F–7366	Sub. Code
	7MPH1C1

M.Sc. DEGREE EXAMINATION, APRIL 2022

First Semester

Physics

MATHEMATICAL PHYSICS – I

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Evaluate the double integral $\iint_A (2x - 3y)dxdy$.

2. Suppose the vectors $\vec{a},\vec{b},\vec{c}$ are given as follows. $\vec{a} = \hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} + 3\hat{j} - 5\hat{k}$ and $\vec{c} = \hat{j} - \hat{k}$. Find out the direction of the product of $\vec{a} \times (\vec{b} \times \vec{c})$.

3. For the matrix $A = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ find sin *kA*, where *k* is a constant.

4. Are the functions {1, *x*, sin *x*} linearly independent or dependent?

5. Using residue theorem evaluate the integral $\int_{-3}^{3} \frac{dx}{x^2 + 3x + 2}$.

6. What are the values of the integer n if $x^n - y^n$ is harmonic?

7. Find the Fourier series of the periodic function $f(x) = x + \pi(-\pi < x < \pi)$ having period 2π.

8. What is Fourier integral?

9. State any two conditions for the Fourier transform should exist.

10. What do you mean by Fourier transform of the derivative of a function?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Show that $\iint_S \vec{F}.\vec{n}\,dS = \frac{3}{2}$, where $\vec{F} = 4xz\hat{i} - y^2\hat{j} + yz\hat{k}$ and S is the surface of the cube bounded by the planes $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z = 0$, $z = 1$.

Or

(b) Show that the equations $3x + 4y + 5z = a$, $4x + 5y + 6z = b$, $5x + 6y + 7z = c$ don't have a solution unless $a + c = 2b$.

12. (a) Show that the inverse of the matrix $M = \begin{pmatrix} 0 & 1 & 1 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$ can be written in the form $M^2 - I$, where I is the identity matrix.

Or

(b) Write a short note on the properties of Sturm-Liouville differential equation.

13. (a) Find a function which is harmonic conjugate to $u(x,y)=\frac{y}{x^2+y^2}$ and hence find a function *f(z)* having $u(x, y)$ as its real part.

Or

(b) Compute the integral $\int_0^{2\pi}\frac{d\theta}{7+6\cos\theta}$.

14. (a) Find the Fourier series representing $f(x)=x$, $0<x<2\pi$ and sketch its graph from $x=-4\pi$ to 4π.

Or

(b) Expand $f(x)=e^x$ in a Fourier cosine series over (0, 1).

15. (a) Find the Fourier transform of the function

$$f(x)=\begin{cases}1+\frac{x}{a} & -a<x<0,\\ 1-\frac{x}{a} & 0<x<a,\\ 0 & \text{otherwise}\end{cases}.$$

Or

(b) Find the Fourier sine and cosine transform of x^{n-1}.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. State and prove Stokes' theorem.

17. Obtain the general solution of the differential equation $x^2y''+xy'+y=x\log x$.

18. Find the Laurent series expansion of $f(z)=\frac{z}{(z-1)(z-2)}$ valid for $|z-1|>1$.

19. Obtain the half-range sine series for the function $f(x) = x^2$ in the interval $0 < x < 3$.

20. Using Fourier sine transform to solve the functions $u_t = u_{xx}$ with the boundary conditions (a) $u(0,t)=0$, (b) $u(x,0)=e^{-x}$ and (c) $u(x, t)$ is bounded.

F–7369

Sub. Code
7MPHE1A

M.Sc. DEGREE EXAMINATION, APRIL 2022

First Semester

Physics

Elective : NUMERICAL METHODS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. State the least-squares approximation criterion.

2. Define systematic and random errors.

3. Give the statement of the process of solving a system of linear equation by the Gauss elimination method.

4. Define the pivoting process in the Gauss elimination method.

5. Define first-order divided differences.

6. What are called Lagrange fundamental polynomials? Write the n^{th} order Lagrange polynomial.

7. Define numerical solution of an ordinary differential equation.

8. Find $y(0.1)$ applying Euler method to the equation $y' = y^3 + \exp(-x),\ y(0) = 1$.

9. What is a numerical integration?

10. Obtain the two-point forward difference formula for first-order derivative of a function.

Part B $(5 \times 5 = 25)$

Answer **all** the questions, choosing either (a) or (b).

