

Roll No. _____

[Total No. of Pages : 2

SIS- N 056 B-18

B.Sc. Ist Semester (CBCS) Degree Examination

PHYSICS

(Mechanics)

Paper - DSC-I-PHY 104T

(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

- 1) Answer all the questions.
- 2) Draw diagrams wherever necessary.

I. Answer any **TEN** of the following in two or three sentences. (10×2=20)

1. Distinguish between inertial and non- inertial frames of reference.
2. What is an elastic collision. Give an example.
3. Connect the relation between angular momentum and angular velocity.
4. Define linear and angular velocity.
5. Define stress. Write it's dimensional formula.
6. What is orbital and escape velocity of satellite?
7. State Kepler's third law.
8. Mention the postulates of special theory of relativity.
9. State and explain Hook's law.
10. Define SHM. Write differential form of SHM.
11. State perpendicular axis theorem.
12. A rod of one meter long is moving along its length with a velocity of $0.6c$. Calculate its length as it appears to an observer
 - a) On the earth
 - b) Moving with rod itself.

B.Sc I Semester Degree [NEP] Examination

- II.** Answer any **FOUR** of the following. (4×5=20)
13. What is center of mass? Derive expression for center of mass of a system.
 14. Derive an expression for velocity of single stage rocket.
 15. Derive differential form of simple harmonic motion equation.
 16. Derive an expression for M.I. of thin rod about an axis through it's center and perpendicular to it's length.
 17. Explain Kepler's laws of planetary motion.
 18. What is Torsional pendulum. Derive an expression for time period of Torsional pendulum.
- III.** Answer any **FOUR** of the following. (4×10=40)
19. a. Write a note on Galilean transformation equation. (5)
b. Derive an expression for fictitious force. (5)
 20. Derive Lorentz transformation equation. (10)
 21. a. State and explain Newton's law of gravitation. (5)
b. Write a note on I- section girders. (5)
 22. a. Show that in an elastic collision relative velocities of two particles before collision is equal to after collision. (5)
b. Derive an expression for M.I. of solid cylinder about an axis passing through it's center and perpendicular to its own axis of cylindrical symmetry? (5)
 23. Derive an expression for poisson's ratio in terms of elastic constants Y,K and η . (10)
 24. a. Discuss work energy principle. (5)
b. Write a note on Geosynchronous orbit. (5)
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**B.Sc I Semester Degree [NEP] Examination
PHYSICS**

Paper: DSC A1 : Mechanics and Properties of Matter

Time: 2 Hours

Max Marks: 60

Instructions to candidates:

1. Answer all the questions.
2. Draw diagrams wherever necessary.

Section - A

Answer any five (5) questions from the following

5 X 2 = 10M

- Q1.
- a. What is work? Write its SI unit.
 - b. What are the postulates of special theory of relativity?
 - c. Define cohesive force and adhesive force.
 - d. What is perfectly elastic body? Give an example.
 - e. Mention SI unit and dimension of MI
 - f. Define SHM and give an example.
 - g. Mention the Lorentz's transformation equations.

Section - B

Answer any four (4) questions from the following

4 X 5 = 20M

- Q2. What is the relation between torque and angular momentum?
- Q3. State and explain Kepler's Laws of planetary motion.
- Q4. Derive the expression for time period of Torsional Pendulum
- Q5. State and explain Hooke's law.
- Q6. Explain surface tension of a liquid by drop weight method.
- Q7. Derive the expression for equation of continuity.

Section - C

Answer any three (3) questions from the following

3 X 10 = 30M

- Q8. Explain the phenomenon of length contraction and time dilation.
- Q9. Derive an expression for Moment of inertia of a rectangular ring.
- a. About an axis passing its centre and perpendicular to its plane
 - b. About its diameter.
- Q10. Derive the expression for Poisson's ratio in terms elastic constant y , k and η .
- Q11. Derive an expression for coefficient of viscosity by Poiseuille's method.
- Q12. State and explain law of conservation of energy and momentum with explain.



