (3x^2y + z^2)\hat{i} + x^3\hat{j} + 2xz\hat{k}$  ভেক্টর ক্ষেত্রটি সংরক্ষী।
- (b) Write down the Gauss's divergence theorem and apply the theorem to calculate the surface integral  $\int_S xdy dz + y dzdx + z dx dy$ , where,  $S$  is the surface of the sphere  $x^2 + y^2 + z^2 = 4$ . 4  
গাউসের ডাইভারজেন্স উপপাদ্যটি বিবৃত করো এবং এটি প্রয়োগ করে তল সমাকল  $\int_S xdy dz + y dzdx + z dx dy$  -এর মান নির্ণয় করো, যেখানে  $S$  একটি গোলক  $x^2 + y^2 + z^2 = 4$ -এর তল নির্দেশ করে।
- (c) Find the value of  $P$  for which the vectors,  $\vec{A} = 2\hat{i} + P\hat{j} + 2\hat{k}$ ,  $\vec{B} = 3\hat{i} + \hat{j} + 2\hat{k}$  and  $\vec{C} = 2\hat{i} + 2\hat{j} + 4\hat{k}$  are coplanar. 3  
 $P$ -এর কোন মানের জন্যে  $\vec{A} = 2\hat{i} + P\hat{j} + 2\hat{k}$ ,  $\vec{B} = 3\hat{i} + \hat{j} + 2\hat{k}$  এবং  $\vec{C} = 2\hat{i} + 2\hat{j} + 4\hat{k}$  ভেক্টর তিনটি একতলীয় হবে?

**B.Sc. Semester I (Honours) Examination, 2018-19****PHYSICS****Course ID : 12421****Course Code : SHPHS-101C-1(P)****Course Title : Mathematical Physics-I Lab.****Time: 2 Hours****Full Marks: 15***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words  
as far as practicable.***Group – A**

1. (a) (i) Convert  $(19.25)_{10}$  into binary.  
(ii) What are the different schemes of representing signed integers. 2+2=4
- (b) (i) What is the need of Floating point numbers?  
(ii) Schematically show the different part of 32 bit single precession floating point number. 2+2=4
- (c) (i) Subtract  $(65)_{10} - (5)_{10}$  using 2's complement scheme.  
(ii) What is underflow and overflow. 2+2=4

1. (d) (i) Write down the full form of CPU and ALU.  
(ii) What are the major components of CPU. 2+2=4
- (e) (i) Convert the binary number  $(10100.00111)_2$  to decimal number.  
(ii) What is the difference between computer organization and computer architecture? 2+2=4
- (f) What are the difference between Primary memory and Secondary memory? Give examples. 2+2=4

1. (g) The frequency table of the monthly salaries of 20 people is shown below:

No. of people	5	8	5	2
Salary (in Rs.)	3500	4200	4200	4300

Calculate the standard deviation of the salaries of 20 peoples. 4

- (h) (i) What are the basic functional units of a computer?  
(ii) What is the role of control unit?  
(iii) Define RAM. 1+2+1=4
- (i) Explain truncation, round-off, absolute and relative error. 4

1. (j) (i) What are the advantages of Learning high level languages? 2+2=4
- (ii) What are the role of MAR and MDR? 2+2=4
- (k) (i) Two students measures two objects with meter sticks, one student measures a lamp post and get a value of the height  $4.025\text{m} \pm 1\text{mm}$ . Another student measures the height of a small cylinder  $0.055\text{m} \pm 1\text{mm}$ . Find the relative error for the comparative accuracy. 2+2=4
- (ii) Write down the formula to calculate standard deviation. 2+2=4
- (l) Explain underflow and overflow using 2's complement representation of 4 bit binary number. How the overflow and underflow can be understood in terms of bit pattern. 4

**Group – B**

2. Plot the function  $y = \sin(x) + \cos(2x)$  using the title “Harmonic Oscillator” with time and amplitude as  $x, y$  axis respectively. Choose the ranges  $(-10 \text{ to } 30)$  and  $(-3 \text{ to } 3)$  for  $x$  and  $y$  axis respectively. 2+1+1=4
3. Make a graph of  $\gamma x$  with  $x$  and  $(\gamma x)^{-1}$  with  $x$ . Show the variation with  $x$  ranging from  $-4$  to  $4$  and  $y$  ranging from  $-1.2$  to  $1.2$ . Set the first graph with red and second one with black.
4. Plot  $f(x) = \sin x$  and  $f(x) = \cos x$  in the same graph set  $x$  axis range  $(-15 : 15)$ . Save the plot with title “Trigonometric function”. Set  $x$  axis label as ‘X’ and  $y$  axis label as ‘Sinusoidal’.
5. Plot  $y = \tan^2 x$  with title ‘Function’. Label  $x$  axis as ‘TIME’ and  $y$  axis ‘Distance’ using range  $-20$  to  $20$  for  $x$  axis and  $y$  axis. 2+1+1=4
6. Plot  $y = e^{-2x} \cos(3\pi x)$  using the title “Under damped SHM”. Label ‘Time’ as  $x$  axis and ‘Amplitude’ as  $y$  axis. Take the ranges for  $x$  axis  $0$  to  $5$  and  $y$  axis  $-1$  to  $1$ . 2+1+1=4
7. Plot  $\frac{\sin(xy)}{xy}$  in 3 dimension. Label the different axis and give a name to graph. 2+1+1=4

**Group – C**

8. Consider a set of data obtained from an experiment of Ohm’s law as

Voltage	Current
2	1
3	1.6
4	2
5	2.6
6	3
7	3.6
9	4.4

Plot the data in a graph using Gnuplot. Fit the graph by a linear equation  $f(x) = mx + c$ . Find out Standard deviation. 4+1=5

9. Plot the following parametric equation using gnuplot to construct 3D plotting of a sphere. The equations  $x = \cos(u) \cos(v)$ ,  $y = \sin(u) \sin(v)$ ,  $z = \cos(v)$ . Create an output file taking the range of  $u(= 0 \text{ to } 2\pi)$  and  $v(= 0 \text{ to } \pi)$  and isosample 40. 5

10. Plot the following parametric equation using gnuplot to construct 3D plotting. The parametric equations are  $x = \cos(2u) \sin(2v)$ ,  $y = \sin(u) \sin(v)$  and  $z = \cos(v)$ . 5

11. Plot the data table using gnuplot

Force	0.00	0.51	1.01	1.48	2.01	2.50	3.00
Depression	0.0000	0.0084	0.0150	0.0230	0.0284	0.0345	0.0411

Plot the data and fit the graph linearly.

4+1=5

12. The weight and elongation data of a spring are given below:

Weight	5	6	7	8	9	10
Elongation	20	24	30	36	42	52

Fit the data according to Hook's law and calculate the Spring correct.

3+1+1=5

13. An experimental data of a volt-ampere characteristic of resistance are given below

Voltage	2	5	7	9	12	15
Current	14	30	54	60	86	115

Fit the data according to Ohm's law and find resistance R.

4+1=5

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**B.Sc. Semester I (Honours) Examination, 2018-19**

**PHYSICS**

**Course ID : 12421**

**Course Code : SHPHS-101C-1(PI)**

**Course Title : Mathematical Physics-I Lab.**

***General Instruction for examiners.***

**1. *Drawing of Cards:***

The Candidate should draw a card for his experiment and in case of his inability to perform the experiment he may be given a 2nd chance only after the drawing of all cards over. Candidates are required to write down their question on the first page of their answer sheet and return the card to the examiners.

