(Pages : 2)

Name...

Reg. No.....................................

FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021

Physics/Applied Physics

APH 1C 01—GENERAL AND APPLIED PHYSICS

(2019—2020 Admissions)

Time : Two Hours

Maximum : 60 Marks

The Symbols used in this question paper have their usual meaning.

Section A (Short Answer Type)

Answer all questions in two or three sentences.
Each correct answer carries a maximum of 2 marks.

1. What are the assumptions made during the derivation of Poiseuille equation ?

2. Differentiate between spontaneous and stimulated emission.

3. Why I shape is used for girders ?

4. Mention any two properties of a laser.

5. Write down the principle of wave propagation through the fibre.

6. What is Poisson's ratio? What are the limiting values of Poisson's ratio ?

7. What do you mean by magnetic moment of a material ?

8. Define the term drift velocity. Write down the expression connecting drift velocity and electric field.

9. Write a short note on quantization of energy.

10. Discuss different regions of electromagnetic spectrum and spectroscopy associated with it.

11. What is tunnel effect ?

12. Discuss the principle of electron microscope.

(Ceiling 20)

Section B (Paragraph or Problem Type)

Answer all questions in a paragraph of about half a page to one page.
Each correct answer carries a maximum of 5 marks.

13. Define modulus of elasticity. Briefly discuss the different types of moduli of elasticity.

14. What is critical velocity ? Derive an expression for critical velocity.

Turn over

15. In an optical fibre, the core material has refractive index 1.6 and refractive index of clad material is 1.3. What is the value of critical angle ? Also calculate the value of acceptance angle.

16. What is Potentiometer ? Discuss its working principle.

17. Differentiate between diamagnetic and paramagnetic materials. Write down any two examples for each.

18. Write a short note on Bragg's spectrometer.

19. Find the de Broglie wavelengths of (a) a 46g golf ball with a velocity of 30m/s ; and (b) an electron with a velocity of 10^7m/s.

(Ceiling 30)

Section C (Essays)

Answer is about **two pages**.
Answer any **one** *question.*
Answer carries 10 *marks.*

20. Deduce an expression for couple per unit twist of a uniform solid cylinder. Show that a hollow rod is a better shaft than a solid one of the same material, mass and length.

21. What do you mean by interference ? Write down the conditions of constructive and destructive interference. Discuss the theory of interference and obtain the expression for resultant electric field.

(1 × 10 = 10 marks)

FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION, NOVEMBER 2021

Physics/Applied Physics

PHY 1C 01—PROPERTIES OF MATTER AND THERMODYNAMICS

(2019 to 2020 Admissions)

Time : Two Hours   Maximum : 60 Marks

The symbols used in this question paper have their usual meanings.

Section A (Short Answer Type)

Answer all questions in two or three sentences.
Each correct answer carries a maximum of 2 marks.

1. Define young's modulus of elasticity.

2. Derive the theoretical limits of Poisson's ratio.

3. What is stress ? What is its unit ?

4. What is surface tension ?

5. Explain the terms Neutral surface and Neutral axis.

6. What is a torsion pendulum ?

7. Explain the concept of heat and temperature.

8. State first law thermodynamics.

9. What do you mean by isothermal elasticity ?

10. What is a refrigerator ?

11. What is its coefficient of performance ?

12. Why thermodynamic temperature is called the absolute temperature ?

(Ceiling 20)

Section B (Paragraph/Problem Type)

Answer all questions in a paragraph of about half a page to full page.
Each correct answer carries a maximum of 5 marks.

13. The excess of pressure inside a soap bubble of radius 1 mm is equal to balance a liquid column of height 2.09 cm. Calculate the density of the liquid. Given surface tension of soap solution is 0.04N/m.

14. Calculate the work done in blowing a bubble.

Turn over

15. Derive an expression for the excess pressure inside a spherical drop.

16. Show that the isothermal bulk modulus of elasticity of a perfect gas is P.

17. State and explain Kelvin-Planck statement of second law of thermodynamics.

18. Write and prove Carnot's theorem.

19. Write down Stokes law and explain the symbols used. Mention three applications of Stokes law.

(Ceiling 30)

Section C (Essay Type)

Answer in about **two pages**, *any* **one** *question.*
Answer carries 10 *marks.*

20. Define coefficient of viscosity. Describe Poiseuille's method to determine it.

21. What is a T-S diagram ? Draw T-S diagrams for reversible isothermal, reversible adiabatic, reversible isochoric and reversible isobaric.

