



K17U 2551

Reg. No. :

Name :

I Semester B.Sc. Degree (CBCSS.-Reg./Supple./Improv.) Examination,
November 2017

Core Course in Physics
(2014 Admn. Onwards)

1B01 PHY : PHYSICS PRIMERS

Time : 3 Hours

Max. Marks : 40

Instruction : Write answers in English only.

SECTION – A

Answer **all**. Very short answer type. **Each** question carries **one** mark. (1×4=4)

1. A wave which requires a medium for their propagation is called _____.
2. A vector divided by its magnitude is called _____.
3. Heliocentric theory was put forward by _____.
4. The differential equation representing Simple Harmonic Motion _____.

SECTION – B

Answer **any seven**. Short answer type. **Each** question carries **two** marks. (2×7=14)

5. What is Gauss's divergence theorem ?
6. State Plank's quantum hypothesis.
7. Represent graphically the variation of kinetic energy, potential energy and total energy with displacement of a particle executing simple harmonic motion.
8. Define null vector and give 2 properties of it.
9. Distinguish between longitudinal and transverse wave.

P.T.O.

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10. What are Lissajous figures ?
11. What is Del operator ?
12. Write an expression for kinetic energy of a particle executing simple harmonic motion.
13. What is Fourier theorem ?
14. Write a note on contributions of Indian physicists in twentieth century.

SECTION – C

Answer **any four**. Short essay/problem type. **Each** question carries **three** marks. **(3×4=12)**

15. Prove that $\text{div curl } (F) = 0$.
16. A tuning fork of frequency 512 Hz produced a plane wave in air having amplitude 0.5×10^{-3} mm. Calculate the energy density and intensity of the wave. (Velocity of sound in air 332 m/s and density of air = 1.29 kg/m^3)
17. The equation of a simple harmonic oscillator is given by $d^2x/dt^2 + 625x = 0$. Find the period and frequency of oscillation.
18. Express v^2 in spherical polar coordinates.
19. Derive the differential equation of wave motion in one dimension.
20. Prove that the given vectors $\vec{A} = i + 4j + 3k$ and $\vec{B} = 4i + 2j - 4k$ are perpendicular to each other.

SECTION – D

Answer **any two**. Long essay type. **Each** question carries **five** marks. **(5×2=10)**

21. Obtain the transformation and reverse transformation equations between Cartesian coordinates and Spherical Polar coordinates.
 22. Derive an expression for the velocity of longitudinal wave in a rod.
 23. What is meant by standard model in high energy physics ? What are the various particle families in the standard model ? Explain Higgs mechanism.
 24. Discuss in detail the two simple harmonic motions of equal periods in a straight line.
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K16U 2509

Reg. No. :

Name :

**I Semester B.Sc. Degree (C.C.S.S. – Reg./Supple./Improv.) Examination,
November 2016**

COMPLEMENTARY COURSE IN PHYSICS

1C01 PHY : Mechanics

(2014 Admn. Onwards)

Time : 3 Hours

Total Marks : 32

Instruction : Write answers only in English.

SECTION – A

Answer **all** questions. Very short answer type, **each** question carries **1** mark.

1. If particles of the medium vibrate parallel to the direction of propagation of wave motion, it is a _____ wave.
2. The Young's modulus of a wire of length L and radius R is Y N/m^2 . If length is reduced to $L/2$, and radius $R/2$, it's Young's modulus will be
3. Velocity of longitudinal wave in a gas depends up on elasticity and _____ of the medium.
4. The uncertainty relation hold for momentum and
5. The equation for torque is **(5×1=5)**

SECTION – B

Answer **any four**. Short answer type, **each** question carries **2** marks.

6. What is poisson's ratio ? Give it's limiting values.
7. Using figure show angle of twist and angle of shear.
8. What do you mean by de Broglie wave ?

P.T.O.



9. State and explain Parallel Axis Theorem.
10. Explain harmonic oscillation with example.
11. A particle executing S.H.M has amplitude 1 m and time period 2 s. Calculate the velocity when displacement being 0.5 m. **(4×2=8)**

SECTION – C

Answer **any three**. Short essay/problem type, **each** question carries **3** marks.

