CE122 (R20)

B.TECH. DEGREE EXAMINATION, SEPTEMBER-2024

Semester II [First Year] (Supplementary)

ENGINEERING PHYSICS

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   - (a) Mention examples of central forces.   CO1
   - (b) Define gravitational potential energy.   CO1
   - (c) Define Newton's law of inertia.   CO1
   - (d) State critical damping oscillations.   CO2
   - (e) Mention different kinds of damping oscillations.   CO2
   - (f) Mention any two properties of a rigid body.   CO2
   - (g) Mention any two examples of resonance.   CO3
   - (h) State law of conservation of angular momentum.   CO3
   - (i) Define a tensor quantity.   CO3
   - (j) State Hooke's law.   CO4
   - (k) State rolling friction.   CO4
   - (l) State elasticity.   CO4
   - (m) Mention difference between cartesian and spherical coordinate system.   CO4
   - (n) State Centrifugal force with expression.   CO4

UNIT – I

2. (a) Show that $F = -$ grad (V) and mention some suitable examples.   (7M)   CO1
   (b) Make a short note on equipotential surfaces with properties.   (7M)   CO1

(OR)

3. (a) Explain Centripetal and Coriolis forces with examples. (7M) CO1
   (b) Deduce an expression for Central force and mention its properties. (7M) CO1

UNIT – II

4. (a) Explain under damping oscillations with its condition. (7M) CO2
   (b) Define harmonic oscillator and also explain power dissipations in a damped harmonic oscillator. (7M) CO2

(OR)

5. (a) Make a short notes on (7M) CO2
      (i) Quality factor
      (ii) Forced oscillations
   (b) Distinguish the Over, Critical and Under damped oscillations with its conditions. (7M) CO2

UNIT – III

6. (a) Explain and deduce Euler's laws of motion. (7M) CO3
   (b) Derive angular momentum of a body rotating about a fixed axis and mention its examples. (7M) CO3

(OR)

7. (a) Define moment of inertia and explain inertia theorem. (7M) CO3
   (b) Describe the three-dimensional rigid body motion with neat diagram. (7M) CO3

UNIT – IV

8. (a) Describe Torsion pendulum and deduce expression for rigidity modulus. (7M) CO4

(b) Explain different types of bending with diagrams and examples. (7M) CO4

(OR)

9. (a) State friction and explain different types of frictions with diagrams. (7M) CO4

(b) Describe three kinds of moduli and deduce relation between them. (7M) CO4

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B.TECH. DEGREE EXAMINATION, JULY-2024

Semester II [First Year] (Regular)

ENGINEERING PHYSICS

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

(a)	State Scalar and Vector quantities.	CO1
(b)	Define conservative force with examples.	CO1
(c)	State quality factor.	CO1
(d)	Define Resonance.	CO2
(e)	State angular momentum.	CO2
(f)	Define Moment of inertia.	CO2
(g)	Mention types of Frictions with examples.	CO3
(h)	State Poisson's ratio.	CO3
(i)	Define static friction.	CO3
(j)	State Rigid body.	CO4
(k)	Define harmonic oscillator.	CO4
(l)	Define centripetal force.	CO4
(m)	Define rigidity of modulus (n).	CO4
(n)	Define forced oscillations.	CO4

UNIT – I

2. (a) State Newton's second law. Describe the particle motion using Newton's laws of motion.   (7M)   CO1

   (b) Describe the Cartesian and spherical coordinate system.   (7M)   CO1

(OR)

3. (a) Explain Conservative and non-conservative forces with examples.   (7M)   CO1

1

(b) Explain construction and working of Foucault's pendulum. (7M) CO1

UNIT – II

4. (a) State Damped harmonic oscillator and deduce its equation. (7M) CO2
   (b) Give a short note on Over and Critical damping oscillations. (7M) CO2

(OR)

5. (a) Explain the energy dissipations in a damped harmonic oscillator. (7M) CO2
   (b) Explain Under damping oscillations (7M) CO2

UNIT – III

6. (a) Make a short note on translational and rotational motion of a rigid body. (7M) CO3
   (b) Deduce an expression for moment of inertia. (7M) CO3

(OR)

7. (a) Explain Euler's laws of motion. (7M) CO3
   (b) Describe the Moment of inertia tensor in matrix form. (7M) CO3

UNIT – IV

8. (a) Explain different types of frictions with limitations. (7M) CO4
   (b) Make a short note on Plasticity and Elasticity. (7M) CO4

(OR)