(1 × 10 = 10 marks)

FIRST SEMESTER (CBCSS-UG) DEGREE EXAMINATION
NOVEMBER 2021

Physics/Applied Physics

PHY 1B 01/APH 1B 01—MECHANICS—I

(2020 Admissions)

Time : Two Hours · Maximum : 60 Marks

The symbols used in the question paper have their usual meanings.

Section A (Short Answer Type)

*Answer **all** questions in two or three sentences.*
Each correct answer carries a maximum of 2 marks.

1. With proper examples define contact forces.

2. Explain Fictious or Pseudo force.

3. Explain the gravitational force of a sphere.

4. Draw the force diagram for the "Dangling rope" and find the tension a distance x from the bottom.

5. State the law of conservation of linear momentum with one example.

6. Define conservative and non-conservative forces. Give examples of each.

7. State and explain the work energy theorem.

8. Draw the energy diagram for a harmonic oscillator and explain.

9. Define power with its various units.

10. Explain torque and compare with force.

11. State and explain parallel axis theorem.

12. Sketch and deduce an equation for the period of a Simple Pendulum.

(Ceiling 20 marks)

Section B (Paragraph / Problem type)

*Answer **all** questions in a paragraph of about half a page to one page.*
Each correct answer carries a maximum of 5 marks.

13. A string of mass m attached to a block of mass M is pulled with force F. Neglect gravity. What is the force F_1 on the block due to the string ?

Turn over

14. Mass m is whirled on the end of a string length R. The motion is in a vertical plane in the gravitational field of the earth. The forces on m are the weight W down, and the string force T towards the centre. The instantaneous speed is v, and the string makes angle θ with the horizontal. Find the T and the tangential acceleration at this instant.

15. A rod of length L has a non-uniform density. λ, the mass per unit length of the rod, varies as $\lambda = \lambda_0 \left(s / L \right)$, where λ_0 is a constant and s is the distance from the end marked 0. Find the centre of mass.

16. A block of mass M slides along a horizontal table with speed v_0. At $x = 0$, it hits a spring with spring constant k and begins to experience a friction force, as indicated in the sketch. The co-efficient of friction is variable and is given by $\mu = bx$, where b is a constant. Find the distance l the block travels before coming to rest :
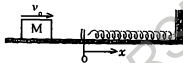
17. A particle of mass m moves in one dimension along the positive x axis. It is acted on by a constant force directed toward the origin with magnitude B, and an inverse-square law repulsive force with magnitude A/x^2.

     (a) Find the potential energy function U (x).

     (b) Sketch the energy diagram for the system when the maximum kinetic energy is

          $$K_0 = \frac{1}{2} m v_0^2.$$

     (c) Find the equilibrium position, x_0.

18. A uniform drum of radius b and mass M rolls without slipping down a plane inclined at angle θ. The moment of inertia of the drum around its axis is $I_0 = Mb^2/2$. Find the drum's acceleration along the plane.

19. Find the moment of inertia of a thin sheet of mass M in the shape of an equilateral triangle around an axis through a vertex, perpendicular to the sheet. The length of each side is L.

(Ceiling 30 marks)

Section C (Essay Type)

*Answer in about **two** pages, any one question.*
Answer carries 10 marks.

20. State Newton's laws of motion. Apply Newtons laws to find the accelerations of two astronauts of masses M_A and M_B pulling on either ends of a rope of negligible mass.

21. State and explain law of conservation of Angular Momentum for a system of particles. Express the torque acting on a rigid body in a uniform gravitational field in terms of position of centre of mass and the weight of the body.

$(1 \times 10 = 10 \text{ marks})$

FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021

Physics/Applied Physics

PHY 1B 01/APH 1B 01—METHODOLOGY OF SCIENCE AND BASIC MECHANICS

(2019 Admissions)

Time : Two Hours   Maximum : 60 Marks

The symbols used in this question paper have their usual meanings.

Section A (Short Answer Type)

Answer all questions in two or three sentences, each correct answer carries a maximum of 2 marks.