Paper Code : 11130

B.Sc. I Semester Degree Examination (NEP), April 2023

Subject : PHYSICS (Paper - I)

Paper : DSC - I : Mechanics and Properties of Matter

Max. Marks : 60

Time : 2 Hours

- Instructions :**
- 1) Answer **all** Sections.
 - 2) Section - A : Answer any five of the following.
 - Section - B : Answer any four of the following.
 - Section - C : Answer any three of the following.

SECTION - A

(5x2=10)

Answer any five of the following.

1. a) How do you convert one system of units into another ? Give two examples. \hookrightarrow
- ~~b) State work and energy. Give its units and dimensions.~~
- ~~c) What do you mean by length contraction and time dilation ?~~
- d) State Newton's laws of motion. \hookrightarrow
- e) Define centre of mass of a system of two and many particles.
- ~~f) Define elasticity. Give two examples.~~
- g) Define surface tension. Give examples. \perp

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SECTION - B

Answer **any four** of the following.

(4x5=20)

2. What are the various types of principal systems of units ? Discuss with examples about their precision in measurement. \hookrightarrow 5
- ~~3. Explain Lorentz transformation of space and time.~~ 5
4. How do you determine 'g' by using compound pendulum ? 5
- ~~5. State Hook's law. Explain stress-strain diagram.~~ 5
- ~~6. Define load, stress and strain. Write the units and dimensions.~~ 5
7. Explain surface energy and derive the relation between surface tension and surface energy. 5

P.T.O.

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Paper Code : 11130



SECTION - C

(3×10=30)

Answer **any three** of the following.

8. ~~a)~~ Explain concept of work, energy and momentum. Discuss with examples. (4+4+2)
- b) Explain the motion of single stage rocket with neat diagram and discuss about variable mass and conversion of energy.
- c) What are basic postulates of special theory of relativity? (4+4+2)
9. a) Explain single and system of particles dynamics.
- b) Explain moment of inertia of flywheel with neat diagram and derive its expression.
- c) How do you prove that the satellite exhibits circular orbit? (2+4+4)
10. ~~a)~~ State the different types of elastic moduli and establish the equation of relation between elastic constants. γ, μ, ν
- b) Derive the expression for Young's modulus for uniform bending of beam. (6+4)
11. a) State coefficient of viscosity. Give its dimensions in various system of units.
- b) Derive the expression for coefficient of viscosity by Poiseuille's method. (3+7)
12. ~~a)~~ Define Kepler's laws for planetary motion.
- b) What is torsional pendulum? Derive its expression for rigidity modulus.
- c) Establish the relation between pressure and surface tension for a curved surface of liquid. (2+4+4)



Paper Code : 11130

B.Sc. I Semester Degree Examination (NEP), April 2023
Subject : PHYSICS (Paper – I)
Paper : DSC – I : Mechanics and Properties of Matter

Time : 2 Hours

Max. Marks : 60

- Instructions :**
- 1) Answer **all** Sections.
 - 2) Section – **A** : Answer **any five** of the following.
Section – **B** : Answer **any four** of the following.
Section – **C** : Answer **any three** of the following.

SECTION – A

Answer **any five** of the following.

(5x2=10)

1. a) How do you convert one system of units into another ? Give two examples. 2
- ~~b) State work and energy. Give its units and dimensions. 2~~
- ~~c) What do you mean by length contraction and time dilation ? 2~~
- ~~d) State Newton's laws of motion. 2~~
- e) Define centre of mass of a system of two and many particles. 2
- ~~f) Define elasticity. Give two examples. 2~~
- ~~g) Define surface tension. Give examples. 2~~

SECTION – B

Answer **any four** of the following.

(4x5=20)

2. What are the various types of principal systems of units ? Discuss with examples about their precision in measurement. 5
- ~~3. Explain Lorentz transformation of space and time. 5~~
- ~~4. How do you determine 'g' by using compound pendulum ? 5~~
5. State Hook's law. Explain stress-strain diagram. 5
- ~~6. Define load, stress and strain. Write the units and dimensions. 5~~
7. Explain surface energy and derive the relation between surface tension and surface energy. 5

$T = 2\pi \sqrt{\frac{L}{g}}$

$\sigma = \tau$

P.T.O.