11. (a) Explain the error estimation by the method of averages.

Or

(b) Describe the method of linear regression.

12. (a) Obtain the solution of the following system of equations by applying the Gauss elimination method.

$2x + 15720y = 15750,\ 3210x + 12310y = 60460.$

Or

(b) Find the root of the equation $x^3 - 8 = 0$ with 3 decimal accuracy using $x_0 = 2.5$ by Newton-Raphson method.

13. (a) The measured value of current I in an electronic circuit as a function of applied voltage V is given below. It is required to know the current for the applied voltage 1.65 V. Calculate it using Lagrange interpolation formula.

V in volts	1	1.5	2
I in ampere	0.2	0.35	0.5

Or

(b) Develop a C program for Lagrange interpolation.

14. (a) Find the numerical solution of the equation $y' = 1 - y + x$ with $y(0) = 0$ at $x = 0.05$ and 0.1 by the Euler method.

Or

(b) Derive the improved Euler formula for first-order differential equation.

15. (a) Obtain a five-point formula for the second derivative of a function.

Or

(b) The distance travelled by a car at intervals of 2 minutes are given below. Evaluate the speed of the car at 4 minutes applying an appropriate difference formula.

Time in minutes :	0	2	4	6	8
Distance in km	0	4	5.8	7.4	9.2

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Make a fit of the following data to the function $y = a + bx + cx^2$.

x	0	–1	–2	–3	–4
y	3	2	–1	–6	–13

17. Solve the system $x + y + 2 = 2,\ 2x + y + 2z = 2,$ $3x - y + 2z = -1$ by the Gauss-Jordan method.

18. The mass of a radioactive decaying sample measured at 4 times is given below. Determine the mass of the sample after 12 days using divided difference interpolation formula.

Time in days	0	5	10	15
Mass in mg	1	0.42	0.17	0.08

19. Find the numerical solution of the equation $x' = 1 - x^2$ with $x(0) = 0$ at $t = 0.05$ and 0.1 by the improved Euler method.

20. Evaluate the integral $\int_0^3 (1 + \exp(x))dx$ using trapezoidal rule by dividing the interval [0, 3] into 6 subintervals.

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F–7371	Sub. Code
	7MPH2C1

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Second Semester

Physics

SOLID STATE PHYSICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is point group and space group?
2. What is ionic bond and give an example?
3. How do you analysis the stiffness constant?
4. What is lattice vibration?
5. Define Hall effect. Mention its different parameters.
6. Mention the properties of metal.
7. Define Hund's rule.
8. What is dielectric breakdown?
9. What is Meissner's effect?
10. Mention the applications of superconductivity?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is defect? Mention its different types. Explain any two.

Or

(b) Explain the determination of crystal structure by Laue method.

12. (a) Explain how to analysis stress and strain.

Or

(b) Describe the theory of phonon momentum.

13. (a) Explain the expression of effect of temperature on the Fermi Dirac distribution.

Or

(b) State and explain Bloch function and theorem.

14. (a) Applying cooling by adiabatic demagnetization, find the change of entropy (ΔS) at a given temperature (T_H) for the given value of H.

Or

(b) Deduce the expression of Weiss theory of paramagnetism and prove that the susceptibility of paramagnetism becomes negative.

15. (a) What is ferromagnetism? Describe the quantum theory of ferromagnetism.

Or

(b) Explain the occurrence of superconductivity. Distinguish between Type I and Type II superconductor.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Mention the different types of bonding in a crystal. Explain them with relevant examples.

17. Explain the vibration of one dimensional mono atomic lattice.

18. (a) Explain De Hass Van Alphen effect to determine the Fermi surface of the materials.

    (b) Briefly explain on semiconductor crystals.

19. Obtain Clausius- Mosotti equation and explain how it can be used to find the dipole moment of polar molecules.

20. (a) What is London's effect? Using this, obtain the penetration depth λ and a.c. skin depth δ.

    (b) Describe BCS theory.