9. (a) Elucidate Stress and Strain concepts. (7M) CO4
   (b) Explain Uniform and Non-uniform bending with examples. (7M) CO4

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CE122 (R20)

B.TECH. DEGREE EXAMINATION, MAY-2024

Semester II [First Year] (Supplementary)

ENGINEERING PHYSICS

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
    (a) State the law of conservation of angular momentum.   CO1
    (b) Define central forces.   CO1
    (c) Compare conservative and non-conservative force.   CO1
    (d) Define forced oscillations.   CO2
    (e) Recite harmonic oscillators.   CO2
    (f) What is power dissipation in a damped harmonic
         oscillator?   CO2
    (g) Find the angular velocity of a body which has
         completed 60 rotations per minute.   CO3
    (h) Define rigid body.   CO3
    (i) Recall moment of inertia.   CO3
    (j) State parallel axes theorem of moment of inertia.   CO4
    (k) Summarize the law of limiting friction.   CO4
    (l) State Hooke's law.   CO4
    (m) Tell the three modulus of elasticity.   CO4
    (n) What is meant by bending of beams?   CO4

UNIT – I

2. (a) State Newton's law of motion. How it is
        useful in describing the motion of a particle.   (10M) CO1
   (b) Show the relation between cartesian
        coordinates and spherical polar coordinates.   (4M) CO1

(OR)

3. (a) What is coriolis force? (2M) CO1
   (b) How a Foucault pendulum is used to detect the rotation of the earth about its axis. (12M) CO1

UNIT – II

4. (a) Recall damped harmonic oscillator. (2M) CO2
   (b) Formulate a differential equation for a damped harmonic motion and hence arrive at its solution. (12M) CO2

(OR)

5. Develop the differential equation of a particle subjected to forced vibrations and hence deduce a solution for it. CO2

UNIT – III

6. (a) State and prove perpendicular axes theorem. (10M) CO3
   (b) Discuss Euler's laws of motion. (4M) CO3

(OR)

7. (a) Apply the angular momentum of a particle to derive moment of inertia tensor. (10M) CO3
   (b) List any four properties of moment of inertia tensor. (4M) CO3

UNIT – IV

8. (a) Make use of stress-strain curve to discuss the behaviour of a material under loading. (10M) CO4
   (b) Define the terms: elasticity and plasticity. (4M) CO4

(OR)

9. (a) What is a torsional pendulum? (2M) CO4
   (b) Derive an expression for the rigidity modulus of a given wire. (12M) CO4

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B.TECH. DEGREE EXAMINATION, NOVEMBER-2023
Semester II [First Year] (Supplementary)
ENGINEERING PHYSICS

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) Identify the fundamental forces in nature.   CO1
   (b) Identify the symmetry operations under Newton's
       laws are invariant.   CO1
   (c) What are central forces?   CO1
   (d) Examine the equipotential surfaces?   CO1
   (e) What is meant by simple harmonic motion?   CO2
   (f) Interpret the relaxation time in damped harmonic
       oscillator.   CO2
   (g) What is meant by logarithmic decrement in damped
       harmonic oscillator?   CO2
   (h) What is a rigid body?   CO3
   (i) Discover the use of parallel axis theorem.   CO3
   (j) Define angular momentum of a rotating body.   CO3
   (k) Define longitudinal stress.   CO4
   (l) Identify the meaning of bending moment.   CO4
   (m) State Hooke's Law.   CO4
   (n) Define Poisson's ratio.   CO4

UNIT – I

2. (a) Differentiate conservative from non-
       conservative forces?   (7M) CO1
   (b) Show that for conservative force, F = -Grad U.
       (U = potential energy).   (7M) CO1

(OR)

3. (a) What are plane polar coordinates? Develop an expression for velocity and acceleration of a particle in plane polar coordinates. (7M) CO1
   (b) Analyse cylindrical and spherical coordinates. (7M) CO1

UNIT – II

4. (a) Formulate the differential equation of damped harmonic oscillator and deduce its solution (7M) CO2
   (b) Analyse damped oscillations in under-damped condition. (7M) CO2

(OR)

5. (a) Construct the differential equation for forced harmonic oscillator and obtain its solution. (7M) CO2
   (b) The differential equation for a certain system is $\frac{d^2x}{dt^2} + 2b\frac{dx}{dt} + \omega^2x = 0$. If $\omega \gg b$, evaluate the time in which amplitude falls to $1/e$ times of its initial value. (7M) CO2

UNIT – III

6. (a) Define angular momentum a rotating body. Show that $\tau = I\alpha$ for rigid body undergoing rotational motion. (7M) CO3
   (b) Develop the Euler's equations of rotational motion for a rigid body fixed at one end. (7M) CO3