SECTION - C

(3×10=30)

Answer **any three** of the following.

- 4
8. a) Explain concept of work, energy and momentum. Discuss with examples. (4)
- b) Explain the motion of single stage rocket with neat diagram and discuss about variable mass and conversion of energy. $m = (M_0 - \alpha t)$ (4+4+2)
- c) What are basic postulates of special theory of relativity? (4+4+2)
- 2
9. a) Explain single and system of particles dynamics. (2)
- b) Explain moment of inertia of flywheel with neat diagram and derive its expression. $I = \frac{M}{n+N} \left[\frac{g h t^2}{8 \pi^2 n} - n r^2 \right]$
- c) How do you prove that the satellite exhibits circular orbit? Kepler's law ← area rule period (2+4+4)
10. a) State the different types of elastic moduli and establish the equation of relation between elastic constants. Y, K, σ $\frac{g}{Y} = \frac{3}{n} + \frac{1}{K}$ (6+4)
- b) Derive the expression for Young's modulus for uniform bending of beam. $\frac{Y}{R} I g$ (6+4)
11. a) State coefficient of viscosity. Give its dimensions in various system of units. (3+7)
- b) Derive the expression for coefficient of viscosity by Poiseuille's method. $\eta = \frac{\pi p r^4}{8 l v}$ (3+7)
12. a) Define Kepler's laws for planetary motion. (2)
- b) What is torsional pendulum? Derive its expression for rigidity modulus. $T = 2\pi \sqrt{\frac{I}{C}}$ (2+4+4)
- c) Establish the relation between pressure and surface tension for a curved surface of liquid. (2+4+4)

Air bubble = $\frac{2T}{R}$

Inside soap bubble = $\frac{4T}{R}$

Liquid drop = $\frac{2T}{R}$

14
18
2

Roll No. _____

[Total No. of Pages 2

SIS-N 060 B-14
B.Sc Ist semester Degree Examination
Physics
(Mechanics & Properties of Matter)
Paper - I
(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to candidates :

Answer all questions from Section A, any FIVE question from Section B and any FOUR questions from Section C

15×1=15

SECTION - A

1. What do you mean by inertial frame of reference ?
2. Define fictitious force.
3. Calculate the linear velocity of a particle moving in a circular path of radius 500cm. The angular velocity of the particle is 25 rad/sec .
4. Write the expression for the centripetal acceleration
5. State the principle of conservation of linear momentum.
6. What is an in elastic collision ? Give an example.
7. On what factors escape velocity depends ?
8. Two balls A and B have radii in the ratio 1:2 . What will be the ratio of their terminal velocities in a liquid.
9. What does the slope of stress versus strain graph gives ?
10. Among solid, liquid and gas which possess the greatest bulk modulus ?
11. Define sphere of influence of a liquid molecule.
12. Write down the following liquids in the order of increasing order of surface tension:
Water, Mercury, Soap solution

[Contd....

SIS-N 060 B-14 /2014

(1)

13. What is critical velocity of a liquid ?
14. What is elastic after effect ?
15. Teflon is coated on the surface of non-sticking pans. Why ?

SECTION - B

5×5=25

16. Show that under Galileian transformation the law of conservation of energy holds good.
17. Derive an expression for radial and transverse components of velocity
18. State the principle of conservation of energy illustrate with examples.
19. State the law of conservation of angular momentum. Show that $\tau = \frac{dl}{dt}$
20. Show that workdone per unit volume = $\frac{1}{2} \times \text{stress} \times \text{strain}$
21. State and prove Stoke's law.
22. Define angle of contact .Obtain the relation between surface tension & surface energy.