**2. *Submission of Laboratory Notebook (LNB):***

The Candidates should submit their LNB before drawing the cards. No marks should be awarded if LNB's are not submitted or not regularly signed.

**3. *Supervision of Theory/Data:***

The candidates will first write down the theory and necessary diagram (if required) in presence of the Examiners and get them signed by any one of the examiners. Examiners are requested to check at least one data and sign thereof, also required to keep a personal note of any fault committed by the candidates which should be considered while awarding marks. They are also required to give special credit to candidate depending on his overall performance.

**4. *Evaluation of answer scripts:***

Both the two examiners should partly check answer scripts and put their signature. Please note that marks for each item such as theory, recording of data, calculation, accuracy, precaution etc. should be shown clearly at the back side of the cover page of answer script. The systematic recording of data in tabular form with proper column heads, with proper units in the header of each column should be main criterion for awarding marks. Calculators may be allowed but only after the completion of the recording.

***Instruction for paper C-1, P-1***

Examiners are requested to paste one question of Group-A and two questions, one from Group-B and another from Group-C combinations of question for Group-A.

For 1st Day 1st Half	For 1st Day 2nd Half	For 2nd Day 1st Half	For 2nd Day 2nd Half
Q.no. 1a, 1b, 1c	Q.no. 1d, 1e, 1f	Q.no. 1g, 1h, 1i	Q.no. 1j, 1k, 1l

For Group-B and Group-C Questions

Students have to write the programme on the script, they have to run the programme in presence of teacher, print out of the graph have to be attached with the script.

**B.Sc. Semester I (Honours) Examination, 2018-19****PHYSICS****Course ID : 12421****Course Code : SHPHS-101C-1(P)****Course Title : Mathematical Physics-I Lab.****Time: 2 Hours****Full Marks: 15***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words  
as far as practicable.***Group – A**

1. (a) (i) Convert  $(19.25)_{10}$  into binary.  
(ii) What are the different schemes of representing signed integers. 2+2=4
- (b) (i) What is the need of Floating point numbers?  
(ii) Schematically show the different part of 32 bit single precession floating point number. 2+2=4
- (c) (i) Subtract  $(65)_{10} - (5)_{10}$  using 2's complement scheme.  
(ii) What is underflow and overflow. 2+2=4

1. (d) (i) Write down the full form of CPU and ALU.  
(ii) What are the major components of CPU. 2+2=4
- (e) (i) Convert the binary number  $(10100.00111)_2$  to decimal number.  
(ii) What is the difference between computer organization and computer architecture? 2+2=4
- (f) What are the difference between Primary memory and Secondary memory? Give examples. 2+2=4

1. (g) The frequency table of the monthly salaries of 20 people is shown below:

No. of people	5	8	5	2
Salary (in Rs.)	3500	4200	4200	4300

Calculate the standard deviation of the salaries of 20 peoples. 4

- (h) (i) What are the basic functional units of a computer?  
(ii) What is the role of control unit?  
(iii) Define RAM. 1+2+1=4
- (i) Explain truncation, round-off, absolute and relative error. 4

1. (j) (i) What are the advantages of Learning high level languages? 2+2=4
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- (ii) Write down the formula to calculate standard deviation. 2+2=4
- (l) Explain underflow and overflow using 2's complement representation of 4 bit binary number. How the overflow and underflow can be understood in terms of bit pattern. 4

**Group – B**

2. Plot the function  $y = \sin(x) + \cos(2x)$  using the title “Harmonic Oscillator” with time and amplitude as  $x, y$  axis respectively. Choose the ranges  $(-10 \text{ to } 30)$  and  $(-3 \text{ to } 3)$  for  $x$  and  $y$  axis respectively. 2+1+1=4
3. Make a graph of  $\gamma x$  with  $x$  and  $(\gamma x)^{-1}$  with  $x$ . Show the variation with  $x$  ranging from  $-4$  to  $4$  and  $y$  ranging from  $-1.2$  to  $1.2$ . Set the first graph with red and second one with black.
4. Plot  $f(x) = \sin x$  and  $f(x) = \cos x$  in the same graph set  $x$  axis range  $(-15 : 15)$ . Save the plot with title “Trigonometric function”. Set  $x$  axis label as ‘X’ and  $y$  axis label as ‘Sinusoidal’.
5. Plot  $y = \tan^2 x$  with title ‘Function’. Label  $x$  axis as ‘TIME’ and  $y$  axis ‘Distance’ using range  $-20$  to  $20$  for  $x$  axis and  $y$  axis. 2+1+1=4
6. Plot  $y = e^{-2x} \cos(3\pi x)$  using the title “Under damped SHM”. Label ‘Time’ as  $x$  axis and ‘Amplitude’ as  $y$  axis. Take the ranges for  $x$  axis  $0$  to  $5$  and  $y$  axis  $-1$  to  $1$ . 2+1+1=4
7. Plot  $\frac{\sin(xy)}{xy}$  in 3 dimension. Label the different axis and give a name to graph. 2+1+1=4

**Group – C**

8. Consider a set of data obtained from an experiment of Ohm’s law as

Voltage	Current
2	1
3	1.6
4	2
5	2.6
6	3
7	3.6
9	4.4

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9. Plot the following parametric equation using gnuplot to construct 3D plotting of a sphere. The equations  $x = \cos(u) \cos(v)$ ,  $y = \sin(u) \sin(v)$ ,  $z = \cos(v)$ . Create an output file taking the range of  $u(= 0 \text{ to } 2\pi)$  and  $v(= 0 \text{ to } \pi)$  and isosample 40. 5

10. Plot the following parametric equation using gnuplot to construct 3D plotting. The parametric equations are  $x = \cos(2u) \sin(2v)$ ,  $y = \sin(u) \sin(v)$  and  $z = \cos(v)$ . 5

11. Plot the data table using gnuplot

Force	0.00	0.51	1.01	1.48	2.01	2.50	3.00
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Plot the data and fit the graph linearly.

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12. The weight and elongation data of a spring are given below:

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Fit the data according to Hook's law and calculate the Spring correct.

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13. An experimental data of a volt-ampere characteristic of resistance are given below

Voltage	2	5	7	9	12	15
Current	14	30	54	60	86	115

Fit the data according to Ohm's law and find resistance R.

4+1=5

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**B.Sc. Semester I (Honours) Examination, 2018-19**

**PHYSICS**

**Course ID : 12421**

**Course Code : SHPHS-101C-1(PI)**

**Course Title : Mathematical Physics-I Lab.**

***General Instruction for examiners.***

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Both the two examiners should partly check answer scripts and put their signature. Please note that marks for each item such as theory, recording of data, calculation, accuracy, precaution etc. should be shown clearly at the back side of the cover page of answer script. The systematic recording of data in tabular form with proper column heads, with proper units in the header of each column should be main criterion for awarding marks. Calculators may be allowed but only after the completion of the recording.

***Instruction for paper C-1, P-1***

Examiners are requested to paste one question of Group-A and two questions, one from Group-B and another from Group-C combinations of question for Group-A.

For 1st Day 1st Half	For 1st Day 2nd Half	For 2nd Day 1st Half	For 2nd Day 2nd Half
Q.no. 1a, 1b, 1c	Q.no. 1d, 1e, 1f	Q.no. 1g, 1h, 1i	Q.no. 1j, 1k, 1l

For Group-B and Group-C Questions

Students have to write the programme on the script, they have to run the programme in presence of teacher, print out of the graph have to be attached with the script.