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F–7372

Sub. Code
7MPH2C2

M.Sc. DEGREE EXAMINATION, APRIL 2022

Second Semester

Physics

MATHEMATICAL PHYSICS – II

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Find the Laplace transform of e^{at}.

2. Find the Laplace transforms of the formula $F(t)=\begin{cases}\sin t & , \ 0<t<\pi \\ 0 & , \ t>\pi\end{cases}$.

3. What is heat flow equation?

4. Solve $xu_x + u_y = -uy$.

5. Define contravariant and covariant vectors.

6. Show that the contraction of A_q^p is a scalar.

7. Define Abelian group.

8. Prove that every subgroup of a cyclic group is cyclic.

9. Show that $\lceil n+1 = n \lceil n$.

10. Write Legendre's differential equation. Write its two independent solutions.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Find the Laplace transform of $F(t) = \sin at - at\cos at$.

Or

(b) State and prove convolution theorem for the inverse of Laplace transform.

12. (a) Find the particular integral of $u_{xx} - u_{xy} - 6u_{yy} = e^{2x+y} + \sin(2x - 3y)$.

Or

(b) Derive heat conduction equation and solve it in two dimensional Cartesian coordinates.

13. (a) Write short note on transformation of coordinates.

Or

(b) Describe Raising and Lowering of Indices in tensor analysis.

14. (a) Explain isomorphic and homomorphic groups.

Or

(b) State and prove Schur's lemma.

15. (a) Find the relation between beta and gamma function.

Or

(b) Find Rodrigue's formula for Legendre polynomials.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Using the method of Laplace transform, show that $\int_0^{\alpha} \cos x^2 dx = \frac{1}{2}\sqrt{\frac{\pi}{2}}$.

17. Derive the equation of motion for the vibrating string.

18. Show that in Cartesian coordinate system the contravariant and covariant components of a vector are identical.

19. Prove the great orthogonality theorem.

20. Derive an expression for the generating function for the Laguerre's polynomials and hence show that $L_n(0) = 1$.

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F–7373	Sub. Code
	7MPH2C3

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Second Semester

Physics

ELECTROMAGNETIC THEORY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Electric potential. What is its unit?

2. What is an Electric image?

3. State Ampere circuital law. Give its limitation.

4. What is a magnetic dipole?

5. Define Displacement current.

6. What is Coulomb gauge transformation.

7. Define Skin effect.

8. Give the properties of Isotropic medium.

9. Define Scattering cross-section.

10. What do you mean by disperson?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Give multipole expansion of potential of charge distribution.

Or

(b) Find electric field due continuous charge distribution.

12. (a) Using Biot-Savart law, calculate the value of magnetic field due to an infinitely long straight wire carrying current 'i' amp at a distance 'a' from the wire.

Or

(b) Derive an expression for the force on a current carrying conductor placed in a magnetic field.

13. (a) Derive Integral form and differential form of Faraday's law.

Or

(b) What are Gauge transformation? Explain importance of Loreutz Gauge.

14. (a) Discuss the propagation of electromagnetic waves in ionosphere.

Or

(b) Write a note on linear and circular polarization.

15. (a) Derive Jefimenko's equation.

Or

(b) What is anomalous dispersion and how it is explained on the basis of electromagnetic theory?

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Write down Laplace's equation in spherical coordinates and obtain its solution.

17. Discuss the motion of charged particles in crossed electric and magnetic fields.

18. Establish Maxwell's electromagnetic wave equation.

19. Describe the propagation wave in a rectangular wave guide with perfectly conducting walls. Find it cut off wavelength and the magnetic field induction.

20. Explain Rayleigh scattering on the basis of theory of scattering of electro magnetic wave by bound electrons.

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F–7374	Sub. Code
	7MPH2C4

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Second Semester

Physics

QUANTUM MECHANICS – II

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. How the orders of wave functions are combined in the perturbation theory?

2. What is meant by adiabatic approximation?

3. What is the basic difference between Coulombic potential and Yukawa potential?

4. Write down the wave function of the incident wave in the scattering process.

5. What is meant by induced emission?

6. Why the assembly of electrons are considered as oscillators in the case of radiation?

7. What is the difference between Pauli's spin matrices and Dirac's spin matrices?

8. What is the deficiency of the Klein-Gordon's equation?

9. Write down the classical field equation of Hamiltonian.

10. Write down the quantum field equation of Lagrangian.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Derive Schrodinger's time dependent perturbation theory.