SECTION - C

10×4=40

23. a) Deduce an expression for velocity of a single stage rocket 6
 b) An empty rocket weight 5000kg and contains 40,000kg fuel. If exhaust velocity of the fuel is 2 km/sec. Calculate the maximum velocity gained by the rocket. 4
24. Show that Newton's laws of motion holds good in inertial frame of reference 10
25. a) Obtain an expression for excess pressure across the curved surface of liquid. 7
 b) What amount of energy will be liberated if 1000 droplets of water 10^{-8} m in diameter coalesce to form one large spherical drop.(st of water = 72×10^{-3} N/m) 3
26. a) Obtain an expression for co-efficient of viscosity by poisselle's method 7
 b) Calculate the mass of water flowing in 10sec through a horizontal capillary tube ($r=10^{-3}$ m). The tube is filled at the bottom of constant level tank at depth of 1m. Given, length of the tube = 0.3142m, $\eta=10^{-3}$ Nsec m^{-1} 3
27. a) Prove that in centre of mass system the magnitude of velocities of particles remains unaltered in two dimensional elastic collision 6
 b) The escape velocity on the earth is 11.2 km/sec calculate the escape velocity on the planet whose radius half that of the earth and whose mass is one-third that of the earth 4
28. a) With usual notation show that $Y = 3K(1 - 2\sigma)$ 8
 b) Poisson's ratio of a material is 0.38 and rigidity, modulus is 2.87×10^{11} N/m² Find the Young's modulus. 2

B.Sc I Semester Degree [NEP] Examination
Paper: OE-I : Sports Science

Time: 2 hours

Max Marks : 60

Instructions to candidates:

1. Answer all the questions.
2. Draw diagrams wherever necessary.

Section - A

Answer any five (5) questions from the following

5 X 2 = 10M

Q1.

- a. What is fundamental unit? Give examples.
- b. Define Ampere. Write its SI unit.
- c. State Newton's second law of motion. Give an examples.
- d. Define angular and linear momentum.
- e. Define term collision? Write different types of collision.
- f. Name the types of vitamins.
- g. List out different types of physical exercise.

Section - B

Answer any four (4) questions from the following

4 X 5 = 20M

Q2. Explain the physics behind shooting.

Q3. What is centre of mass? Derive expression for centre of a system.

Q4. Distinguish between kinetic and potential energy.

Q5. Explain physics behind indoor game billiards.

Q6. State and explain law of conservation of linear momentum.

Q7A force of 200N acts on body of mass 0.5kg for 2sec. Calculate acceleration of the body and its change in momentum .

Section - C

Answer any three (3) questions from the following

3 X 10 = 30M

Q8. State and explain Newton's law of motion with examples.

Q9. Write note a basic principle conservation of energy including mass and energy.

Q10. Discuss physics behind

(a) Skating

(b) Cycling

Q11. Write note on

(a) Blood pressure and Vitamins

Q12. Explain the followings

a. Electrical Energy.

b. Chemical Energy.

c. Mechanical Energy.

d. Thermal Energy.

e. Nuclear Energy.

B.Sc I Semester Degree [NEP] Examination
Paper: OE-I : Sports Science

Time: 2 hours

Max Marks : 60

Instructions to candidates:

1. Answer *all* the questions.
2. Draw diagrams wherever necessary.

Section - A

Answer any five (5) questions from the following

5 X 2 = 10M

Q1.

- a. What are physical quantities? Give examples.
- b. Define power. Write its SI unit.
- c. State universal law of gravitation.
- d. State Conservation of energy and mass.
- e. Define term collision? Write different types of collision.
- f. Name the source for vitamin **B** and **D**.
- g. What is Archimedes principle and buoyancy?

Section - B

Answer any four (4) questions from the following

4 X 5 = 20M

Q2. Explain the physics behind Discus.

Q3. State and explain Newton's law of gravitation and derive the relation between g and G .

Q4. Distinguish between elastic and inelastic collision.

Q5. Explain physics behind indoor game billiards.

Q6. State and explain law of conservation of linear momentum.

Q7. A body of mass 15kg has a momentum 100Kg m/s, calculate the velocity of a body.

Section - C

Answer any three (3) questions from the following

3 X 10 = 30M

Q8. State and explain Newton's law of motion with examples.

Q9. Derive Einstein equation for mass energy relation. Explain with example.

Q10. (a) What are types of energy? Explain

(b) Derive the expression for Kinetic energy and Potential energy.

Q11. (a) State and explain Newton's laws of gravitation? Derive the relation between g and G .

(b) Find the acceleration produced in a body of mass 3Kg when a force of 18N acts on it.