1. What is meant by falsification ?

2. Give two examples for Pseudoscience.

3. What is fictitious force ?

4. Define law od conservation of momentum.

5. Define terminal velocity.

6. What is Bola ?

7. State and explain ideal gas law.

8. Give the geometrical interpretation of angular momentum.

9. State Hook's law.

10. What is rigidity modulus.

11. State work - energy theorem.

12. Explain bending of a beam.

(Ceiling—20)

Section B (Paragraph / Problem Type)

Answer all questions in a paragraph of about half a page to one page, each correct answer carries a maximum of 5 marks.

13. Write a note on Scientific method.

14. Compare different unit systems.

15. Calculate the work done in twisting a steel wire of diameter 2 mm. and length 0.25 m. through an angle 45°. Given rigidity modulus for steel is $8 \times 10^{10} N/m^2$.

16. Derive the M.I. of Stick.

17. Define Torque. Derive its relation with angular momentum

18. Determination of Y by bending of a beam.

19. A wire of radius 1mm and length 2 m. is stretched through 0.1 mm. on the application of a force of 10 N, Find the stress and strain

(Ceiling - 30)

Section C (Essay Type)

*(Essays - Answer in about **two pages**, any **one** question. Answer question carries 10 marks).*

20. Explain centre of mass. Write on Drum Major's Baton.

21. What is cantilever ? Calculate the bending moment of a cantilever loaded at free end.

(10 marks)

FIRST SEMESTER (CBCSS–UG) DEGREE EXAMINATION
NOVEMBER 2021

Physics/Applied Physics

APH 1C 01—GENERAL AND APPLIED PHYSICS

(2021 Admissions)

Time : Two Hours   Maximum : 60 Marks

Section A

Answer atleast **eight** *questions.*
Each question carries 3 marks.
All questions can be attended.
Overall ceiling 24.

1. What do you mean by a torsion pendulum ?

2. What is the importance of an I-section girder ?

3. What do you mean by the term bending moment of a beam ?

4. Distinguish between streamline and turbulent flows of liquids.

5. Write down Poiseuille's formula for steady flow of liquid through a narrow tube. What are the terms involved ?

6. Write down the conditions for constructive and destructive interferences.

7. Distinguish between a step index and a graded index optical fiber.

8. What do you mean by a metastable energy level ?

9. How will you set a magnetometer and a bar magnet in tan A position ?

10. What is the IR region of the electromagnetic spectrum ? How does it originate ?

11. Explain Planck's quantum hypothesis.

12. What is the use of a scanning tunneling microscope ?

(8 × 3 = 24 marks)

Turn over

Section B

Answer atleast **five** *questions.*
Each question carries 5 marks.
All questions can be attended.
Overall ceiling 25.

13. Estimate the amount of work done in twisting a wire of radius 1mm and length 25 cm through an angle 45°. Given, the rigidity modulus of the material of the wire is 8×10^{11} dynes/cm².

14. Three capillary tubes of lengths 8L, 0.2L and 2L, with radii r, $0.2r$ and $0.5r$ are connected in series. If the total pressure across the system in an experiment is p, determine the pressure across the shortest capillary.

15. Explain the stimulated emission process. What are the characteristics of stimulated emission ?

16. Calculate the numerical aperture and hence the acceptance angle of an optical fiber having core and cladding refractive indices 1.45 and 1.40, respectively.

17. Discuss the working principle of a potentiometer.

18. Using a suitable figure, obtain Bragg's law of X-ray diffraction.

19. Determine the de Broglie wavelength of an electron moving with a velocity 10^7 m/s.

(5 × 5 = 25 marks)

Section C

Answer any **one** *question.*
Each question carries 11 marks.

20. Discuss the interference of two simple harmonic oscillations of constant phase difference. Obtain an expression for the intensity at a point on a screen placed at a distance.

21. (i) What do you mean by the term current density ? Obtain an expression for current density ; and (ii) List the properties of diamagnetic, paramagnetic and ferromagnetic materials.

(1 × 11 = 11 marks)

(Pages : 2)

Name..

Reg. No...................................

FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION, NOVEMBER 2021

Physics/Applied Physics

PHY 1C 01—PROPERTIES OF MATTER AND THERMODYNAMICS

(2021 Admissions)

Time : Two Hours

Maximum : 60 Marks

The symbols used in this question paper have their usual meanings.

Section A (Short Answer Type)

*Answer at least **eight** questions.*
Each question carries 3 marks.
All questions can be attended.
Overall Ceiling 24.

