F–0636

Sub. Code
7MPH1C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

First Semester

Physics

MATHEMATICAL PHYSICS – I

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Find the constants a,b,c, so that the vectors $\phi = (2x + 3y + az)i + (bx + 2y + 3z)j + (2x + cy + 3z)k$ is irrotational.
2. Show that the vectors (1,2,–3) (1,3,–2) and (2,–1,5) are linearly independent.
3. What do you mean by the eigen values and eigen vectors of a matrix?
4. Find a general solution of $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 0$.
5. Define an analytic function of a complex variable.
6. State cauchy residue theorem.
7. What are Dirichlet's conditions for a fourier series expansion?
8. Write complex form of a Fourier integral.
9. Define Fourier integral transform of a function and state its linearity property.
10. Find fourier transform of the function $f(x) = e^{-x^2/2}$.

Part B (5 × 5 = 25)

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

11. (a) Evaluate $\int_v (2x+y)dv$, where V is the closed region bounded by the cylinder $z = 4 - x^2$ and the planes $x = 0$, $y = 0$, $y = 2$ and $z = 0$.

Or

(b) Using Schwartz's inequality prove the cauchy in equality $(\Sigma a_i b_i)^2 \le (\Sigma a_i)^2 (\Sigma bi)^2$ where $a_i, b_i (i = 1,2,...n)$ are all real numbers.

12. (a) State and prove Cayley–Hamilton theorem.

Or

(b) Solve the differential equation $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 3y = 65\cos 2x$.

13. (a) State and prove Cauchy integral theorem $\int_c f(z)dz = 0$.

Or

(b) Evaluate the integral $\int_c \frac{4z^2 + 16z + 14}{z^3 + 6z^3 + 11z + 6}$ dz where C is the circle $|z| = 5/2$.

14. (a) Expand the function $f(x) = |x|$, for $-\pi \le x \le \pi$ in fourier series.

Or

(b) Find the fourier integral of the function $f(x) = e^{-kx}$ when $x > 0$ and $f(-x) = f(x), k > 0$.

15. (a) Describe the various properties of fourier transform.

Or

(b) Find the finite sine transform of $\sin ax$

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. State and prove Gauss theorem.

17. Diagonalise the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

18. Find Laurent's expansion of $f(z) = \frac{1}{z(z-1)}$ valid for (a) $0 < |z| < 1$ (b) $0 < |z-1| < 1$.

19. Expand as fourier series the function $f(x) = x^2$ in the interval $-\pi < x < \pi$ and hence show that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots + \frac{\pi^2}{1^2}$.

20. Solve $\frac{\partial u(x,t)}{\partial t} = \frac{\partial^2 u(x,t)}{\partial x^2}, x > 0, t > 0$; subject to conditions

(a) $u(0,t) = 0$

(b) $u(x,0) = \begin{cases} 1; 0 < x < 1 \\ 0; x \geq 1 \end{cases}$

(c) $u(x,t)$ is bounded.

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F–0637	Sub. Code
	7MPH1C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

First Semester

Physics

CLASSICAL DYNAMICS AND RELATIVITY

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is generalized momentum? Express it in generalized coordinates.

2. What is conservative system?

3. What is meant by the 'laboratory system' and the 'centre of mass system' in a two body scattering problem?

4. What do you mean by scattering cross-section?

5. Define the term principal axes of the body.

6. Explain the meaning of normal coordinates.

7. What is the physical significance of Hamilton's characteristic function?

8. Show that a function is an integral of motion if it does not depend on time explicitly and its Poisson bracket with Hamitonian vanishes.

9. Why Lorentz transformations are superior to Galilean transformation?

10. Two particles come towards each other with speed 0.8 C with respect to laboratory. What is their relative speed?

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

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

11. (a) The homogeneity of time implies that the total energy is a constant of motion. Substantiate.

Or

(b) Two masses m and $2m$ are connected by a light inextensible string which passes over a pulley of mass $2m$ and radius a. Write the Lagrangian and find the acceleration of the system.

12. (a) Explain how the problem of two bodies moving under the influence of mutual central force can be reduced to one body problem.

Or

(b) A particle describes a circular orbit under the influence of an attractive central force directed towards a point on the circle. Show that the force varies as the inverse fifth power of the distance.

13. (a) Obtain the Euler's equation of motion of a rigid body with one point fixed.

Or

(b) Express the kinetic and potential energies of a system in terms of normal coordinates.

14. (a) Obtain Hamilton's equation for a simple pendulum. Hence obtain an expression for its period.

Or

(b) Apply the Hamilton-Jacobi method to study the motion of a freely falling body.

15. (a) State and explain the relativistic law of addition of velocities.

Or

(b) Deduce the expressions for rest energy, kinetic energy and potential energy of a relativistic particle.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain the Hamilton's principle and derive Euler-Lagrange's equation of motion from Hamilton's principle.

17. Using Hamiltonian equations derive the differential equation for planetary motion and prove that a real velocity is constant.

18. Find the normal frequencies and normal modes for a double pendulum each having a mass m suspended by a string of length l.

19. Discuss in detail the method of action-angle variables and how it helps to obtain the frequencies of a periodic system.