Q12. Write a note on ~~weight management~~.



1025
1005
1039
1033
Paper Code : 11130

1009
B.Sc. I Semester Degree Examination (NEP), April 2022
Subject : PHYSICS
Paper : Mechanics and Properties of Matter
Paper : DSC – 1
76217

Time : 2 Hours

Max. Marks : 60

- Instructions :** 1) Answer **all** Sections.
2) Draw diagrams **wherever** necessary.

SECTION – A

Answer **any five** of the following :

(5×2=10)

1. a) Define the terms i) fundamental unit ii) strain.
b) What is rigid body ? Give an example.
c) What is radius of gyration ? Mention its SI units.
d) Define normal stress and tangential stress.
e) What is viscosity ? Write its SI units.
f) Define streamline flow and turbulent flow.
g) Write the Lorentz transformation equations.

SECTION – B

Answer **any four** of the following :

(4×5=20)

2. State and explain the law of conservation of momentum of a particle.
3. Derive the expression for time dilation.
4. Write a note on Global Positioning System (GPS).
5. Explain stress-strain relation with a neat diagram.
6. What is surface tension ? Explain it on the basis of molecular theory.
7. Derive the expression for equation of continuity.

Paper Code : 11130



SECTION - C

Answer **any three** of the following :

(3×10=30)

8. a) By velocity addition theorem, show that velocity of light is invariant in relativity.
b) What is the speed of a particle moving, if the mass is equal to four times its rest mass ?
9. Derive an expression for moment of inertia of a rectangular lamina
 - a) About an axis through its centre and parallel to one of its sides.
 - b) About an axis passing through its centre and perpendicular to its plane.
10. Write a note on I-section girders.
11. Derive an expression for coefficient of viscosity by Poiseuille's method.
12. a) A sphere of mass 20 kg is attracted by another sphere of mass 145 kg. When their centres are separated by a distance 0.22 m with a force equal to the weight of 0.25 mg. Calculate the gravitational constant.
b) Write a note on cantilever.

SIS- N 056 B-18
B.Sc. Ist Semester (CBCS) Degree Examination
PHYSICS
(Mechanics)
Paper - DSC-I-PHY 104T
(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

- 1) Answer all the questions.
- 2) Draw diagrams wherever necessary.

L Answer any **TEN** of the following in two or three sentences.

(10×2=20)

1. Distinguish between inertial and non- inertial frames of reference.
2. What is an elastic collision. Give an example.
3. Connect the relation between angular momentum and angular velocity.
4. Define linear and angular velocity.
5. Define stress. Write it's dimensional formula.
6. What is orbital and escape velocity of satellite?
7. State Kepler's third law.
8. Mention the postulates of special theory of relativity.
9. State and explain Hook's law.
10. Define SHM. Write differential form of SHM.
11. State perpendicular axis theorem.
12. A rod of one meter long is moving along its length with a velocity of $0.6c$. Calculate its length as it appears to an observer
 - a) On the earth
 - b) Moving with rod itself.

(4×5=20)

II. Answer any **FOUR** of the following.

- 13. What is center of mass? Derive expression for center of mass of a system.
- 14. Derive an expression for velocity of single stage rocket.
- 15. Derive differential form of simple harmonic motion equation.
- 16. Derive an expression for M.I. of thin rod about an axis through its center and perpendicular to its length.
- 17. Explain Kepler's laws of planetary motion.
- 18. What is Torsional pendulum. Derive an expression for time period of Torsional pendulum.

III. Answer any **FOUR** of the following.

(4×10=40)

- 19. a. Write a note on Galilean transformation equation. (5)
- b. Derive an expression for fictitious force. (5)
- 20. Derive Lorentz transformation equation. (10)
- 21. a. State and explain Newton's law of gravitation. (5)
- b. Write a note on I-section girders. (5)
- 22. a. Show that in an elastic collision relative velocities of two particles before collision is equal to after collision. (5)
- b. Derive an expression for M.I. of solid cylinder about an axis passing through its center and perpendicular to its own axis of cylindrical symmetry? (5)
- 23. Derive an expression for poisson's ratio in terms of elastic constants Y, K and η . (10)
- 24. a. Discuss work energy principle. (5)
- b. Write a note on Geosynchronous orbit. (5)

Roll No. _____

[Total No. of Pages : 2

SIS-N-056 B-19
B.Sc. I Semester (CBCS) Degree Examination
PHYSICS
Mechanics-I
Paper - DSC I - PHY 104
(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

- 1) Answer all the questions.
- 2) Draw diagrams wherever necessary.