1. What do you mean by modulus of rigidity ? Give an expression for the work done per unit volume when a body undergoes a strain.

2. Write down the relation connecting Young's modulus, Bulk modulus and rigidity modulus.

3. Draw a diagram to illustrate the terms angle of twist and angle of shear.

4. What are the two forces that govern the shape of a liquid drop ? Why a smaller drop assumes spherical shape ?

5. What do you mean by a viscous force ?

6. What are the basic assumptions used while arriving at the Poiseuille's formula ?

7. What is Brownian motion ?

8. What are the essential conditions for a process to be reversible ?

9. What are the basic processes in a Carnot's cycle ?

10. Give Clausius statement of the second law of thermodynamics.

11. Explain the principle of increase of entropy.

12. Explain the Clausius-Clapeyron equation.

(8 × 3 = 24 marks)

Section B (Paragraph/Problem Type)

*Answer at least **five** questions.*
Each question carries 5 marks.
All questions can be attended.
Overall Ceiling 25.

13. A bar of width 2.5 cm and thickness 2.5 mm is supported symmetrically on two knife edges kept 1 m apart. When the bar is loaded with weight 200 g at each end, projected 10 cm from the knife edges, the centre is elevated by 4 mm. Estimate the Young's modulus of the material of the bar.

Turn over

14. Water flows through a pipe of radius 0.04 m and length 2 km at the rate of 100 litres/min. If the co-efficient of viscosity of water is 10^{-3} Nsm^{-2} and the atmospheric pressure is 1.01×10^5 Pa, determine the pressure required to maintain the flow.

15. What is the pressure inside a drop of a liquid of radius 3 mm at room temperature, if the surface tension of the liquid at room temperature is 0.465 N/m ?

16. A carnot engine working between 300 K and 600 K has a work output of 800 J per cycle. Determine the amount of heat energy supplied to the engine from the source per cycle.

17. lg of water at 100°C is boiled at a pressure of 1 atm to steam at the same temperature. If the specific latent heat of steam is 226×10^4 J/kg and the specific volume of water and steam at 100°C are 1 cm^3/g and 1671 cm^3/g, determine the work done and increase in internal energy in the process.

18. Prove that the slope of an adiabatic is γ times the slope of the isothermal, where γ is the ratio of the specific heat capacities at constant pressure and constant volume.

19. Discuss the working principle of a Carnot's refrigerator.

(5 × 5 = 25 marks)

Section C (Essay Type)

Answer any **one** *question.*
The question carries 11 marks.

20. Obtain an expression for the bending moment of a beam.

21. Explain the term entropy. Obtain an expression for the change of entropy in a reversible isothermal process.

(1 × 11 = 11 marks)

FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021

Physics/Applied Physics

PHY 1B 01/APH 1B 01—MECHANICS—I

(2021 Admissions)

Time : Two Hours — Maximum : 60 Marks

The symbols used in the question paper have their usual meanings.

Section A (Short Answer Type)

Answer at least **eight** *questions.*
Each question carries 3 marks.
All questions can be attended.
Overall Ceiling 24.

1. State Newton's third law of motion and give various examples to illustrate it.

2. What are the fundamental forces in nature ? Compare their strengths.

3. State work-energy theorem for a conservative system. How does dissipative force modify the description ?

4. Explain central force. Show that the work done by a central force is path independent.

5. Obtain the expression for change in acceleration due to gravity with height.

6. Define moment of inertia. How is it related to angular momentum ?

7. What are conservative forces ? Give examples.

8. Show that angular momentum is conserved for a particle in central force motion.

9. Define centre of mass of a system of particles. Obtain an expression for it.

10. Define power of a mechanical system. Calculate the expression for power of an object falling from a height, assuming acceleration due to gravity is a constant.

11. State the law of conservation of linear momentum with one example.

12. State and explain parallel axis theorem.

(8 × 3 = 24 marks)

Turn over

Section B (Paragraph / Problem Type)

Answer at least **five** *questions.*
Each question carries 5 marks.
All questions can be attended.
Overall Ceiling 25.

13. A 5 kg mass moves under the influence of a force $F = \left(4t^2 \, \hat{i} - 3t \, \hat{j} \right)$ N, where t is the time in seconds,

   (1N = 1 Newton). It starts at rest from the origin at $t = 0$. Find :

   (a) Its velocity ;

   (b) Its position ; and

   (c) $r \times v$, for any later time.