Or

(b) Discuss the change in the energy levels when the adiabatic approximation method is adopted.

12. (a) Discuss scattering by Yukawa potential.

Or

(b) Solve the Schrodinger's equation for a scattering by Coulumbic potential.

13. (a) Calculate the rate of spontaneous transition of an excited state.

Or

(b) What are Einstein's transition probabilities?

14. (a) Discuss briefly the occurrence of Zitterbewegung.

Or

(b) Derive Dirac's electromagnetic field equation.

15. (a) Derive the Hamiltonian for a quantized Dirac field.

Or

(b) Compare and contrast Maxwell's field and Schrodinger's field.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Apply the perturbation theory for the case of Stark effect in Hydrogen atom.

17. Derive the Born `s approximation and its validity in the low energy scattering.

18. Evaluate the relations between the various Einstein's coefficients.

19. Derive Dirac's Relativistic equation for a free particle.

20. Prove that the Classical Hamiltonian equation of motion for a field agree with the Lagrangian in a Cell approximation.

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F–7377	Sub. Code
	7MPH3C3

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Third Semester

Physics

ADVANCED ELECTRONICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A (10 × 2 = 20)

Answer **all** questions.

1. What is varactor diode?

2. Why SCR cannot be used as a bidirectional switch.

3. What are the advantages of active filters over the passive filters?

4. Why integrators are preferred over differentiators in analog computers?

5. Differentiate between synchronous counter and ripple counter.

6. Write the functions of Shift Registers and List its types.

7. Give the pin connections of IC-555.

8. Why sample and hold circuit is used?

9. As related to AM, what is over modulation, under modulation and 100% modulation?

10. What is IMPATT?

Section B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the operation of Photo transistor.

Or

(b) Explain the construction, operation and V-I characteristics of UJT.

12. (a) Design an amplifier with a gain of -10 and input resistance equal to $10 k\Omega$.

Or

(b) Construct the basic operational amplifier circuit for the mathematical operation of differentiation and explain in detail.

13. (a) Explain RS Flip-flop with truth table, logic symbol and logical circuit.

Or

(b) Explain the working of 4-bit Serial-In-Parallel-Out (SIPO) shift resistor with logic circuit and truth table.

14. (a) Explain the working principle of ADC counter method.

Or

(b) Explain the operation of crystal oscillator.

15. (a) Draw the frequency spectrum of FM and explain.

Or

(b) Write a note on pulse width modulation.

Section C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the operation of JFET and derive the drain and transfer characteristics.

17. Illustrate the operation of current to voltage and Voltage to current converter circuits.

18. Discuss Digital IC logic families and characteristics of basic gate in each family.

19. Draw the diagram of triangular wave generator using operational amplifier and find an expression for the frequency of oscillation.

20. Describe with the neat sketch the constructional details and principle of operation of a reflex klystron tube. With the help of Applegate diagram illustrate the phenomenon of bunching.

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F–7380	Sub. Code
	7MPHE3A

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Fourth Semester

Physics

Elective: NANOSCIENCE

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Why transition metals are important in nanotechnology? Give example.

2. What are nanowires and nanoshells?

3. Mention the advantages of electro deposition.

4. What are the factors influencing the sol-gel method?

5. Mention the difference between C_{60} and C_{70}.

6. What is protein molecule? Sketch the structure of amino acid.

7. How polarization technique is important in modern optics?

8. What is imaging?

9. Sketch the diagram of MOSFET and show that it is meant for switching operation.

10. What is lithography? Mention its different types.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Describe the scientific revolutions and important challenges in nanotechnology.

Or

(b) Explain the arrangement of elements in periodic table.

12. (a) Explain the preparation of nanomaterials by chemical vapour deposition.

Or

(b) Mention the various applications of Nanomaterials.

13. (a) Explain the method of formation of self assembled monolayer.

Or

(b) Describe the molecular models of DNA structures.

14. (a) Write down the properties of light and explain how it is related with nanotechnology.

Or

(b) Give a brief explanation of photonic crystals.