I. Answer any **TEN** of following in two or three sentences.

(10×2=20)

- 1) Which physical quantities are invariant under Galilean transformation?
- 2) Define Collision. Mention their types.
- 3) Give the relation between Torque & Angular momentum.
- 4) What is fictitious force?
- 5) Define compound pendulum.
- 6) Define elasticity & perfectly elastic body.
- 7) What is Orbital velocity?
- 8) What are transformation equations?
- 9) Define stress. Write the types of stress.
- 10) What is Lorentz transformation equations?
- 11) Write the types of SHM?
- 12) Define periodic motion.

II. Answer any **Four** of the following:

(4×5=20)

- 13) Derive an expression for velocity and linear momentum of center of mass of system of particles.
- 14) Write a note on Geostationary satellite?
- 15) Explain Young's modulus of elasticity.
- 16) Write a note on Damped oscillations.
- 17) Derive an expression for orbital velocity of a satellite.
- 18) Explain moment of inertia of a body. What is its physical significance?

III. Answer any **Four** of the following:

(4/16)

- 19) a. Show that in Galilean transformation the distance & acceleration are invariant. (5)
- b. Explain Newton's laws of motion. (5)
- 20) a. Describe the principle of satellite launching. (5)
- b. Write a note on GPS. (5)
- 21) a. Derive the expression for work done in twisting wire. (5)
- b. Derive the expression for Poisson's ratio. (5)
- 22) a. Show that in an inelastic collision of center of mass frame of reference, the velocity is Zero? (5)
- b. Explain the conservation of linear momentum. (5)
- 23) a. Derive the differential equation of SHM. (5)
- b. Write a note on length contraction. (5)
- 24) a. Derive the expression of time period of a compound pendulum. (5)
- b. Derive the expression for moment of inertia of a circular disc about an axis through its centre & perpendicular to its plane. (5)

Roll No. _____

[Total No. of Pages : 2

SIS-N-056 A-21
B.Sc. I Semester (CBCS) Degree Examination
PHYSICS
Mechanics
Paper - DSC 1 - PHY 104
(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

1. Answer **all** the questions.
2. Draw diagrams wherever necessary.

SECTION-A

- I. Answer any **ten** of the following in two or three sentences. (10×2=20)
1. Name the physical quantities which are invariant under Galilean transformation.
 2. What is inelastic collision. Give an example.
 3. Give the relation between Torque and angular momentum.
 4. Define moment of Inertia. Give its SI unit.
 5. Define orbital and escape velocity of satellite.
 6. State Kepler's second law.
 7. State and prove Hook's law.
 8. Define stress. Mention types of stress.
 9. Mention characteristics of SHM.
 10. State perpendicular axes theorem.
 11. Mention the postulates of special theory of relativity.
 12. What are transformation equations?

SECTION-B

- II. Answer any **four** of the following. (4×5=20)
13. Derive an expression for velocity and linear momentum of centre of mass of system of particles. (5)
 14. State and prove work - energy theorem. (5)
 15. State and prove parallel axes theorem. (5)
 16. Derive an expression for M.I. of thin rod about an axis through its centre and perpendicular to its length. (5)
 17. Explain Kepler's laws of planetary motion. (5)
 18. What is Torsional pendulum? Derive an expression for time period of it. (5)

