

PAPER CODE: PHY-1A

CH.S.D.ST.THERESA'S AUTONOMOUS COLLEGE FOR WOMEN:ELURU

I B.Sc. – I SEMESTER END EXAMINATION – OCTOBER 2016

PHYSICS PAPER I

MECHANICS AND WAVES AND OSCILLATIONS

Time: 3 hrs.

Max.Marks:50

PART - A

Answer any THREE of the following:

3x9=27M

1. What are Gradient and Divergence of a vector field?
State and prove Green's theorem.
2. What is variable mass? Derive an expression for the motion of a rocket moving under the action of the gravitational field of earth.
3. Explain the precessional motion of a symmetric top.
Obtain an expression for its precessional velocity.
4. What is simple harmonic Oscillator? Derive the equation of motion of simple harmonic oscillator and find its solution.
5. What are damped oscillations? Obtain the differential equation and discuss its solution under different conditions.

PART – B

Answer any FIVE questions.

5x3=15M

6. Prove that the curl of a gradient is zero.
7. Explain the terms impact parameter and scattering cross-section.
8. Write a note on Gyroscope.
9. Write a short notes on Lissajous figures.
10. Define and explain logarithmic decrement and relaxation time.
11. The Kinetic energy of metal disc rotating at a constant speed of 5 revolutions per second is 100 joules. Find the angular momentum of the disc.
12. Explain velocity resonance.
13. The displacement of a particle describing SHM is $x=0.5 \cos(10\pi t + \frac{\pi}{3})$ m.
Calculate a) amplitude b) Phase and c) Frequency

PART – C

Answer any FOUR questions.

4x2=8M

14. If γ is a position vector of a point, prove that $\text{curl } \gamma = 0$
15. What are elastic and inelastic collisions?
16. Write a short note on torsion pendulum.
17. What is resonance and Q-factor.
18. A rocket burns 0.05kg of fuel per second and ejects the burnt gases with a velocity of 5000 m/S. Find the reaction.
19. Define angular momentum and Torque.

SUBJECT CODE: PHY-1A

CH.S.D.ST. THERESA'S AUTONOMOUS COLLEGE FOR WOMEN: ELURU

I B.Sc.– I SEMESTER END EXAMINATION – OCTOBER 2017

PHYSICS PAPER I

MECHANICS, WAVES AND OSCILLATIONS

Time: 3 hrs.

Max.Marks: 50

PART - A

Long Answer Questions: Answer any THREE of the following: $3 \times 9 = 27M$

1. State and prove Gauss theorem of divergence. Give its physical significance.
2. Explain the motion of a system of variable mass system. Derive the expression for final velocity of a rocket.
3. Explain the precessional motion of a symmetric top of time the expression for its precessional velocity.
4. What are Lissajous figures. Discuss the combination of two mutually perpendicular simple harmonic vibrations of equal frequencies. Discuss the various cases.
5. What are forced oscillations. Obtain the differential equation and find its solution. Discuss various cases.

PART – B

Short answer questions: Answer any FIVE questions: $5 \times 3 = 15M$

6. Define line, surface and volume integrals.
7. Explain Impact parameter and scattering cross section.
8. Describe a Gyroscope and Mention its applications.
9. Define logarithmic decrement, relaxation time and Quality factor. Give their expressions.
10. Prove that $\text{curl}(\Phi A) = \Phi \text{curl} A + (\text{grad} \Phi) \times A$
11. A sphere of mass 2.5 kg is rolling with velocity 2m/s. Find its rotational Kinetic Energy.
12. The amplitude of an oscillator of frequency 200 Hz falls to 1/10 of its final value after 200 cycles. Calculate its relaxation time and Quality factor.
13. A spring is stretched by 8 cm by a force of 10N. Find its time period when 4 kg mass suspended to it.

PART – C

Very short answer questions. Answer any FOUR questions. $4 \times 2 = 8M$

14. Define gradient of a scalar field give its physical significance.
15. What is a Multistage rocket.
16. Explain precession of top in brief.
17. State any four characteristics of S.H.M.
18. Give reasons for damping.
19. What is velocity resonance.

Time: 3 hrs.

Max.Marks:50

PART - A

Long Answer Questions. Answer any THREE of the following: 3x9=27M

1. Derive the equation for Image plane in terms of magnification of an optical system by using matrix method.
2. Explain Fresnel's biprism experiment to determine the wavelength of monochromatic light.
3. Derive an expression for resultant Intensity due to Fraunhofer diffraction by a double slit for normal Incidence.
4. Describe the construction and working of a Nicol's prism. Explain its limitations.
5. Explain the construction and working of Ruby Laser.