12. Derive an expression for work done in twisting a wire.
13. Derive expression for the energy of S.H.M. Plot the kinetic and potential energies as a function of displacement.
14. Show that a hollow shaft is better than a solid shaft of same length and same Material, for transmitting torque.
15. A gold wire 3.2×10^{-4} m in diameter elongates by 10^{-3} m when stretched by a force of 0.33 kg Wt. Find the Young's modulus of the material if the length of the wire is 0.6 meter.
16. Derive time independent schrodinger equation. **(3×3=9)**

SECTION – D

Answer **any two**. Long essay type, **each** question carries **5** marks.

17. Describe damped harmonic oscillator. Discuss different cases of damping.
 18. Explain Transverse wave in stretched string and modes of transverse vibrations in a string.
 19. With necessary theory explain torsional oscillation of a torsion pendulum and derive an expression for the rigidity modulus of a thin wire.
 20. Explain about Davisson and Germer experiments. **(2×5=10)**
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K15U 0593

Reg. No. :

Name :

I Semester B.Sc. Degree (CCSS – Reg./Supple./Improv.)
Examination, November 2015
Core Course in Physics
1B01 PHY : PHYSICS PRIMERS
(2014 Admn. Onwards)

Time : 3 Hours

Max. Marks : 40

Instruction : Write answers only in **English**.

SECTION – A

Answer **all** questions. Very short answer type, **each** question carries 1 mark.

1. Light radiation of frequency ν is quanta of energy $E =$ _____
2. Albert Einstein was awarded Nobel prize for _____
3. The semiconductor device which was known as “wonder child of electronics” is _____
4. The operator ∇^2 is called _____ (4×1=4)

SECTION – B

Answer **any seven**. Short answer type, **each** question carries 2 marks.

5. “Magnetic monopole doesnot exist”, show it mathematically.
6. State Stokes theorem.
7. Distinguish between Transverse wave and Longitudinal wave with example.
8. Explain S.H.M. and give one example.
9. “Universe is expanding”. Illustrate with Hubble’s law.
10. Briefly explain L.H.C Experiment.
11. What do you mean by “Chandrasekhar limit” ?

P.T.O.

K15U 0593



12. Derive the differential equation for one dimensional wave motion
13. State and explain Fourier theorem.
14. State the postulates of Einstein's Special Theory of Relativity. (7×2=14)

SECTION – C

Answer **any four**. Short essay/problem type, **each** question carries **3** marks.

15. Analyse Square wave using Fourier theorem.
16. Given $f(x, y, z) = r$, Evaluate ∇r .
17. Equation of a progressive wave is $y = A \cos 240(t - x/32)$, where x and y are in meters. Find :
 - 1) Velocity
 - 2) Frequency
 - 3) Phase difference between two points 0.5 m apart.
18. Prove that $\nabla \cdot (\nabla \times F) = 0$.
19. Explain Ultra Violet Catastrophy.
20. Give the volume element for Cylindrical coordinate system and hence find out the volume of a cylinder of radius R . (4×3=12)

SECTION – D

Answer **any two**. Long essay type, **each** question carries **5** marks.

21. Discuss the development of quantum mechanics from the limitations of Classical mechanics.
22. Check product rule $\nabla \cdot (\vec{A} \times \vec{B}) = \vec{B} \cdot (\nabla \times \vec{A}) - \vec{A} \cdot (\nabla \times \vec{B})$ by calculating each term separately for the functions $\vec{A} = xi + 2yj + 3zk$ and $\vec{B} = 3yi - 2xj$
23. Explain composition of two rectangular simple harmonic motions of same time period and Lissajous figure.
24. Explain longitudinal waves in gases. (2×5=10)



K15U 0594

Reg. No. :

Name :

I Semester B.Sc. Degree (CCSS – Reg./Supple./Improv.)
Examination, November 2015
Complementary Course in Physics
1C01 PHY : MECHANICS
(2014 Admn. Onwards)

Time : 3 Hours

Max. Marks : 32

Instruction : Write answers **only** in **English**.

SECTION – A

Answer **all** questions. Very short answer type, **each** question carries **1** mark.

1. A wire is stretched to double its length. The value of strain is _____
2. If U be the potential energy of a S.H.M., the potential energy when the particle is half way to it's end point is _____
3. The one dimensional differential equation for wave motion is _____
4. The Schrodinger's time independent wave equation is _____
5. The equation for Angular momentum is _____ (5×1=5)

SECTION – B

Answer **any four**. Short answer type, **each** question carries **2** marks.