**B.Sc. Semester I (Honours) Practical Examination, 2018-19****PHYSICS****Course ID : 12422****Course Code : SHPHS-102C-2(P)**

Course Title : Mechanics Lab

**Time: 2 Hours****Full Marks: 15***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words  
as far as practicable.*

1. Find the spring constant of a spring by measuring the time period of oscillation of the spring. [Take at least six different weights hanging from the spring.]
  - (a) Definition of the quantity to be determined (spring constant). 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data 6
  - (d) Graph (for mass vs. square of time period) 2
  - (e) Calculation 1
  - (f) Accuracy 1
  - (g) Precaution 1
  
2. Find the acceleration due to gravity at your place by measuring the time period of oscillation of a spring. [Take at least six different readings.]
  - (a) Definition of the quantity to be determined (acceleration due to gravity). 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data 6
  - (d) Drawing of graph 2
  - (e) Calculation 1
  - (f) Accuracy 1
  - (g) Precaution 1

3. Determine the Young's modulus of the given material in the form of a bar by the method of flexure. [Take one length of the bar.]
- (a) Definition of the quantity to be measured (Young's modulus). 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data (load - depression) 6
  - (d) Drawing of graph 2
  - (e) Calculation 1
  - (f) Accuracy 1
  - (g) Precaution 1
4. Determine the coefficient of viscosity of water by capillary flow method. [Take readings for at least two different height difference.]
- (a) Definition of the quantity to be measured (coefficient of viscosity) 1
  - (b) Theory (working formula with explanation of symbols). 2
  - (c) Recording of data for two different heights 3+3=6
  - (d) Calculation 2
  - (e) Accuracy 1
  - (f) Precaution 1
5. Determine the coefficient of viscosity of the highly viscous supplied liquid by Stoke's method. [Take at least three balls of different radii.]
- (a) Definition of the quantity to be measured (coefficient of viscosity) 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data:
    - (i) Density of the material of the balls
    - (ii) Terminal velocity for three different balls 2+6=8
  - (d) Calculation 1
  - (e) Accuracy 1
  - (f) Precaution 1

6. Determine the acceleration due to gravity using a bar pendulum. [Take at least eight different readings, four lengths on each side of the centre of mass.]
- (a) Definition of the quantity to be measured (acceleration due to gravity) 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data 6
  - (d) Drawing of graph 2
  - (e) Calculation 1
  - (f) Accuracy 1
  - (g) Precaution 1
7. Determine the acceleration due to gravity using Kater's pendulum. [Take one distance between the knife edges, use Bessel's formula to get the value of g.]
- (a) Definition of the quantity to be determined (acceleration due to gravity) 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data 8
  - (d) Calculation 1
  - (e) Accuracy 1
  - (f) Precaution 1
8. Determine the moment of inertia of the supplied fly wheel. [Take at least three different hanging masses.]
- (a) Definition of the quantity to be determined (moment of inertia) 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data
  - (d) Measurement of diameter 2
  - (e) Data for three masses 6
  - (f) Calculation 1
  - (g) Accuracy 1
  - (h) Precaution 1
-

**B.Sc. Semester I (Honours) Practical Examination, 2018-19**

**PHYSICS**

**Course ID : 12422**

**Course Code : SHPHS-102C-2(PI)**

**Course Title : Mechanics Lab**

***(Instruction to the Examiners)***

The examiners are requested to paste one question on a card with respective serial number of the question. Cards may be duplicated, but the total number of cards may exceed the number of examinees. A list of arranged experiment sets signed by both the examiners along with answer script packet should be sent to The University. In no case, Examination will be conducted by the Examiner alone. Secrecy of the result must be maintained.

Each candidate should perform the experiment which is noted on the card drawn by him/her. The examiners may, however, use their discretion in offering him/her a second chance only after drawing card by all the candidates. The Laboratory Notebook must be submitted by the candidates before drawing of the card. **No credit should be given to Notebook which has not been signed.**

Candidates are required to write down the questions on one answer-script with respective number of the questions and return the card to the examiner. Candidates will first write down the theory (only for working formula explaining the symbol used) in presence of examiners and get them signed by either of the examiners.

Examiners are requested to see that the candidates are working according to instruction and to sign some important data for the experiment. Each answer script should be examined jointly by the Internal and External Examiner and should bear the signature of both examiners. All changes must be initiated by both the examiners. Marks for each item theory, adjustment of apparatus, data recording, graph, calculation and accuracy of result must be shown separately. Total marks for experiment should also be shown on the back side of the cover page.

Marks distribution:

Laboratory Notebook — 2

Experiment —13

If the candidate is found unable to write working formula, it may be supplied by the examiners but no mark on that head will be awarded. Proper handling of the instruments, setting of the apparatus and systematic recording of data should be taken into account while allotting marks for systematic recording of data. Marks for accuracy are to be awarded on the basis of the correct result, calculated by the examiners.

Special instructions for different experiments:

Experiment no. 3: Supplied data – Breadth and depth of the bar

Experiment no. 4: Supplied data – Length and radius of the tube

Experiment no. 5: Supplied data – Radii of the balls and density of the liquid

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**B.Sc. Semester I (Honours) Practical Examination, 2018-19****PHYSICS****Course ID : 12422****Course Code : SHPHS-102C-2(P)**

Course Title : Mechanics Lab

**Time: 2 Hours****Full Marks: 15***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words  
as far as practicable.*

1. Find the spring constant of a spring by measuring the time period of oscillation of the spring. [Take at least six different weights hanging from the spring.]
  - (a) Definition of the quantity to be determined (spring constant). 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data 6
  - (d) Graph (for mass vs. square of time period) 2
  - (e) Calculation 1
  - (f) Accuracy 1
  - (g) Precaution 1
  
2. Find the acceleration due to gravity at your place by measuring the time period of oscillation of a spring. [Take at least six different readings.]
  - (a) Definition of the quantity to be determined (acceleration due to gravity). 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data 6
  - (d) Drawing of graph 2
  - (e) Calculation 1
  - (f) Accuracy 1
  - (g) Precaution 1

3. Determine the Young's modulus of the given material in the form of a bar by the method of flexure. [Take one length of the bar.]
- (a) Definition of the quantity to be measured (Young's modulus). 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data (load - depression) 6
  - (d) Drawing of graph 2
  - (e) Calculation 1
  - (f) Accuracy 1
  - (g) Precaution 1
4. Determine the coefficient of viscosity of water by capillary flow method. [Take readings for at least two different height difference.]
- (a) Definition of the quantity to be measured (coefficient of viscosity) 1
  - (b) Theory (working formula with explanation of symbols). 2
  - (c) Recording of data for two different heights 3+3=6
  - (d) Calculation 2
  - (e) Accuracy 1
  - (f) Precaution 1
5. Determine the coefficient of viscosity of the highly viscous supplied liquid by Stoke's method. [Take at least three balls of different radii.]
- (a) Definition of the quantity to be measured (coefficient of viscosity) 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data:
    - (i) Density of the material of the balls
    - (ii) Terminal velocity for three different balls 2+6=8
  - (d) Calculation 1
  - (e) Accuracy 1
  - (f) Precaution 1