14. State and prove parallel axis theorem. Apply it to obtain the moment of inertia of a thin stick about its end.

15. A uniform rope of mass m and length l is attached to a block of mass M. The rope is pulled with force F. Find the tension at distance x from the end of the rope. Neglect gravity.

16. Analyze the molecular vibration of a diatomic molecule and calculate the fundamental frequency. Draw the Potential Energy curve.

17. Show that :

   (a) If the total linear momentum of a system of particles is zero, the angular momentum of the system is the same around all origins.

   (b) Show that if the total force on a system of particles is zero, the torque on the system is the same around all origins.

18. A loaded spring gun, initially at rest on a horizontal frictionless surface, fires a marble at angle of elevation θ .The mass of the gun is M, the mass of the marble is m, and the muzzle velocity of the marble (the speed with which the marble is ejected, relative to the muzzle) is v_0. What is the final motion of the gun ?

19. Three freight cars each of mass M are pulled with force F by a locomotive. Friction is negligible. Find the force on each car ?

$(5 \times 5 = 25 \text{ marks})$

Section C (Essay Type)

*Answer any **one** question.*
The question carries 11 marks.

20. Derive general statement of work-energy theorem for translational motion. Apply this to obtain the escape velocity of a mass projected from earth's surface.

21. Define potential energy :

   (a)   Obtain Potential energies of a uniform force field ;

   (b)   Obtain Potential energy of a central force ; and

   (c)   Obtain the Potential energy of the Three-dimensional Spring Force.

$(1 \times 11 = 11$ marks$)$

FIRST SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021

Physics/Applied Physics

PHY 1C 01—PROPERTIES OF MATTER AND THERMO DYNAMICS

(2016 to 2018 Admissions)

Time : Three Hours　　　　　　　　　　　　　　　　Maximum : 80 Marks

Section A

Answer **all** *questions.*

Each question carries 1 mark.

Answer in a word **or** *phrase.*

1. The total energy within a body is called ————.

2. The SI unit of Gibb's free energy is ————.

3. An adiabatic wall is an ideal ———— wall.

4. ———— is the angle of contact for plain glass.

5. A system which can exchange both matter and energy with the surroundings is called ————.

6. Young's modulus is ————

7. The increase in internal energy is taken as ————

8. In a reversible process the entropy of the system ————.

9. The area of the Carnot cycle on a T-S diagram represents ————.

10. When a gas is expanded adiabatically, the temperature ————.

(10 × 1 = 10 marks)

Section B

Answer **all** *questions.*

Each question carries 2 marks.

Answer in two **or** *three sentences.*

11. What is Poisson's ratio ?

12. Define entropy. What is its physical significance ?

13. Distinguish between isothermal and adiabatic process.

14. Explain rigidity modulus.

15. Explain second law of thermodynamics.

<div align="right">(5 × 2 = 10 marks)</div>

Section C

*Answer any **four** questions.*
Each question carries 5 marks.
*Answer in **one** paragraph.*

16. Derive an expression for the change in entropy during a reversible process.

17. Is it possible that the efficiency of Carnot engine is 100% ? If so when ?

18. Derive an expression for excess pressure inside a bubble.

19. Show that the change in entropy in a Carnot cycle is zero.

20. Derive an expression for the work done during an isothermal process.

21. Derive Poiseuille ' s equation.

<div align="right">(4 × 5 = 20 marks)</div>

Section D

*Answer any **two** questions.*
Each question carries 5 marks.

22. Air is compressed adiabatically to half its volume. Calculate the change in it's temperature. $\gamma = 1.4$

23. A Carnot's engine is operated between two reservoirs at temperatures 450K and 350K. If the engine receives 100J of heat from the source in each cycle, calculate the heat rejected to the sink in each cycle, the efficiency of the engine and the work done per cycle.

24. Calculate the change in entropy when 1kg of water at 90°c is mixed with 0.5 kg of water at 0°C ? Specific heat capacity of water = $4200 J Kg^{-1} K^{-1}$.

25. Two wires of radius 0.2 cm one made of steel and the other made of brass, are loaded as shown in the figure (on 3rd page). The young's modulus of steel is 2×10^{11} Pa and that of brass is 10^{11} Pa. Calculate the elongations in steel and brass wires.