(OR)

7. (a) Create the matrix form of moment of inertia tensor. (7M) CO3
   (b) Analyse the properties of moment of inertia tensor. (7M) CO3

UNIT – IV

8. (a) State laws of friction. Explain angle of limiting friction and angle of repose.   (7M) CO4
   (b) Explain the stress-strain diagram for an elastic body.   (7M) CO4

(OR)

9. (a) Explain the three moduli of elasticity.   (7M) CO4
   (b) Analyse the method for determining the Young's modulus of the material of the beam by uniform bending.   (7M) CO4

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Hall Ticket Number:

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B.TECH. DEGREE EXAMINATION, JULY-2023
Semester II [First Year] (Regular & Supplementary)
ENGINEERING PHYSICS
Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) Specify Cartesian coordinate system and give its importance. CO1
   (b) Express the relation between angular momentum and linear momentum. CO1
   (c) Why soldiers do not march on bridges? Explain phenomenon in it? CO2
   (d) Write expression for quality factor of a mechanical oscillator. CO2
   (e) What are damped harmonic oscillations? Give one example. CO2
   (f) State parallel axis theorem. CO3
   (g) State Euler's first law of motion. CO3
   (h) Compare the kinetic energy of a body in linear and rotational motion. CO3
   (i) If mass of body is increased by 3 times, then what happens to coefficient of friction? CO4
   (j) State the units and dimensions of modulus of elasticity. CO4
   (k) What are brittle materials? Give two examples. CO4
   (l) Define Poisson's ratio. CO4
   (m) What is Coriolis force? CO1
   (n) Differentiate forced vibrations and free vibrations. CO2

2. (a) What are conservative and non-conservative forces and show that F = –grad(U) for conservative forces. (7M) CO1

   (b) Describe Foucault pendulum and give its importance. (7M) CO1

(OR)

3. (a) Write a short note on conservation of angular momentum. (6M) CO1

   (b) Interpret various fundamental forces in nature. (8M) CO1

UNIT – II

4. (a) Outline the theory of damped harmonic oscillations clearly by analyzing under damped, critically damped and over damped cases. (10M) CO2

   (b) A quality factor of sonometer wire is 2000. On plucking it makes 240 vibrations per second. Calculate the time in which amplitude decreases to half of its initial value. (4M) CO2

(OR)

5. (a) Explain resonance in detail and write a note on its importance. (6M) CO2

   (b) Discuss the energy decay in damped harmonic oscillator? Write about power dissipation? (8M) CO2

UNIT – III

6. (a) What is rigid body and brief the three-dimensional rigid body motion. (7M) CO3

   (b) State and derive perpendicular axis theorem. (7M) CO3

(OR)

7. (a) Analyze the properties of moment of inertia tensor. (8M) CO3
   (b) State and explain Euler's second law of motion and give its importance. (6M) CO3

UNIT – IV

8. (a) Elaborate the various moduli of elasticity and write their importance. (6M) CO4
   (b) State and explain Hook's law? Describe the stress-strain diagram for an elastic body. (8M) CO4

(OR)

9. (a) What is limiting friction and state laws of limiting friction? (7M) CO4
   (b) Describe the concept of stress and strain at a point with example. (7M) CO4

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B.TECH. DEGREE EXAMINATION, JANUARY-2023

Semester II [First Year] (Supplementary)

ENGINEERING PHYSICS

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) Define conservative forces and give example.   CO1
   (b) Why Foucault pendulum does not work at equator.   CO1
   (c) A mechanical oscillator is changed from air to water.
       What happens to tis Quality factor?   CO2
   (d) What is resonance? Give one example for it.   CO2
   (e) Write expression for power dissipation in damped
       harmonic oscillations.   CO2
   (f) Obtain the angular displacement of seconds hand in
       clock in 45 seconds.   CO3
   (g) Express any two equations of motion for a particle
       rotating about fixed axis.   CO3
   (h) State perpendicular axis theorem.   CO3
   (i) What it is Euler's second law of motion?   CO3
   (j) State the units and dimensions of modulus of rigidity. CO4
   (k) Mention the theoretical and practical limits of
       Poisson's ratio.   CO4
   (l) What are Ductile materials? Give two examples?   CO4
   (m) What are symmetry operations?   CO1
   (n) Differentiate harmonic and damped harmonic
       oscillations.   CO2

UNIT – I

2. (a) Explain cylindrical coordinate system and
       obtain expression for acceleration of particle in
       this system.   (8M) CO1
   (b) Describe central forces in detail with example. (6M) CO1