6. Determine the acceleration due to gravity using a bar pendulum. [Take at least eight different readings, four lengths on each side of the centre of mass.]
- (a) Definition of the quantity to be measured (acceleration due to gravity) 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data 6
  - (d) Drawing of graph 2
  - (e) Calculation 1
  - (f) Accuracy 1
  - (g) Precaution 1
7. Determine the acceleration due to gravity using Kater's pendulum. [Take one distance between the knife edges, use Bessel's formula to get the value of g.]
- (a) Definition of the quantity to be determined (acceleration due to gravity) 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data 8
  - (d) Calculation 1
  - (e) Accuracy 1
  - (f) Precaution 1
8. Determine the moment of inertia of the supplied fly wheel. [Take at least three different hanging masses.]
- (a) Definition of the quantity to be determined (moment of inertia) 1
  - (b) Theory (working formula with explanation of symbols). 1
  - (c) Recording of data
  - (d) Measurement of diameter 2
  - (e) Data for three masses 6
  - (f) Calculation 1
  - (g) Accuracy 1
  - (h) Precaution 1
-

**B.Sc. Semester I (Honours) Practical Examination, 2018-19**

**PHYSICS**

**Course ID : 12422**

**Course Code : SHPHS-102C-2(PI)**

**Course Title : Mechanics Lab**

***(Instruction to the Examiners)***

The examiners are requested to paste one question on a card with respective serial number of the question. Cards may be duplicated, but the total number of cards may exceed the number of examinees. A list of arranged experiment sets signed by both the examiners along with answer script packet should be sent to The University. In no case, Examination will be conducted by the Examiner alone. Secrecy of the result must be maintained.

Each candidate should perform the experiment which is noted on the card drawn by him/her. The examiners may, however, use their discretion in offering him/her a second chance only after drawing card by all the candidates. The Laboratory Notebook must be submitted by the candidates before drawing of the card. **No credit should be given to Notebook which has not been signed.**

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Marks distribution:

Laboratory Notebook — 2

Experiment —13

If the candidate is found unable to write working formula, it may be supplied by the examiners but no mark on that head will be awarded. Proper handling of the instruments, setting of the apparatus and systematic recording of data should be taken into account while allotting marks for systematic recording of data. Marks for accuracy are to be awarded on the basis of the correct result, calculated by the examiners.

Special instructions for different experiments:

Experiment no. 3: Supplied data – Breadth and depth of the bar

Experiment no. 4: Supplied data – Length and radius of the tube

Experiment no. 5: Supplied data – Radii of the balls and density of the liquid

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**B.Sc. Semester I (Honours) Practical Examination, 2018-19****PHYSICS****Course ID : 12424****Course Code : SHPHS-103GE-1(P)****Course Title : Mechanics, Electrostatics and Sound Lab.****Time: 2 Hours****Full Marks: 15**Perform *any one* experiment of the following.

1. Determine the length and diameter of the given body using Vernier Caliper and screw gauge. [Take at least 5 sets of readings]

ভার্নিয়ার ক্যালিপারস এবং স্ক্রু-গেজের সাহায্যে প্রদত্ত বস্তুর দৈর্ঘ্য ও ব্যাস নির্ণয় করো। (কমপক্ষে পাঁচবার করে পাঠ নিতে হবে।)

Distribution of marks for Experiment no.1

Theory	Systematic recording of data and performance of experiment	Calculation	Accuracy
1	10	1	1

2. Determine the length and diameter of the given body using travelling microscope and screw gauge.

[Take at least 5 sets of readings]

চলমান অণুবীক্ষণ যন্ত্র এবং স্ক্রু-গেজের সাহায্যে প্রদত্ত বস্তুর দৈর্ঘ্য এবং ব্যাস নির্ণয় করো। (কমপক্ষে পাঁচবার করে পাঠ নিতে হবে।)

Distribution of marks for Experiment no.2

Theory	Systematic recording of data and performance of the experiments	Calculation	Accuracy
1	10	1	1

3. Determine the moment of inertia of flywheel. [Take at least 5 different sets of mass]

ফ্লাই-হুইলের জড়তা ভ্রামক নির্ণয় করো। (পাঁচটি ভিন্ন ভরের জন্য পাঠ নিতে হবে।)

Distribution of marks for Experiment no.3

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of experiment	Calculation	Accuracy
1	1	9	1	1

4. Determine the Young's modulus of a given wire by Optical Lever method. [Take at least 5 sets of readings for increasing in the length of the wire as well as for the diameter of the same.]

আলোকীয় লিভার যন্ত্রের সাহায্যে প্রদত্ত তারের ইয়ং গুণাক্ষ নির্ণয় করো। তারের দৈর্ঘ্য বৃদ্ধি এবং তারের ব্যাস উভয়ের জন্য কমপক্ষে পাঁচবার পাঠ নিতে হবে।

Distribution of marks for Experiment no.4

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	7+2 (graph)	1	1

5. Determine the modulus of the rigidity of given wire by Maxwell's needle. [Take at least 3 sets of readings both for the diameter of the wire and for the time period.]

ম্যাক্সওয়েল সূচকের সাহায্যে প্রদত্ত তারের দৃঢ়তা গুণাঙ্ক নির্ণয় করো। (তারের ব্যাস ও দোলনকালের জন্য কমপক্ষে তিনবার করে পাঠ নিতে হবে।

Distribution of marks for Experiment no.5

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

6. Determine Young's modulus of the material of a wire by Searle's method. [Take at least 5 sets of readings for increasing in length of the wire as well as for the diameter of the same.]

শার্লো পদ্ধতিতে প্রদত্ত তারের উপাদানের ইয়ং গুণাঙ্ক নির্ণয় করো। (তারের দৈর্ঘ্য বৃদ্ধি এবং তারের ব্যাস উভয়ের জন্য কমপক্ষে পাঁচবার পাঠ নিতে হবে।

Distribution of marks for Experiment no.6

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	7+2 (graph)	1	1

7. Determine acceleration due to gravity (g) by Kater's pendulum. [Adjustment to be done for forty oscillations. Take readings for one set of Knife edge.]

কেটার দোলকের সাহায্যে অভিকর্ষজ ত্বরণের মান নির্ণয় করো।

Distribution of marks for Experiment no.7

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	Preliminary records of time=5	1	1
		Final time period = 3		
		Determination of C.G. =1		

8. Study the motion of a spring and calculate spring constant. [Take at least 5 different sets of mass]

(স্প্রিং-এর গতি পর্যবেক্ষণ এবং স্প্রিং ধ্রুবকের মান নির্ণয় করো।)

Distribution of marks for Experiment no.8

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

9. Study the motion of a spring and calculate acceleration due to gravity. [Take at least 5 different sets of mass]

(স্প্রিং-এর গতি পর্যবেক্ষণ করে অভিকর্ষজ ত্বরণের মান নির্ণয় করো।)

Distribution of marks for Experiment no.9

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

10. Investigate the motion of coupled oscillators and measure the frequencies of normal modes. [Take at least 3 sets of the time period.]