PART – B

Short Answer Questions: Answer any FIVE Questions. 5x3=15M

6. Obtain the system matrix for a thin lens placed in air and made of glass of refractive Index 1.5 and radii of curvature 50cm each.
7. Explain the formation of colours of thin films.
8. In Newton's rings experiment, the diameter of 10th dark ring changes from 1.40cm to 1.20cm when a liquid is introduced between the lens and the glass plate. Calculate the refractive Index of the liquid.
9. Explain briefly the construction of a Zone plate.
10. Find the radius of the first zone in a zone plate of focal length 20cm for a light of wavelength 4500Å.
11. Explain briefly about optical activity by a Crystal.
12. A sugar solution of specific rotation 52° per decimeter per 81 C.C. causes a rotation of 12° in a column of 10cm long. What is the concentration of the solution.
13. Write any three applications of lasers.

PART – C

Very Short Answer Questions. Answer any FOUR questions. 4x2=8M

14. Write the translation and refraction matrices for a light ray.
15. What is coherence. Give one example for coherent sources.
16. What is the effect of slowly moving the lens vertically above the glass plate by using monochromatic light.
17. Write any two differences between Interference and Diffraction.
18. State and explain Malu's law.
19. Explain briefly about spontaneous and stimulated emission of radiation.

PAPER CODE: PHY-2A

CH.S.D.ST.THERESA'S AUTONOMOUS COLLEGE FOR WOMEN:ELURU

II B.Sc. – III SEMESTER END EXAMINATION – OCTOBER 2016

PHYSICS PAPER III

WAVE OPTICS

Time: 3 hrs.

Max.Marks:60

PART - A

Long Answer Questions. Answer any THREE of the following: 3x10=30M

1. Derive the equation for Image plane in terms of magnification of an optical system by using matrix method.
2. Explain Fresnel's biprism experiment to determine the wavelength of monochromatic light.
3. Derive an expression for resultant Intensity due to Fraunhofer diffraction by a double slit for normal Incidence.
4. Describe the construction and working of a Nicol's prism. Explain its limitations.
5. Explain the construction and working of Ruby Laser.

PART – B

Short Answer Questions: Answer any FIVE Questions. 5x4=20M

6. Obtain the system matrix for a thin lens placed in air and made of glass of refractive Index 1.5 and radii of curvature 50cm each.
7. Explain the formation of colours of thin films.
8. In Newton's rings experiment, the diameter of 10th dark ring changes from 1.40cm to 1.20cm when a liquid is introduced between the lens and the glass plate. Calculate the refractive Index of the liquid.
9. Explain briefly the construction of a Zone plate.
10. Find the radius of the first zone in a zone plate of focal length 20cm for a light of wavelength 4500Å.
11. Explain briefly about optical activity by a Crystal.
12. A sugar solution of specific rotation 52° per decimeter per 81 C.C. causes a rotation of 12° in a column of 10cm long. What is the concentration of the solution.
13. Write any three applications of lasers.

PART – C

Very Short Answer Questions. Answer any FIVE questions. 5x2=10M

14. Write the translation and refraction matrices for a light ray.
15. What is coherence. Give one example for coherent sources.
16. What is the effect of slowly moving the lens vertically above the glass plate by using monochromatic light.
17. Write any two differences between Interference and Diffraction.
18. State and explain Malu's law.
19. Explain briefly about spontaneous and stimulated emission of radiation.
20. Basic concept of holography.
21. Ruby Laser.

PAPER CODE: PHY-2B

CH.S.D.ST. THERESA'S AUTONOMOUS COLLEGE FOR WOMEN: ELURU.

II B.Sc. – IV SEMESTER END EXAMINATION – APRIL 2016

PHYSICS PAPER II
THERMODYNAMICS

Time: 3 hrs.

Max.Marks: 50

PART - A

Answer any THREE of the following questions:

3x9=27

1. Derive an expression for the coefficient of viscosity of a gas on the basis of Kinetic theory.
2. Describe Carnot's engine and Carnot's cycle.
Derive an expression for the efficiency of the Carnot's engine.
3. What are thermodynamic potentials? Deduce to Maxwell's thermodynamic relations from them.
4. Explain Joule-Kelvin effect. Describe porus plug experiment and discuss its results.
5. Derive Planck's radiation formula. Deduce Wien's law and Rayleigh-Jeans Law from Planck's law.