15. (a) Explain the invention of the transistor and integrated circuit.

Or

(b) Discuss the working function of optical lithography.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Differentiate between and bottom-up approach. Explain how are they important in nanotechnology?

    (b) Explain how does energy play a role in nanotechnology?

17. Describe the preparation of nanoparticles by ball milling method. Mention its advantages.

18. Mention and explain the different types of nano tubes with neat diagrams.

19. (a) Illustrate the behavior of a photon as both a particle and wave.

    (b) Explain Photon trapping and plasmons.

20. Give a brief explanation on MEMS.

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F–7381	Sub. Code
	7MPHE3B

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Fourth Semester

Physics

Elective: ANALYTICAL INSTRUMENTATION

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. State Beer-Lambert's law.

2. What is absorption and interference filters?

3. Mention the various types of detectors used in IR spectroscopy.

4. Name the various sources of atomic emission spectrometer.

5. List out some X-ray detectors.

6. How will you achieve a narrow beam of X-rays?

7. Define Lande's splitting factor.

8. What are the six units of continuous wave NMR spectrometer?

9. What are the disadvantages of a total consumption as compared to a premix burner for atomic absorption use?

10. Name the types of emission spectra.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explicate the role of filter in UV spectrophotometry.

Or

(b) Explain the working principle of photomultiplier tube.

12. (a) Write a note pressed pellet technique.

Or

(b) Explain the working principle of photographic detection.

13. (a) Explain the two methods of monochromatization of X-rays.

Or

(b) Draw and explain X-ray fluorescence spectrophotometer.

14. (a) Describe the ESCA method.

Or

(b) Describe the principle of NMR spectroscopy.

15. (a) Compare flame emission and atomic absorption spectroscopic techniques of analysis with respect to principle and method of analysis.

Or

(b) Explain the principle of flame emission spectroscopy.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. With a neat diagram, explain the instrumentation system of visible spectrophotometer.

17. Explain the functions of various components in IR spectrophotometer with the help of a neat sketch of IR spectrophotometer.

18. With a neat diagram, explain the instrumentation set up for Laser Raman Spectrometer.

19. Draw a neat sketch of ESR Spectrometer and explain each component in it.

20. Explain the instrumentation and its applications of Fluorescence spectroscopy.

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F–7382

Sub. Code
7MPHE4A

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Fourth Semester

Physics

Elective: THERMODYNAMICS AND STATISTICAL PHYSICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Correlate entropy with disorder. Will entropy decrease?

2. Give the expression of Helmholtz function 'F'. What is other name?

3. Write the Boltzmann's transport equation when collisions are taken into account.

4. Define mean free path.

5. What is phase space? What is its other name?

6. How does a micro canonical ensemble differ from a grand canonical ensemble?

7. Name the two quantum statistics.

8. Give the expression of B.E. statistics.

9. When lambda transition does occur?

10. When ideal F.D gas will be completely degenerate?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Briefly the thermodynamic potentials.

Or

(b) Obtain Vander Waal's equation of state.

12. (a) Write a note on conservation laws.

Or

(b) Deduce diffusion equation on the basis of transport phenomena.

13. (a) Give an account on macro and micro states.

Or

(b) Describe the principle of equipartition of energy.

14. (a) Obtain the expression of F.D statistics.

Or

(b) Write a note on B.E. condensation.

15. (a) Write a note on Liquid Helium.

Or

(b) List the properties of an ideal Fermi gas.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Briefly the principle of phase transitions (both I and II orders)

17. Describe Boltzmann's H – theorem.

18. State and prove Liouville's theorem.

19. Arrive sackur-Tetrode equation.

20. Write a note on pauli's paramagnetism.

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F–7383	Sub. Code
	7MPHE4B

M.Sc. DEGREE EXAMINATION, APRIL 2022

Fourth Semester

Physics

Elective : COMMUNICATION ELECTRONICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define noise figure in communication.

2. What is the difference between VHF and UHF antenna?

3. Define pulse code modulation.

4. What do mean by shift keying?

5. What is IMPATT diode?

6. List out any two applications of RADAR.

7. Define an acceptance angle of an optical fiber.

8. Give two examples for optical sources and detectors.

9. What is an eclipse?

10. Mention the various multiple access scheme used in cellular communication?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the theory of frequency modulation.