3. (a) What is Coriolis force? Derive expression for it.   (7M) CO1
    (b) Elaborate Newton laws of motion in describing
         particle motion.   (7M) CO1

UNIT – II

4. (a) What are damped oscillations? Solve
         differential equation of a damped harmonic
         oscillator and discuss the case when it is under
         damped and critically damped?   (9M) CO2
    (b) Formulate the equation for energy dissipation in
         oscillator.   (5M) CO2

5. (a) Obtain differential equation for forced harmonic
         oscillator and deduce its solution.   (7M) CO2
    (b) Show that for simple harmonic oscillator,
         mechanical energy remains constant and is
         proportional to square of amplitude.   (7M) CO2

UNIT – III

6. (a) State and explain parallel axis theorem in detail. (8M) CO3
    (b) Write a short note on moment of inertia tensor.   (6M) CO3

7. (a) Define angular momentum and derive
         expression for it for a body rotating in fixed
         axis.   (7M) CO3
    (b) What is rigid body and describe its motion in
         translational and rotational motion in detail.   (7M) CO3

UNIT – IV

8. (a) Describe the phenomenon of plasticity and elasticity with examples. (7M) CO4
   (b) State and explain Hook's law? Describe the stress-strain curve for a wire under increasing load with neat diagram. (7M) CO4

(OR)

9. (a) What are various methods to decrease friction? Find the normal force applied on a body having a coefficient of friction of 0.5 and limiting friction is 50 N. (7M) CO4
   (b) Discuss the torsional oscillations and derive expression for rigidity modulus of wire using torsional pendulum. (7M) CO4

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B.TECH. DEGREE EXAMINATION, OCTOBER-2022

Semester II [First Year] (Regular & Supplementary)

ENGINEERING PHYSICS

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) Summarize Newton's laws of motion.   CO1
   (b) Outline one application of Foucault pendulum.   CO1
   (c) List all forces available in nature.   CO1
   (d) Distinguish free and forced oscillations.   CO2
   (e) Recite harmonic oscillators.   CO2
   (f) What is energy dissipation in a damped harmonic
       oscillator?   CO2
   (g) Find the angular velocity of a body which has
       completed 60 rotations per minute.   CO3
   (h) Recall expression for Euler's equation of motion.   CO3
   (i) Write a formula for moment of inertia tensor.   CO3
   (j) Tell parallel axes theorem of moment of inertia.   CO3
   (k) Summarize the law of limiting friction.   CO4
   (l) What is Poisson's ratio?   CO4
   (m) Define the rigidity modulus of a material.   CO4
   (n) Show stress-strain curve for a brittle material.   CO4

UNIT – I

2. (a) Distinguish conservative and non-conservative
       force. Derive relation between a conservative
       force and a potential energy function.   (8M) CO1
   (b) Outline centripetal and coriolis force.   (6M) CO1

(OR)

3. Formulate expressions for velocity and acceleration of a particle in planar polar coordinates. CO1

UNIT – II

4. (a) Recall the differential equation of a damped harmonic oscillator. (2M) CO2
   (b) Explain the conditions under which the oscillations are said to be under damped, over damped and critically damped. (12M) CO2

(OR)

5. Develop the differential equation of a particle subjected to forced vibrations and hence deduce a solution for it. CO2

UNIT – III

6. (a) Develop the matrix form of inertial tensor. (10M) CO3
   (b) Summarize the properties of inertial tensor. (4M) CO3

(OR)

7. (a) Formulate the expression for the angular momentum of a body rotating about a fixed axis. (7M) CO3
   (b) State and prove the perpendicular axes theorem. (7M) CO3

UNIT – IV

8. (a) Make use of stress-strain curve to discuss the behaviour of a material under loading. (10M) CO4
   (b) Define the terms elasticity and plasticity. (4M) CO4

(OR)

9. (a) Discuss bending of beams and derive an expression for it. (10M) CO4

(b) Compare uniform and non-uniform bending.   (4M)   CO4

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CE122(R20)

B.TECH. DEGREE EXAMINATION, FEBRUARY-2022

Semester II [First Year] (Supplementary)

ENGINEERING PHYSICS

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

   (a) What is a vector field?   CO1

   (b) What are symmetry operations?   CO1

   (c) What is meant by equipotential surface?   CO1

   (d) Explain the significance of Foucault's pendulum.   CO2

   (e) What is simple harmonic motion?   CO2

   (f) What is meant by logarithmic decrement in damped
       harmonic oscillator?   CO2