(যুগ্ম দোলকের গতি পর্যবেক্ষণ করো এবং নর্মাল মোডের কম্পাঙ্ক নির্ণয় করো।)

Distribution of marks for Experiment no.10

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

11. Determine the amplitude and phase difference of two superposed waves with the help of Lissajous figures [Find for one figure]

লিসাজের চিত্র থেকে দুটি উপরিপাতিত তরঙ্গের বিস্তার এবং দশা পার্থক্য নির্ণয় করো। (একটি চিত্রের জন্য নির্ণয় করো।)

Distribution of marks for Experiment no.11

Definition of the quantities to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	2	8	1	1

12. Determine the moment of inertia of cylindrical body about an axis passing through its centre of gravity and perpendicular to its axis of symmetry. [Take help of an auxiliary body of regular shape. Take at least 3 sets of time periods]

প্রদত্ত সুস্থম বস্তুর সাহায্য লইয়া অপর একটি চোঙাকৃতি বস্তুর ভারকেন্দ্রগামী অভিলম্ব অক্ষরেখার সাপেক্ষে জাড্যভ্রামক নির্ণয় করো। (অন্তত তিনটি করে দোলনকালের পাঠ নিতে হবে।)

Distribution of marks for Experiment no.12

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

13. Draw  $n$  vs  $\frac{1}{l}$  curve for the sonometer wire under a constant tension and hence find the unknown frequency of the given tuning fork. (Take at least 4 tuning forks of known frequencies)

একটি নির্দিষ্ট টানের জন্য একটি সনোমিটার তারের  $n$  বনাম  $\frac{1}{l}$  লেখচিত্র অঙ্কন করো এবং ঐ লেখচিত্র হইতে প্রদত্ত সুর শলাকার অজানা কম্পাঙ্ক বাহির করো। (কমপক্ষে চারটি জানা কম্পাঙ্কের সুরশলাকা ব্যবহার করিতে হইবে।)

Distribution of marks for Experiment no.13

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

14. Determine the modulus of rigidity of a wire by dynamical method. (Take at least 3 sets of readings for time period.)

গতীয় পদ্ধতিতে একটি তারের দৃঢ়তা গুণাঙ্ক নির্ণয় করো। (তিনটি দোলনকালের জন্য পাঠ নিতে হবে।)

Distribution of marks for Experiment no.14

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

**SH-I/Physics/103GE-1(PI)/19**

**B.Sc. Semester I (Honours) Practical Examination, 2019**

**PHYSICS**

**Course ID : 12424**

**Course Code : SHPHS-103GE-1(PI)**

Course Title : Mechanics, Electronics and Sound Lab.

***Instruction for Examiners***

The examiners are requested to past one question on a card with respective serial number of the question. Cards may be duplicated, but the total number of cards may exceed the number of examinees. A list of arranged experiment sets signed by both the examiners along with answer script packet should be sent to the University. In no case, Examination will be conducted by the Examiner alone. Secrecy of the result must be maintained. Each candidate should perform the experiment which is noted on the card drawn by him/her. The examiners may, however, use their discretion in offering him/her a second chance only after drawing card by all the candidates before drawing of the card. *No credit should be given to Note-Book which has not been signed.*

Candidates are required to write down the questions on one answer-script with respective number of the questions and return the card to the examiner. Candidates will first write down the theory (only for working formula explaining the symbol used) in presence of examiners and get them signed by either of the examiners. Examiners are requested to see that the candidates are working according to instruction and to sign some important data for the experiment. Each answer script should be examined jointly by the internal and External Examiner and should bear the signature of both examiners. All changes must be initiated by both the examiners. Marks for each item theory, adjustment of apparatus, data recording, graph calculation and accuracy of result must be shown separately. Total marks for experiment should also be shown on the back side of the cover page.

Marks Distribution:

Laboratory Note Book -2

Experiment -13

If the candidate is found unable to write working formula, it may be supplied by the examiners but no mark on that head will be awarded. Proper handling of the instruments, setting of the apparatus and systematic recording of data should be taken into account while allotting marks for systematic recording of data. Marks for accuracy are to be awarded on the basis of the correct result, calculated by the examiners.

**B.Sc. Semester I (Honours) Practical Examination, 2018-19****PHYSICS****Course ID : 12424****Course Code : SHPHS-103GE-1(P)****Course Title : Mechanics, Electrostatics and Sound Lab.****Time: 2 Hours****Full Marks: 15**Perform *any one* experiment of the following.

1. Determine the length and diameter of the given body using Vernier Caliper and screw gauge. [Take at least 5 sets of readings]

ভার্নিয়ার ক্যালিপারস এবং স্ক্রু-গেজের সাহায্যে প্রদত্ত বস্তুর দৈর্ঘ্য ও ব্যাস নির্ণয় করো। (কমপক্ষে পাঁচবার করে পাঠ নিতে হবে।)

Distribution of marks for Experiment no.1

Theory	Systematic recording of data and performance of experiment	Calculation	Accuracy
1	10	1	1

2. Determine the length and diameter of the given body using travelling microscope and screw gauge. [Take at least 5 sets of readings]

[Take at least 5 sets of readings]

চলমান অণুবীক্ষণ যন্ত্র এবং স্ক্রু-গেজের সাহায্যে প্রদত্ত বস্তুর দৈর্ঘ্য এবং ব্যাস নির্ণয় করো। (কমপক্ষে পাঁচবার করে পাঠ নিতে হবে।)

Distribution of marks for Experiment no.2

Theory	Systematic recording of data and performance of the experiments	Calculation	Accuracy
1	10	1	1

3. Determine the moment of inertia of flywheel. [Take at least 5 different sets of mass]

ফ্লাই-হুইলের জড়তা ভ্রামক নির্ণয় করো। (পাঁচটি ভিন্ন ভরের জন্য পাঠ নিতে হবে।)

Distribution of marks for Experiment no.3

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of experiment	Calculation	Accuracy
1	1	9	1	1

4. Determine the Young's modulus of a given wire by Optical Lever method. [Take at least 5 sets of readings for increasing in the length of the wire as well as for the diameter of the same.]

আলোকীয় লিভার যন্ত্রের সাহায্যে প্রদত্ত তারের ইয়ং গুণাক্ষ নির্ণয় করো। তারের দৈর্ঘ্য বৃদ্ধি এবং তারের ব্যাস উভয়ের জন্য কমপক্ষে পাঁচবার পাঠ নিতে হবে।

Distribution of marks for Experiment no.4

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	7+2 (graph)	1	1

5. Determine the modulus of the rigidity of given wire by Maxwell's needle. [Take at least 3 sets of readings both for the diameter of the wire and for the time period.]

ম্যাক্সওয়েল সূচকের সাহায্যে প্রদত্ত তারের দৃঢ়তা গুণাঙ্ক নির্ণয় করো। (তারের ব্যাস ও দোলনকালের জন্য কমপক্ষে তিনবার করে পাঠ নিতে হবে।

Distribution of marks for Experiment no.5

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

6. Determine Young's modulus of the material of a wire by Searle's method. [Take at least 5 sets of readings for increasing in length of the wire as well as for the diameter of the same.]

শার্লো পদ্ধতিতে প্রদত্ত তারের উপাদানের ইয়ং গুণাঙ্ক নির্ণয় করো। (তারের দৈর্ঘ্য বৃদ্ধি এবং তারের ব্যাস উভয়ের জন্য কমপক্ষে পাঁচবার পাঠ নিতে হবে।

Distribution of marks for Experiment no.6

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	7+2 (graph)	1	1

7. Determine acceleration due to gravity (g) by Kater's pendulum. [Adjustment to be done for forty oscillations. Take readings for one set of Knife edge.]