6. Iron rails used in railway tracks have cross-section in the form of I. Explain advantage of such a structure.
7. Define bending moment and write down it's expression in case of beam of rectangular cross-section.
8. Deduce the expression for periodic oscillation of a torsion pendulum.
9. Write down the expressions for energy density and intensity of a plane harmonic wave explaining the notations used.

P.T.O.



10. Explain the significance of Davisson Germer experiment.
11. In which manner, damping force influence velocity and kinetic energy of an oscillator ? (4×2=8)

SECTION – C

Answer **any three**. Short essay/problem type, **each** question carries **3** marks.

12. Show that angular momentum of a particle about a fixed point is equal to the product of mass and double the area described in unit time by the rotating line joining the fixed point and the particle. What is the direction of angular momentum ?
13. What do you mean by resonance and under which condition amplitude resonance take place ? Find out the frequency at the resonance.
14. Give the expression for work done in twisting a cylindrical wire. How much potential energy is stored in a cylinder of length L , area of Cross-section A and rigidity modulus n when it is twisted through $\frac{\pi}{4}$ radian.
15. Calculate the energy difference between the ground state and the first excited. State for an electron in a one dimensional rigid box of length 1 \AA .
16. An electron initially at rest is accelerated by a potential difference of 5000 V . Find the de Broglie wave length. (3×3=9)

SECTION – D

Answer **any two**. Long essay type, **each** question carries **5** marks.

17. Define simple harmonic motion and derive the expression for kinetic and potential energies of a harmonic oscillator. Show that total energy is conserved .
18. Explain Longitudinal waves in rods.
19. Derive the expression for depression of a cantilever loaded at the free end.
20. Describe damped harmonic oscillator. Discuss different cases of damping. (2×5=10)



M 7847

Reg. No. :

Name :

I Semester B.Sc. Degree (CCSS – Regular) Examination, November 2014

(2014 Admn.)

CORE COURSE IN PHYSICS

1B01 PHY : Physics Primers

Time: 3 Hours

Max. Marks : 40

Instruction : Write answers in English only

SECTION – A

Answer **all**. Very short answer type. **Each** question carries **one** mark.

1. The differential equation representing Simple Harmonic Motion _____
2. The phenomenon of polarization is not observed in sound because, Sound is _____ wave.
3. _____ is an Example of curl less field
4. Rayleigh-Jeans formula was introduced to explain _____

SECTION – B

Answer **any seven**. Short answer type. **Each** question carries **two** marks.

5. What is ultraviolet catastrophe ?
6. Write a note on cylindrical polar coordinate system.
7. What is Del operator ?
8. Give physical significance of gradient of a scalar function.
9. State Stokes theorem.
10. What is meant by Simple Harmonic Motion ?
11. What is Fourier theorem ? Explain its importance.

P.T.O.

M 7847



12. What are Lissajous figures ?
13. Write a note on contributions of Indian physicists in twentieth century.
14. Write a note on Expanding Universe.

SECTION – C

Answer **any four**. Short essay/problem type. **Each** question carries **three** marks.

15. Briefly explain Planck's explanation of black body radiation.
16. A plane wave of sound of frequency 512 Hz and amplitude 0.005 mm is travelling in air. Calculate the energy transmitted per unit volume. Also calculate the energy current. (Given velocity of sound in air 340m/s and density of air 1.3kg/m^3 .)
17. A body of mass 1kg connected with a mass less horizontal spring of force constant 1N/m is set into Simple Harmonic Oscillations. Find the period of oscillation.
18. Prove that $\text{div curl}(F) = 0$.
19. Express v_2 in spherical polar coordinates.
20. Discuss the composition of two simple harmonic motions of equal periods and equal amplitudes with a phase difference of 90° .

SECTION – D

Answer **any two**-long essay type. **Each** question carries **five** marks.

21. Obtain the transformation and reverse transformation equations between Cartesian coordinates and Spherical Polar coordinates.
22. State and prove Gauss's theorem.
23. What is meant by standard model in high energy physics ? What are the various particle families in the standard model ? Explain Higgs mechanism.
24. Explain what is meant by natural frequency and resonance. Obtain the natural frequency and overtones in pipes with both ends open, with the help of a neat diagram.