SECTION-C

- III. Answer any **four** of the following. (4×10=40)
19. a) Write a note on Galilean transformation equation. (5)
b) Derive an expression for the angular momentum and Torque. (5)
 20. a) Derive an expression for fictitious force. (5)
b) Derive the differential equation of SHM. (5)
 21. a) Derive an expression for moment of inertia of a hollow cylinder about its own axis. (7)
b) Calculate the MI of a disc of mass 2 kg and radius $20 \times 10^{-2} \text{m}$ about an axis perpendicular to the disc and passing through its centre. (3)
 22. a) Write a note on GPS. (5)
b) Write a note on Weightlessness. (5)
 23. Derive an expression for relation connecting between elastic constant (i.e. Y, k and n). (10)
 24. Derive Lorentz transformation equations. (10)
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Roll No. _____

[Total No. of Pages : 2

SIS-N-056 A-21
B.Sc. I Semester (CBCS) Degree Examination
PHYSICS
Mechanics
Paper - DSC 1 - PHY 104
(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

1. Answer **all** the questions.
2. Draw diagrams wherever necessary.

SECTION-A

- I.** Answer any **ten** of the following in two or three sentences. **(10×2=20)**
1. Name the physical quantities which are invariant under Galilean transformation.
 2. What is inelastic collision. Give an example.
 3. Give the relation between Torque and angular momentum.
 4. Define moment of Inertia. Give its SI unit.
 5. Define orbital and escape velocity of satellite.
 6. State Kepler's second law.
 7. State and prove Hook's law.
 8. Define stress. Mention types of stress.
 9. Mention characteristics of SHM.
 10. State perpendicular axes theorem.
 11. Mention the postulates of special theory of relativity.
 12. What are transformation equations?

SIS-N-056 A-21/2021

(1)

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SECTION-B

II. Answer any **four** of the following.

- (4×5=20)
13. Derive an expression for velocity and linear momentum of centre of mass of system of particles. (5)
 14. State and prove work - energy theorem. (5)
 15. State and prove parallel axes theorem. (5)
 16. Derive an expression for M.I. of thin rod about an axis through its centre and perpendicular to its length. (5)
 17. Explain Kepler's laws of planetary motion. (5)
 18. What is Torsional pendulum? Derive an expression for time period of it. (5)

SECTION-C

III. Answer any **four** of the following.

(4×10=40)

19. a) Write a note on Galilean transformation equation. (5)
- b) Derive an expression for the angular momentum and Torque. (5)
20. a) Derive an expression for fictitious force. (5)
- b) Derive the differential equation of SHM. (5)
21. a) Derive an expression for moment of inertia of a hollow cylinder about its own axis. (7)
- b) Calculate the MI of a disc of mass 2 kg and radius $20 \times 10^{-2} \text{m}$ about an axis perpendicular to the disc and passing through its centre. (3)
22. a) Write a note on GPS. (5)
- b) Write a note on Weightlessness. (5)
23. Derive an expression for relation connecting between elastic constant (i.e. Y , k and n). (10)
24. Derive Lorentz transformation equations. (10)

Paper Code : 11130

B.Sc. I Semester Degree Examination (NEP), April 2022

Subject : PHYSICS

Paper : Mechanics and Properties of Matter

Paper : DSC – 1

Time : 2 Hours

Max. Marks : 60

- Instructions :** 1) Answer **all** Sections.
2) Draw diagrams **wherever** necessary.

SECTION – A

Answer **any five** of the following :

(5×2=10)

1. a) Define the terms i) fundamental unit ii) strain.
- b) What is rigid body ? Give an example.
- c) What is radius of gyration ? Mention its SI units.
- d) Define normal stress and tangential stress.
- e) What is viscosity ? Write its SI units.
- f) Define streamline flow and turbulent flow.
- g) Write the Lorentz transformation equations.

SECTION – B

Answer **any four** of the following :

(4×5=20)

2. State and explain the law of conservation of momentum of a particle.
3. Derive the expression for time dilation.
4. Write a note on Global Positioning System (GPS).
5. Explain stress-strain relation with a neat diagram.
6. What is surface tension ? Explain it on the basis of molecular theory.
7. Derive the expression for equation of continuity.

P.T.O.