কেটার দোলকের সাহায্যে অভিকর্ষজ ত্বরণের মান নির্ণয় করো।

Distribution of marks for Experiment no.7

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	Preliminary records of time=5	1	1
		Final time period = 3		
		Determination of C.G. =1		

8. Study the motion of a spring and calculate spring constant. [Take at least 5 different sets of mass]

(স্প্রিং-এর গতি পর্যবেক্ষণ এবং স্প্রিং ধ্রুবকের মান নির্ণয় করো।)

Distribution of marks for Experiment no.8

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

9. Study the motion of a spring and calculate acceleration due to gravity. [Take at least 5 different sets of mass]

(স্প্রিং-এর গতি পর্যবেক্ষণ করে অভিকর্ষজ ত্বরণের মান নির্ণয় করো।)

Distribution of marks for Experiment no.9

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

10. Investigate the motion of coupled oscillators and measure the frequencies of normal modes. [Take at least 3 sets of the time period.]

(যুগ্ম দোলকের গতি পর্যবেক্ষণ করো এবং নর্মাল মোডের কম্পাঙ্ক নির্ণয় করো।)

Distribution of marks for Experiment no.10

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

11. Determine the amplitude and phase difference of two superposed waves with the help of Lissajous figures [Find for one figure]

লিসাজের চিত্র থেকে দুটি উপরিপাতিত তরঙ্গের বিস্তার এবং দশা পার্থক্য নির্ণয় করো। (একটি চিত্রের জন্য নির্ণয় করো।)

Distribution of marks for Experiment no.11

Definition of the quantities to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	2	8	1	1

12. Determine the moment of inertia of cylindrical body about an axis passing through its centre of gravity and perpendicular to its axis of symmetry. [Take help of an auxiliary body of regular shape. Take at least 3 sets of time periods]

প্রদত্ত সুস্থম বস্তুর সাহায্য লইয়া অপর একটি চোঙাকৃতি বস্তুর ভারকেন্দ্রগামী অভিলম্ব অক্ষরেখার সাপেক্ষে জাড্যভ্রামক নির্ণয় করো। (অন্তত তিনটি করে দোলনকালের পাঠ নিতে হবে।)

Distribution of marks for Experiment no.12

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

13. Draw  $n$  vs  $\frac{1}{l}$  curve for the sonometer wire under a constant tension and hence find the unknown frequency of the given tuning fork. (Take at least 4 tuning forks of known frequencies)

একটি নির্দিষ্ট টানের জন্য একটি সনোমিটার তারের  $n$  বনাম  $\frac{1}{l}$  লেখচিত্র অঙ্কন করো এবং ঐ লেখচিত্র হইতে প্রদত্ত সুর শলাকার অজানা কম্পাঙ্ক বাহির করো। (কমপক্ষে চারটি জানা কম্পাঙ্কের সুরশলাকা ব্যবহার করিতে হইবে।)

Distribution of marks for Experiment no.13

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

14. Determine the modulus of rigidity of a wire by dynamical method. (Take at least 3 sets of readings for time period.)

গতীয় পদ্ধতিতে একটি তারের দৃঢ়তা গুণাঙ্ক নির্ণয় করো। (তিনটি দোলনকালের জন্য পাঠ নিতে হবে।)

Distribution of marks for Experiment no.14

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

**SH-I/Physics/103GE-1(PI)/19**

**B.Sc. Semester I (Honours) Practical Examination, 2019**

**PHYSICS**

**Course Id : 12424**

**Course Code : SHPHS-103GE-1(PI)**

Course Title : Mechanics, Electronics and Sound Lab.

***Instruction for Examiners***

The examiners are requested to past one question on a card with respective serial number of the question. Cards may be duplicated, but the total number of cards may exceed the number of examinees. A list of arranged experiment sets signed by both the examiners along with answer script packet should be sent to the University. In no case, Examination will be conducted by the Examiner alone. Secrecy of the result must be maintained. Each candidate should perform the experiment which is noted on the card drawn by him/her. The examiners may, however, use their discretion in offering him/her a second chance only after drawing card by all the candidates before drawing of the card. *No credit should be given to Note-Book which has not been signed.*

Candidates are required to write down the questions on one answer-script with respective number of the questions and return the card to the examiner. Candidates will first write down the theory (only for working formula explaining the symbol used) in presence of examiners and get them signed by either of the examiners. Examiners are requested to see that the candidates are working according to instruction and to sign some important data for the experiment. Each answer script should be examined jointly by the internal and External Examiner and should bear the signature of both examiners. All changes must be initiated by both the examiners. Marks for each item theory, adjustment of apparatus, data recording, graph calculation and accuracy of result must be shown separately. Total marks for experiment should also be shown on the back side of the cover page.

Marks Distribution:

Laboratory Note Book -2

Experiment -13

If the candidate is found unable to write working formula, it may be supplied by the examiners but no mark on that head will be awarded. Proper handling of the instruments, setting of the apparatus and systematic recording of data should be taken into account while allotting marks for systematic recording of data. Marks for accuracy are to be awarded on the basis of the correct result, calculated by the examiners.

**B.Sc. Semester I (Programme) Practical Examination, 2018-19****PHYSICS****Course ID: 12428****Course Code : SPPHS-101C-1A(P)****Course Title : Physics-I Lab.****Time: 2 Hours****Full Marks: 15**Perform *any one* experiment of the following.

1. Determine the length and diameter of the given body using Vernier Caliper and screw gauge. [Take at least 5 sets of readings]

ভার্নিয়ার ক্যালিপারস এবং স্ক্রু-গেজের সাহায্যে প্রদত্ত বস্তুর দৈর্ঘ্য ও ব্যাস নির্ণয় করো। (কমপক্ষে পাঁচবার করে পাঠ নিতে হবে।)

Distribution of marks for Experiment no.1

Theory	Systematic recording of data and performance of experiment	Calculation	Accuracy
1	10	1	1

2. Determine the length and diameter of the given body using travelling microscope and screw gauge.

[Take at least 5 sets of readings]

চলমান অণুবীক্ষণ যন্ত্র এবং স্ক্রু-গেজের সাহায্যে প্রদত্ত বস্তুর দৈর্ঘ্য এবং ব্যাস নির্ণয় করো। (কমপক্ষে পাঁচবার করে পাঠ নিতে হবে।)

Distribution of marks for Experiment no.2

Theory	Systematic recording of data and performance of the experiments	Calculation	Accuracy
1	10	1	1

3. Determine the moment of inertia of flywheel. [Take at least 5 different sets of mass]

ফ্লাই-হুইলের জড়তা ভ্রামক নির্ণয় করো। (পাঁচটি ভিন্ন ভরের জন্য পাঠ নিতে হবে।)

Distribution of marks for Experiment no.3

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of experiment	Calculation	Accuracy
1	1	9	1	1

4. Determine the Young's modulus of a given wire by Optical Lever method. [Take at least 5 sets of readings for increasing in the length of the wire as well as for the diameter of the same.]

আলোকীয় লিভার যন্ত্রের সাহায্যে প্রদত্ত তারের ইয়ং গুণাক্ষ নির্ণয় করো। তারের দৈর্ঘ্য বৃদ্ধি এবং তারের ব্যাস উভয়ের জন্য কমপক্ষে পাঁচবার পাঠ নিতে হবে।

Distribution of marks for Experiment no.4

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	7+2 (graph)	1	1

5. Determine the modulus of the rigidity of given wire by Maxwell's needle. [Take at least 3 sets of readings both for the diameter of the wire and for the time period.]