Or

(b) How does microwave antenna work? Explain.

12. (a) Explain pulse width modulation technique.

Or

(b) Write note on time division multiplexing.

13. (a) Explain construction and working of Gunn diode.

Or

(b) Derive Radar range equation.

14. (a) Discuss the mechanism of attenuation dispersion and bending losses in optical fibre.

Or

(b) Find the refractive index of the core and cladding if the NA is 0.3 and the relative refractive index difference is 8%.

15. (a) Explain various types of satellite orbits.

Or

(b) What is CDMA? Explain.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Describe the theory of Hertzian dipole.

17. Explain the following

    (a) Amplitude shift keying

    (b) Frequency shift keying

    (c) Differential and Quadra Polar shift keying

18. Describe the construction and working of Reflex Klystron.

19. Explain with a neat block diagram, the working of fiber optical communication system.

20. List the feature of GSM. Explain its architecture.

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F–7384

Sub. Code
7MPHE5A

M.Sc. DEGREE EXAMINATION, APRIL 2022

Fourth Semester

Physics

Elective : ENERGY AND ENVIRONMENTAL PHYSICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What do you understand by transport of energy?

2. List out the various components of air.

3. Define solar constant.

4. Write any two advantages of flat plate collector.

5. Differentiate biomass and biogas.

6. Point out any two advantages of fixed dome type plant.

7. What are fuel cells?

8. Give any two safety management steps in storage of hydrogen.

9. Outline puffs.

10. Recall the major sources of noise pollution.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the causes of greenhouse effect.

Or

(b) Brief out Indian monsoon and elements of weather.

12. (a) How will you estimate the average solar radiation?

Or

(b) Elaborate the physical principles of flat plate solar collector.

13. (a) List and explain the factors that affect bio-digestion.

Or

(b) With a neat diagram, explain the continuous type biogas plant.

14. (a) Write a note on the uses of hydrogen as fuel.

Or

(b) Describe the elementary concepts of hydride batteries.

15. (a) Give a brief note on waste disposal and heat island effect.

Or

(b) Elucidate land breeze and sea breeze.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Give a detailed note on (a) Raynold's transport theorem and (b) Radiation temperature of the earth.

17. Derive energy balance equation and collector efficiency to describe the performance of solar collector.

18. Explain in detail wet and dry processes in biomass conversion.

19. Enumerate the different types of fuel cells.

20. List out the factors that affect air pollution. Also discuss the purification and control measures of air pollution.

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F–7385

Sub. Code
7MPHE5B

M.Sc. DEGREE EXAMINATION, APRIL 2022

Fourth Semester

Physics

Elective : MEDICAL PHYSICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Name the different white blood cells and indicate the cell responsible for immune function.

2. What is the meant by electro retinogram?

3. Indicate the various categories of hearing loss.

4. Write the function of stethoscope.

5. Write the different elements of the eye.

6. Name the lenses used in light microscope for magnification of the image and indicate the maximum magnification.

7. Write the properties of X radiation.

8. Indicate the protection methods followed while working with X radiation.

9. Write the diastolic and systolic readings in normal and high blood pressure.

10. What is meant by pace maker?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Discuss the electric signal from heart and brain.

Or

(b) Write the measurement of lung volume.

12. (a) Discuss about deafness and testing of hearing.

Or

(b) Describe the production of speech.

13. (a) Define laser. Describe the application of laser in medicine.

Or

(b) Write the important components of a light microscope and explain their function.

14. (a) Discuss briefly about radiotherapy planning.

Or

(b) Discuss briefly about digital radiography.

15. (a) Discuss major components of cardiovascular system.

Or

(b) Describe about defibrillator. Discuss the role of defibrillator in the treatment of cardiac disease.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Discuss the physics of alveoli, breathing mechanism and work of breathing.

17. Discuss the physics of ear and hearing.

18. Describe about color vision. Discuss about defective vision and its correction.

19. Discuss the production of X radiation and its mode of interaction with body.

20. State Bernoulli's principle and explain its use in blood flow measurements.

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