Paper Code : 11130

SECTION – C

(3×10=30)

Answer **any three** of the following :

8. a) By velocity addition theorem, show that velocity of light is invariant in relativity.
b) What is the speed of a particle moving, if the mass is equal to four times its rest mass ?
9. Derive an expression for moment of inertia of a rectangular lamina
 - a) About an axis through its centre and parallel to one of its sides.
 - b) About an axis passing through its centre and perpendicular to its plane.
10. Write a note on I-section girders.
11. Derive an expression for coefficient of viscosity by Poiseuille's method.
12. a) A sphere of mass 20 kg is attracted by another sphere of mass 145 kg. When their centres are separated by a distance 0.22 m with a force equal to the weight of 0.25 mg. Calculate the gravitational constant.
b) Write a note on cantilever.

Paper Code : 95512

I Semester Degree Examination (NEP), April 2022
Subject : PHYSICS
Paper : Sports Science
Paper - OE

Max. Marks : 60

Time : 2 Hours

Instructions : 1) Answer **all** the Sections.
2) Draw diagram **wherever** necessary.

SECTION - A

(5×2=10)

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

1. a) What are physical quantities ? Give an example.
- b) Differentiate between mass and weight.
- c) What is inelastic collision ? Give an example.
- d) What do you mean by a unit ?
- e) Write any two use of fat.
- f) How do you measure blood pressure of a human being ?
- g) At what angle range of projectile is maximum ?

SECTION - B

(4×5=20)

Answer **any four** of the following questions.

2. Discuss applications of Newton's law's of motion.
3. Explain principle of physics behind shooting.
4. Explain with an example, how kinetic energy is converted into potential energy.
5. Discuss the problems due to the deficiency of various Vitamins.
6. Discuss the applications of centre of mass in cycling and skating.
7. Write a note on physics behind Javelin throw.

Paper Code : 95512



SECTION - C

Answer **any three** of the following questions.

(3×10=30)

8. a) Write the differences between precision and significant figure.
b) Write a note on standards of measurement of time, length and mass.
9. Explain Newton's law's of motion with their corresponding derivations.
10. Discuss physics behind
 - i) Carom
 - ii) Racing.
11. Explain how jogging and running help maintain good health.
12. Discuss any ten best practices for health line.



Paper Code : 95512

B.A./B.Com./B.B.A./B.Sc./B.C.A. I Semester Degree
Examination (NEP), April 2023
Paper : OE – 1 : SPORTS SCIENCE (Open Elective)

Time : 2 Hours

Max. Marks : 60

- Instructions :** 1) Answer **all** Sections .
2) Section – **A** : Answer **any five** of the following.
Section – **B** : Answer **any four** of the following.
Section – **C** : Answer **any three** of the following.

SECTION – A

Answer **any five** of the following :

(5×2=10)

1. a) Mention various physical quantities applicable in sports activities. 2
- b) State Newton's first law of motion. Give its applications. 2
- c) Write the physical significance of centre of mass in cycling. 2
- d) Why the person floats on water while swimming ? Mention principle involved. 2
- e) Distinguish between 'g' and 'G' for gravitation. 2
- f) How do you know the fat and blood pressure are interdependent ? 2
- g) Mention the importance of physical exercises for healthy personality. 2

SECTION – B

Answer **any four** of the following :

(4×5=20)

2. State and explain Newton's laws of motion. 5
3. Compare the physics principles, theory involved in shooting, Javelin throw and discuss throw. 5
4. Compare elastic and inelastic collisions. Mention its applicability in sports. 5
5. State and explain Newton's law of gravitation. Discuss its applicability in sports. 5

P.T.O.

Paper Code : 95512



6. What are the different health issues caused due to various vitamins ? List out and discuss with examples. 5
7. List out the best physical exercises for physical fitness. Discuss the physics principle involved in each. 5

SECTION – C

Answer **any three** of the following : (3×10=30)

8. Explain standards and units of time, length and mass. Discuss about precision and significant figures with examples. 10
9. State and explain linear and angular momentum. Discuss with examples, in which sports these concepts occurs. 10
10. State and explain Archimedes principle. Discuss its physical significance in swimming. 10
11. What are the various proteins and vitamins useful for human being health and discuss its consequences in sports activities. 10
12. a) What are the different forms of energy ? Give examples.
b) Explain conservation of mass-energy. (5+5)