ম্যাক্সওয়েল সূচকের সাহায্যে প্রদত্ত তারের দৃঢ়তা গুণাঙ্ক নির্ণয় করো। (তারের ব্যাস ও দোলনকালের জন্য কমপক্ষে তিনবার করে পাঠ নিতে হবে।

Distribution of marks for Experiment no.5

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

6. Determine Young's modulus of the material of a wire by Searle's method. [Take at least 5 sets of readings for increasing in length of the wire as well as for the diameter of the same.]

শার্লো পদ্ধতিতে প্রদত্ত তারের উপাদানের ইয়ং গুণাঙ্ক নির্ণয় করো। (তারের দৈর্ঘ্য বৃদ্ধি এবং তারের ব্যাস উভয়ের জন্য কমপক্ষে পাঁচবার পাঠ নিতে হবে।

Distribution of marks for Experiment no.6

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	7+2 (graph)	1	1

7. Determine acceleration due to gravity (g) by Kater's pendulum. [Adjustment to be done for forty oscillations. Take readings for one set of Knife edge.]

কেটার দোলকের সাহায্যে অভিকর্ষজ ত্বরণের মান নির্ণয় করো।

Distribution of marks for Experiment no.7

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	Preliminary records of time=5	1	1
		Final time period = 3		
		Determination of C.G. =1		

8. Study the motion of a spring and calculate spring constant. [Take at least 5 different sets of mass]

(স্প্রিং-এর গতি পর্যবেক্ষণ এবং স্প্রিং ধ্রুবকের মান নির্ণয় করো।)

Distribution of marks for Experiment no.8

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

9. Study the motion of a spring and calculate acceleration due to gravity. [Take at least 5 different sets of mass]

(স্প্রিং-এর গতি পর্যবেক্ষণ করে অভিকর্ষজ ত্বরণের মান নির্ণয় করো।)

Distribution of marks for Experiment no.9

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

10. Investigate the motion of coupled oscillators and measure the frequencies of normal modes. [Take at least 3 sets of the time period.]

(যুগ্ম দোলকের গতি পর্যবেক্ষণ করো এবং নর্মাল মোডের কম্পাঙ্ক নির্ণয় করো।)

Distribution of marks for Experiment no.10

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

11. Determine the amplitude and phase difference of two superposed waves with the help of Lissajous figures [Find for one figure]

লিসাজের চিত্র থেকে দুটি উপরিপাতিত তরঙ্গের বিস্তার এবং দশা পার্থক্য নির্ণয় করো। (একটি চিত্রের জন্য নির্ণয় করো।)

Distribution of marks for Experiment no.11

Definition of the quantities to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	2	8	1	1

12. Determine the moment of inertia of cylindrical body about an axis passing through its centre of gravity and perpendicular to its axis of symmetry. [Take help of an auxiliary body of regular shape. Take at least 3 sets of time periods]

প্রদত্ত সুসম বস্তুর সাহায্য লইয়া অপর একটি চোঙাকৃতি বস্তুর ভারকেন্দ্রগামী অভিলম্ব অক্ষরেখার সাপেক্ষে জাড্যভ্রামক নির্ণয় করো। (অন্তত তিনটি করে দোলনকালের পাঠ নিতে হবে।)

Distribution of marks for Experiment no.12

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

13. Draw  $n$  vs  $\frac{1}{l}$  curve for the sonometer wire under a constant tension and hence find the unknown frequency of the given tuning fork. (Take at least 4 tuning forks of known frequencies)

একটি নির্দিষ্ট টানের জন্য একটি সনোমিটার তারের  $n$  বনাম  $\frac{1}{l}$  লেখচিত্র অঙ্কন করো এবং ঐ লেখচিত্র হইতে প্রদত্ত সুর শলাকার অজানা কম্পাঙ্ক বাহির করো। (কমপক্ষে চারটি জানা কম্পাঙ্কের সুরশলাকা ব্যবহার করিতে হইবে।)

Distribution of marks for Experiment no.13

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

14. Determine the modulus of rigidity of a wire by dynamical method. (Take at least 3 sets of readings for time period.)

গতীয় পদ্ধতিতে একটি তারের দৃঢ়তা গুণাঙ্ক নির্ণয় করো। (তিনটি দোলনকালের জন্য পাঠ নিতে হবে।)

Distribution of marks for Experiment no.14

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

**B.Sc. Semester I (Programme) Practical Examination, 2018-19**

**PHYSICS**

**Course ID : 12428**

**Course Code : SPPHS-101C-1A(PI)**

Course Title : Physics-I Lab.

***Instruction for Examiners***

The examiners are requested to past one question on a card with respective serial number of the question. Cards may be duplicated, but the total number of cards may exceed the number of examinees. A list of arranged experiment sets signed by both the examiners along with answer script packet should be sent to the University. In no case, Examination will be conducted by the Examiner alone. Secrecy of the result must be maintained. Each candidate should perform the experiment which is noted on the card drawn by him/her. The examiners may, however, use their discretion in offering him/her a second chance only after drawing card by all the candidates before drawing of the card. *No credit should be given to Note-Book which has not been signed.*

Candidates are required to write down the questions on one answer-script with respective number of the questions and return the card to the examiner. Candidates will first write down the theory (only for working formula explaining the symbol used) in presence of examiners and get them signed by either of the examiners. Examiners are requested to see that the candidates are working according to instruction and to sign some important data for the experiment. Each answer script should be examined jointly by the internal and External Examiner and should bear the signature of both examiners. All changes must be initiated by both the examiners. Marks for each item theory, adjustment of apparatus, data recording, graph calculation and accuracy of result must be shown separately. Total marks for experiment should also be shown on the back side of the cover page.

Marks Distribution:

Laboratory Note Book -2

Experiment -13

If the candidate is found unable to write working formula, it may be supplied by the examiners but no mark on that head will be awarded. Proper handling of the instruments, setting of the apparatus and systematic recording of data should be taken into account while allotting marks for systematic recording of data. Marks for accuracy are to be awarded on the basis of the correct result, calculated by the examiners.

**B.Sc. Semester I (Programme) Practical Examination, 2018-19****PHYSICS****Course ID: 12428****Course Code : SPPHS-101C-1A(P)****Course Title : Physics-I Lab.****Time: 2 Hours****Full Marks: 15**Perform *any one* experiment of the following.

1. Determine the length and diameter of the given body using Vernier Caliper and screw gauge. [Take at least 5 sets of readings]

ভার্নিয়ার ক্যালিপারস এবং স্ক্রু-গেজের সাহায্যে প্রদত্ত বস্তুর দৈর্ঘ্য ও ব্যাস নির্ণয় করো। (কমপক্ষে পাঁচবার করে পাঠ নিতে হবে।)

Distribution of marks for Experiment no.1

Theory	Systematic recording of data and performance of experiment	Calculation	Accuracy
1	10	1	1

2. Determine the length and diameter of the given body using travelling microscope and screw gauge.

[Take at least 5 sets of readings]

চলমান অণুবীক্ষণ যন্ত্র এবং স্ক্রু-গেজের সাহায্যে প্রদত্ত বস্তুর দৈর্ঘ্য এবং ব্যাস নির্ণয় করো। (কমপক্ষে পাঁচবার করে পাঠ নিতে হবে।)

Distribution of marks for Experiment no.2

Theory	Systematic recording of data and performance of the experiments	Calculation	Accuracy
1	10	1	1

3. Determine the moment of inertia of flywheel. [Take at least 5 different sets of mass]

ফ্লাই-হুইলের জড়তা ভ্রামক নির্ণয় করো। (পাঁচটি ভিন্ন ভরের জন্য পাঠ নিতে হবে।)

Distribution of marks for Experiment no.3

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of experiment	Calculation	Accuracy
1	1	9	1	1

4. Determine the Young's modulus of a given wire by Optical Lever method. [Take at least 5 sets of readings for increasing in the length of the wire as well as for the diameter of the same.]