PART – B

Answer any FIVE of the following:

5x3=15

6. Explain Transport phenomena in gases.
7. Carnot engine has the same efficiency between
i) 1500°K and 500°K and ii) $T^{\circ}\text{K}$ and 1000°K . Find the value of 'T'.
8. What are reversible and Irreversible processes? Give examples.
9. Derive Clausius-clapeyron Latent heat equation.
10. Describe with a neat diagram the liquifaction of Melium gas by Kapitza's method.
11. Describe the disappearing filament Optical pyrometer.
12. A blackbody at 500°C has a surface area of 0.5m^2 and radiate heat at the rate of $1.02 \times 10^4 \text{J.S}^{-1}$, Calculate the stefan's constant.
13. Give a comparison of M-B (Maxwell-Boltzmann), B-E (Bose-Einstein) and F-D (Fermi-Dirac) statistics.

PART – C

Answer any FOUR of the following:

4x2=8

14. Calculate the value of r.m.s speed for Hydrogen molecule at 5000°K .
(Given $K = 1.38 \times 10^{-23} \text{J/K}$)
15. What is entropy? Write the expression of second law of thermodynamics in terms of entropy.
16. Define specific heats of a gas. Write the expression for the difference of two specific heats.
17. Explain the principle of refrigeration.
18. Determine the temperature of sun with the help of Wien's law, given $b = 2.92 \times 10^{-3} \text{mk}$ and maximum wavelength is 4900°A .
19. What do you mean by statistical equilibrium.

SUBJECT CODE: PHY-4A

CH.S.D.ST. THERESA'S AUTONOMOUS COLLEGE FOR WOMEN: ELURU

III B.Sc. – V SEMESTER END EXAMINATION - OCTOBER 2017

PHYSICS PAPER VI

ELECTRICITY AND SOLID STATE PHYSICS

Time: 3 hrs.

Max.Marks: 50

PART - A

I Answer any THREE of the following:

3x9=27M

1. Explain Hysteresis Loop. Calculate the energy loss due to hysteresis.
2. Explain the principle and construction of a transformer. Derive the emf equation.
3. Discuss the nature of growth and decay of current in a CR Circuit.
4. What is Poynting vector? Derive an expression of poynting vector from Maxwell's equations.
5. Explain the Seven Crystal Systems with neat diagrams.

PART - B

II Answer any FIVE of the following:

5x3=15M

6. Compare Dia, para and ferromagnetic material.
7. Define B, H and I. Derive the relation among them.
8. Obtain an expression for Self inductance of a Solenoid.
9. Explain Q factor.
10. What is power factor in an A.C circuit.
11. Show that electromagnetic waves are transverse in nature.
12. Explain Displacement Vector.
13. Explain the structure of Nacl.

PART – C

III Answer any FOUR of the following:

4x2=8M

14. Define hysteresis.
15. What is Lenz's law?
16. A coil of self inductance 50 henry and resistance 100Ω are joined.
17. Define time constant.
18. What is impedance.
19. Mention the various types of bonding.

PAPER CODE: PHY-3A

CH.S.D.ST.THERESA'S AUTONOMOUS COLLEGE FOR WOMEN:ELURU

III B.Sc. – V SEMESTER END EXAMINATION – OCTOBER 2016

PHYSICS PAPER III

ELECTRICITY AND MAGNETISM

Time: 3 hrs.

Max.Marks:50

PART – A

Answer any THREE of the following: 3x9=27M

1. Define Electric Potential. Derive an Expression for potential due to a charged Spherical conductor.
2. What is meant by Di-electric, Discuss the atomic view of Di-electrics. Obtain a relation among D, E and P.
3. Explain the principle of a condenser. Derive an Expression for the capacitance of a Parallel plate condenser containing a di-electric between the plates.
4. Explain the principle and working of a moving coil ballistic galvanometer. Derive an expression for charge flowing through it.
5. Describe the construction, working and theory of Lawrence cyclotron. Derive an expression for the energy of a particle accelerated by Cyclotron.