   (g) What is meant by restoring force?   CO2

   (h) Define radian.   CO3

   (i) Differentiate translational and rotational motions.   CO3

   (j) State the parallel axis theorem.   CO3

   (k) What is meant by bending moment?   CO3

   (l) What is meant by coefficient of friction?   CO4

   (m) Compare plasticity and elasticity.   CO4

   (n) Define Poisson's ratio.   CO4

UNIT – I

2. (a) Discuss the types of fundamental forces in
       nature.   (7M) CO1

   (b) Differentiate the conservative and non-
       conservative forces? Show that for conservative
       force, $F = -$ Grad U. (U = potential energy).   (7M) CO1

(OR)

3. (a) Derive the expressions for velocity and acceleration of a particle in plane polar coordinates. (7M) CO1

   (b) Derive the expression for centripetal force. What is its significance? (7M) CO1

UNIT – II

4. (a) Obtain the equation of motion for damped harmonic oscillator and find out its solution. (7M) CO2

   (b) Discuss various damping conditions. (7M) CO2

(OR)

5. (a) Set up the equation of motion for forced harmonic oscillator and obtain its solution. (7M) CO2

   (b) Discuss the amplitude resonance of a forced harmonic oscillator. (7M) CO2

UNIT – III

6. (a) Define angular momentum. Derive an expression for angular momentum of a body rotating about a fixed axis. (7M) CO3

   (b) State and prove perpendicular axis theorem. (7M) CO3

(OR)

7. (a) What is Euler's laws of motion? Describe the three-dimensional rigid body motion. (7M) CO3

   (b) Obtain the expression for angular velocity of a rotating rigid body. (7M) CO3

UNIT – IV

8. (a) Explain the law of limiting friction.   (7M) CO4
   (b) Discuss the Stress-Strain diagram for an elastic body.   (7M) CO4

(OR)

9. (a) Discuss the three moduli of elasticity.   (7M) CO4
   (b) Describe the determination of rigidity modulus of the material of a wire.   (7M) CO4

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CE122(R20)

B.TECH. DEGREE EXAMINATION, OCTOBER-2021

Semester II [First Year] (Regular)

ENGINEERING PHYSICS

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
    (a) What are symmetry operations?   CO1
    (b) Mention the forces in nature.   CO1
    (c) What is meant by equipotential surfaces?   CO1
    (d) Explain the significance of Foucault's pendulum.   CO2
    (e) What is simple harmonic motion?   CO2
    (f) Define relaxation time in damped harmonic oscillator. CO2
    (g) What is meant by quality factor?   CO3
    (h) Define radian.   CO3
    (i) Differentiate translational and rotational motions.   CO3
    (j) State the parallel axis theorem.   CO3
    (k) State Hooke's law.   CO4
    (l) What is meant by coefficient of friction?   CO4
    (m) Compare plasticity and elasticity.   CO4
    (n) Define Poisson's ratio.   CO4

UNIT – I

2. (a) Discuss the transformation of scalars and
         vectors under rotation.   (7M) CO1
    (b) Describe the Newton's laws and its
         completeness in describing particle motion.   (7M) CO1

(OR)

3. (a) Differentiate conservative and non-conservative forces. Define central force, giving examples. (7M) CO1
   (b) Derive the expression for Coriolis force. Explain its significance. (7M) CO1

UNIT – II

4. (a) Formulate the equation of motion for damped harmonic oscillator and find out its solution. (7M) CO2
   (b) Discuss various damping conditions of a damped harmonic oscillator. (7M) CO2

(OR)

5. (a) Set up the equation of motion for forced harmonic oscillator and obtain its solution. (7M) CO2
   (b) What is meant by resonance? Discuss the concept of amplitude resonance. (7M) CO2

UNIT – III

6. (a) Define angular momentum. Derive an expression for angular momentum of a body rotating about a fixed axis. (7M) CO3
   (b) State and prove perpendicular axis theorem. (7M) CO3

(OR)

7. (a) What are Euler's laws of motion? Describe the three-dimensional rigid body motion. (7M) CO3
   (b) Obtain the expression for angular velocity of a rotating rigid body. (7M) CO3

UNIT – IV

8. (a) Explain the concept of stress and strain at a point. (7M) CO4
   (b) Discuss the Stress-Strain diagram for an elastic body. (7M) CO4

9. (a) Discuss about bending of beams. Compare uniform and non-uniform bending. (7M) CO4

   (b) Using torsion pendulum, explain the determination of rigidity modulus of the material of a wire. (7M) CO4

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