.5 m steel

Kg

.5 m Brass

Kg
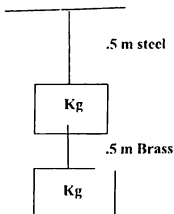
26. Calculate the change in entropy when 1 Kg of ice at –5°c is converted into steam at 105°C ?

(2 × 5 = 10 marks)

Section E

Answer any **two** *questions.*
Each question carries 15 marks.

27. Draw the T-S diagram of a Carnot cycle and hence derive an expression for the thermal efficiency of a Carnot engine.

28. A girl dips a thin capillary tube in water. Water rises through it :

   (a) Explain the phenomenon.

   (b) How does this rise vary with the diameter of the tube ?

   (c) Obtain an expression for the rise of liquid in a tube ?

29. Derive the Maxwell's four thermodynamic relations and explain their importances.

(2 × 15 = 30 marks)

FIRST SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021

Physics/Applied Physics

PHY 1B 01/APY 1B 01—METHODOLOGY OF SCIENCE AND PHYSICS

(2016—2018 Admissions)

Time : Three Hours   Maximum : 80 Marks

Part A

Answer **all** *questions.*
Each question carries 1 mark.

1. Give the value of velocity of light to 4 significant figures.

2. Clocks run more slowly in regions of high gravitational potential. This is called ———————.

3. What is the value of Boltzmann's constant.

4. The energy distribution is not uniform for any given temperature in a perfect black body.

    a) True.   b) False.

5. What is an α particle ?

6. General theory of relativity was introduced in the year ———————.

7. Law of gravitation was formulated by ———————.

8. Rayleigh-Jean's law holds good for which of the following ?

    a) Shorter wavelength.   b) Longer wavelength.

    c) High temperature.   d) High energy.

9. Slope is the ——————— derivative.

10. $A.B$ = ———————.

(10 × 1 = 10 marks)

Turn over

Part B

Answer **all** *questions.*
Each question carries 2 marks.

11. Explain the significance of peer review.

12. What are de-Broglie waves ?

13. Explain Quantum theory.

14. Define Relativity of Simultaneity.

15. Explain photoelectric,work function.

16. Explain the role of mathematics in physics.

17. Write down gradient in terms of spherical polar co-ordinates.

(7 × 2 =14 marks)

Part C

Answer any **five** *questions.*
Each question carries 4 marks.

18. Explain the role of mathematics in physics.

19. Discuss the scientific temper as an important outcome of learning science.

20. Explain Photoelectric effect and photoelectric wave function.

21. Discuss the sociological criteria of scientific theories.

22. Write a note on hypothesis.

23. Write a note on Revolution in science and Technology.

24. Explain product rules for gradient, divergent and curl.

(5 × 4 = 20 marks)

Part D

Answer any **four** *questions.*
Each question carries 4 marks.

25. Write a note on Revolution in science and Technology.

26. A spacecraft is moving relative in the earth. An observer on the earth finds that, between 1 P.M. and 2 P.M. according to her clock, 3601 s elapse on the spacecraft's clock. What is the space crafts speed relative to the earth ?

27. When radiation of certain wavelength shines on the cathode of the photoelectric cell, the photocurrent produced can be reduced to zero by applying stopping potential of 2.63 V. If the work function of the photo emitter is 4 eV, find the wavelengths of radiation.

28. Dick and Jane each send out a radio signal once a year while Dick is away. How many signals does Dick receive ? How many does Jane receive ? (they are separated by a distance 0.8c)

29. Write a note on scientific temperement.

30. A certain photon has a momentum of 1.50×10^{-27} kg m/s. What will be the photon's de Broglie wavelength ?

31. Find the gradient of the following functions :

   a) $f(x, y, z) = X^2 + Y^3 + Z^4$; and

   b) $f(x, y, z) = X^2 Y^3 Z^4$.

$$(4 \times 4 = 16 \text{ marks})$$

Part E

Answer any two questions.
Each question carries 10 marks.

32. Write notes on practical, theoretical and Scientific knowledge.

33. What is photoelectric effect ? With figure, explain the experiment.

34. With necessary figure, explain Compton effect.

35. Discuss the factors to be considered in experimentation with relevant supports.

$$(2 \times 10 = 20 \text{ marks})$$