আলোকীয় লিভার যন্ত্রের সাহায্যে প্রদত্ত তারের ইয়ং গুণাক্ষ নির্ণয় করো। তারের দৈর্ঘ্য বৃদ্ধি এবং তারের ব্যাস উভয়ের জন্য কমপক্ষে পাঁচবার পাঠ নিতে হবে।

Distribution of marks for Experiment no.4

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	7+2 (graph)	1	1

5. Determine the modulus of the rigidity of given wire by Maxwell's needle. [Take at least 3 sets of readings both for the diameter of the wire and for the time period.]

ম্যাক্সওয়েল সূচকের সাহায্যে প্রদত্ত তারের দৃঢ়তা গুণাঙ্ক নির্ণয় করো। (তারের ব্যাস ও দোলনকালের জন্য কমপক্ষে তিনবার করে পাঠ নিতে হবে।

Distribution of marks for Experiment no.5

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

6. Determine Young's modulus of the material of a wire by Searle's method. [Take at least 5 sets of readings for increasing in length of the wire as well as for the diameter of the same.]

শার্লো পদ্ধতিতে প্রদত্ত তারের উপাদানের ইয়ং গুণাঙ্ক নির্ণয় করো। (তারের দৈর্ঘ্য বৃদ্ধি এবং তারের ব্যাস উভয়ের জন্য কমপক্ষে পাঁচবার পাঠ নিতে হবে।

Distribution of marks for Experiment no.6

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	7+2 (graph)	1	1

7. Determine acceleration due to gravity (g) by Kater's pendulum. [Adjustment to be done for forty oscillations. Take readings for one set of Knife edge.]

কেটার দোলকের সাহায্যে অভিকর্ষজ ত্বরণের মান নির্ণয় করো।

Distribution of marks for Experiment no.7

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	Preliminary records of time=5	1	1
		Final time period = 3		
		Determination of C.G. =1		

8. Study the motion of a spring and calculate spring constant. [Take at least 5 different sets of mass]

(স্প্রিং-এর গতি পর্যবেক্ষণ এবং স্প্রিং ধ্রুবকের মান নির্ণয় করো।)

Distribution of marks for Experiment no.8

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

9. Study the motion of a spring and calculate acceleration due to gravity. [Take at least 5 different sets of mass]

(স্প্রিং-এর গতি পর্যবেক্ষণ করে অভিকর্ষজ ত্বরণের মান নির্ণয় করো।)

Distribution of marks for Experiment no.9

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

10. Investigate the motion of coupled oscillators and measure the frequencies of normal modes. [Take at least 3 sets of the time period.]

(যুগ্ম দোলকের গতি পর্যবেক্ষণ করো এবং নর্মাল মোডের কম্পাঙ্ক নির্ণয় করো।)

Distribution of marks for Experiment no.10

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

11. Determine the amplitude and phase difference of two superposed waves with the help of Lissajous figures [Find for one figure]

লিসাজের চিত্র থেকে দুটি উপরিপাতিত তরঙ্গের বিস্তার এবং দশা পার্থক্য নির্ণয় করো। (একটি চিত্রের জন্য নির্ণয় করো।)

Distribution of marks for Experiment no.11

Definition of the quantities to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	2	8	1	1

12. Determine the moment of inertia of cylindrical body about an axis passing through its centre of gravity and perpendicular to its axis of symmetry. [Take help of an auxiliary body of regular shape. Take at least 3 sets of time periods]

প্রদত্ত সুস্থম বস্তুর সাহায্য লইয়া অপর একটি চোঙাকৃতি বস্তুর ভারকেন্দ্রগামী অভিলম্ব অক্ষরেখার সাপেক্ষে জাড্যভ্রামক নির্ণয় করো। (অন্তত তিনটি করে দোলনকালের পাঠ নিতে হবে।)

Distribution of marks for Experiment no.12

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

13. Draw  $n$  vs  $\frac{1}{l}$  curve for the sonometer wire under a constant tension and hence find the unknown frequency of the given tuning fork. (Take at least 4 tuning forks of known frequencies)

একটি নির্দিষ্ট টানের জন্য একটি সনোমিটার তারের  $n$  বনাম  $\frac{1}{l}$  লেখচিত্র অঙ্কন করো এবং ঐ লেখচিত্র হইতে প্রদত্ত সুর শলাকার অজানা কম্পাঙ্ক বাহির করো। (কমপক্ষে চারটি জানা কম্পাঙ্কের সুরশলাকা ব্যবহার করিতে হইবে।)

Distribution of marks for Experiment no.13

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	6+3 (graph)	1	1

14. Determine the modulus of rigidity of a wire by dynamical method. (Take at least 3 sets of readings for time period.)

গতীয় পদ্ধতিতে একটি তারের দৃঢ়তা গুণাঙ্ক নির্ণয় করো। (তিনটি দোলনকালের জন্য পাঠ নিতে হবে।)

Distribution of marks for Experiment no.14

Definition of the quantity to be measured	Theory	Systematic recording of data and performance of the experiment	Calculation	Accuracy
1	1	9	1	1

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**B.Sc. Semester I (Programme) Practical Examination, 2018-19**

**PHYSICS**

**Course Id : 12428**

**Course Code : SPPHS-101C-1A(P)**

Course Title : Physics-I Lab.

***Instruction for Examiners***

The examiners are requested to past one question on a card with respective serial number of the question. Cards may be duplicated, but the total number of cards may exceed the number of examinees. A list of arranged experiment sets signed by both the examiners along with answer script packet should be sent to the University. In no case, Examination will be conducted by the Examiner alone. Secrecy of the result must be maintained. Each candidate should perform the experiment which is noted on the card drawn by him/her. The examiners may, however, use their discretion in offering him/her a second chance only after drawing card by all the candidates before drawing of the card. *No credit should be given to Note-Book which has not been signed.*

Candidates are required to write down the questions on one answer-script with respective number of the questions and return the card to the examiner. Candidates will first write down the theory (only for working formula explaining the symbol used) in presence of examiners and get them signed by either of the examiners. Examiners are requested to see that the candidates are working according to instruction and to sign some important data for the experiment. Each answer script should be examined jointly by the internal and External Examiner and should bear the signature of both examiners. All changes must be initiated by both the examiners. Marks for each item theory, adjustment of apparatus, data recording, graph calculation and accuracy of result must be shown separately. Total marks for experiment should also be shown on the back side of the cover page.

Marks Distribution:

Laboratory Note Book -2

Experiment -13

If the candidate is found unable to write working formula, it may be supplied by the examiners but no mark on that head will be awarded. Proper handling of the instruments, setting of the apparatus and systematic recording of data should be taken into account while allotting marks for systematic recording of data. Marks for accuracy are to be awarded on the basis of the correct result, calculated by the examiners.