PART – B

Answer any FIVE questions. 5x3=15M

6. Obtain an expression for electric field due to an Electric dipole.
7. Define Electric susceptibility, show that relative electric susceptibility.
$$\chi = \frac{E}{E_0} - 1$$
8. Describe an expression for the Energy stored in a condenser.
9. Calculate the magnetic field induction due to a solenoid.
10. Explain Hall effect and its importance.
11. Explain the principle of synchrocyclotron.
12. The magnetic susceptibility of the medium is 948×10^{-11} . Calculate the permeability (or absolute permeability) and relative permeability.(given that $M_0 = 4\pi \times 10^{-7}$).
13. The capacity of a parallel plate condenser is $0.2 \mu\text{F}$ and potential difference between the plates is 2 volts. Calculate the energy stored by the charged condenser.

PART – C

Answer any FOUR of the following: 4x2=8M

14. Derive an Expression for the force on the surface of charged conductor.
15. Define polarization and Electric displacement vector.
16. Derive an expression for the capacity of a Spherical condenser.
17. Explain Magnetic Shell.
18. State and Explain Biot-Savart's law.
19. Two concentric spheres of radii 9cm and 10 cm have air between them. Find the capacitance of the spherical capacitor.

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CH.S.D.ST.THERESA'S AUTONOMOUS COLLEGE FOR WOMEN:ELURU

III B.Sc. – V SEMESTER END EXAMINATION – OCTOBER 2016

PHYSICS PAPER IV

MODERN PHYSICS

Time: 3 hrs.

Max.Marks:50

PART - A

Long Answer Questions. Answer any THREE of the following: 3x9=27M

1. Describe Stern – Gerlach Experiment with a neat Sketch.
2. What is Raman Effect? Explain it basing on Quantum Theory.
Write any two applications of Raman Effect.
3. State Heisenberg's uncertainty principle for P and x. Extend it to energy and time. Explain the consequence of uncertainty principle in the case of gamma ray microscope.
4. Obtain Schrodinger wave equation for Particle in a box.
5. What is Super conductivity? Explain Meissner effect. Write any two applications of super conductivity.

PART – B

Short Answer Questions. Answer any FIVE questions: 5x3=15M

6. Explain L-S and J-J coupling Schemes.
7. Explain different types of molecular spectra.
8. Explain Debroglie's concept of matter waves.
9. Explain the Physical Significance of wave function.
10. Write a short note on BCS Theory.
11. State the Postulates of Quantum Mechanics.
12. Calculate the limit of Balmer series of Hydrogen. ($R=1.097 \times 10^7 \text{ m}^{-1}$)
13. Find the Debroglie wavelength of an electron, when the electron is accelerated through a potential difference of 6400 Volts.

PART – C

Very Short Answer Questions. Answer any FOUR questions: 4x2=8M

14. Write any two limitations of Bohr's Theory.
15. What do you mean by Vibrational and rotational Spectrum of a molecule.
16. If the uncertainty in energy of the electron is equal to h , then determine the uncertainty in its time.
17. Define Operator.
18. What are Type-I Super conductors?
19. Write the selection rules for L,S and J.

PAPER CODE: PHY-4B

CH.S.D.ST. THERESA'S AUTONOMOUS COLLEGE FOR WOMEN: ELURU.

III B.Sc. – VI SEMESTER END EXAMINATION – MARCH 2016

PHYSICS PAPER IV

ELECTRONICS AND NUCLEAR PHYSICS

Time: 3 hrs.

Max.Marks: 50

PART - A

Answer any THREE of the following:

3x9=27

1. What is a Junction diode? Explain its working under forward bias and reverse bias conditions.
2. What is Barkhausen Criterion? Explain the construction and working of a phase shift Oscillator with a neat circuit diagram.
3. Discuss the working of Logic gates with their truth tables.
4. Explain the Gamow's theory of α -decay.
5. Explain the principle, construction and working of Geiger-Muller counter.

PART – B

Answer any FIVE of the following:

5x3=15

6. Write a short notes on Series inductor filter.
7. Explain the various current components in a transistor.
8. Explain the positive and negative feedback in amplifiers.
9. Write a note on the working of half adder.
10. Convert the following numbers as indicated:
 - a) $(1101, 101)_2 = (-----)_{10}$
 - b) $(19)_{10} = (-----)_2$
11. Mention the types of nuclear forces.
12. Explain Geiger – Nuttal Law.
13. Write in brief about Scintillation counter.

PART – C

Answer any FOUR of the following:

4x2=8

14. Define α show that it is always less than unity.
15. Draw the circuit diagram of a full wave bridge type rectifier.
16. Find the decimal equivalent of 1111.
17. Draw the transistor circuit in CE configuration.
18. Write the range – energy relation.
19. Mention any two properties of the Nucleus.