20. State Maxwell's equations and show that they are invariant under Lorentz transformation.

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F– 0638

Sub. Code
7MPHE1A

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

First Semester

Physics

Elective – NUMERICAL METHODS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Give the general formula for errors.
2. Write down the equation for Least Square Fitting.
3. Define fixed point iteration method.
4. How Gauss elimination method different from Gauss Jordon method?
5. Define interpolation.
6. What is divided difference formula?
7. State the Euler's general formula for $y' = f(x, y)$ with $y(x_0) = y_0$.
8. Why Runge-Kutta methods are more effective in finding the solution of differential equation.
9. Write down the formula for Simpson's $\frac{1}{3}$ rule.
10. Give the practical application for numberical Integration.

Part B (5 × 5 = 25)

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

11. (a) Fit a Straight Line of the form $y = a_0 + a_1 x$ to the data.

x	0	2	5	7
y	–1	5	12	20

Or

(b) Explain the exponential regression method with suitable example.

12. (a) Determine the root of $xe^x - 3 = 0$, correct to three decimal places.

Or

(b) Explain the method of solving the equations using Gauss Seital method.

13. (a) Find the polynomial interpolating the points of the following data.

x	1	1.3	1.6	1.9	2.2
$f(x)$	0.1411	–0.6878	–0.9982	–0.5507	0.3117

Or

(b) Derive the Newton's interpolation formula for equal intervals.

14. (a) Deduce the Euler's equation.

Or

(b) Derive the second order Runge-Kutta method.

15. (a) Derive the formula for trapezoidal rule.

Or

(b) Write down the C program to evaluate the integral using Simpson's rule.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Fit the second degree parabola to the following :

x	2	4	6	8	10
y	1	2	3	4	5

17. Solve the following equations by Gauss elimination method

$2x + y + 4z = 12,\ 8x - 3y + 2z = 20,\ 4x + 11y - z = 33$.

18. Interpolate the value of the function corresponding to $f(x) = 4x + x$ using Lagrange's interpolation formula from the following set of data.

x	2	3	5	8	12
$f(x)$	10	15	25	40	60

19. Solve the equation $\frac{dy}{dx} = 1 - y$ with the initial condition $x = 0,\ y = 0$ using Euler's method and find the solution at $x = 0.1, 0.2, 0.3, 0.4$. Compared the results with improved Euler's method.

20. Compute the value of $\log_e^2 = \int_0^1 \frac{dx}{x}$ using Simpson's $\frac{1}{3}$ rule. Take 4 equal intervals in (1, 2).

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F–0639	Sub. Code
	7MPH2C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Second Semester

Physics

SOLID STATE PHYSICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is meant by crystal classes?

2. Define a reciprocal lattice.

3. Mention the any four Elastic Properties.

4. What is Quantization of lattice?

5. Define Hall effect.

6. What is meant by Matthiessen's rule?

7. List the different type of polarization.

8. Define dielectric materials.

9. Give any four properties of Super Conductor.

10. State Curie-Weiss law.

Part B (5 × 5 = 25)

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

11. (a) Describe the structure of Sodium Chloride Crystal with neat diagram.

Or

(b) Explain the powder Crystal method.

12. (a) Derive the Elastic waves in cubic crystals waves in [100] directions.

Or

(b) Explain the analysis strain and stiffness constants.

13. (a) Write a note on tight-bonding approximation of electron in a crystal.

Or

(b) Explain the effective mass and density of status.

14. (a) Explain the dia and para magnetisum theory.

Or

(b) Write a short on following.

(i) Dielectric Constant

(ii) Dielectric Loss

(iii) Polarizability

15. (a) Explain the BCS theory of Super Conductivity.

Or

(b) Discuss the occurrence of Super Conductivity.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain the crystal structure of SC, FCC and BCC. Calculate the packing fraction of each.

17. Discuss the lattice with two atoms primitive cell and Describe Quantization of lattice vibrations.

18. (a) Explain the Kroning penny model.

    (b) State Bloch function and theorem.

19. Derive the Clausius- Mossotti relation. Mention its limitations.

20. Explain the following.

    (a) Experimental and theoretical survey of Super Conductor

    (b) Describe the Josephson effect underlying a SQUID.

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F–0640	Sub. Code
	7MPH2C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Second Semester

Physics

MATHEMATICAL PHYSICS – II

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Give any two Properties of Laplace transform.

2. Write down the Laplace transform of $f(t) = e^{at}$.

3. Give the Vibrating String equation.

4. Write a note on Separation of Variables.

5. What is meant by rank of a tensor.

6. Differentiate Symmetric and asymmetric tensor.

7. Write a note on Factor group.

8. Show that the order of every element of a group (G,0) of finite order is finite.

9. Write down the differential equation of Legendre Polynomial.

10. Show that $\int_{-1}^{1} P_0(x)dx = 2$.

Part B (5 × 5 = 25)

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

11. (a) Obtain the Laplace transform of $\frac{\cos\sqrt{t}}{\sqrt{t}}$.

Or

(b) Find the Laplace transform of the function $f(t) = \frac{Sinat}{a}$.

12. (a) Deduce the least Conducting equations using Partial differential equations.

Or

(b) Explain the Laplace transform method in Partial differential equation.

13. (a) Prove that the Kronecker Symbol δ_i^k is a tensor where Components are the same in every coordinate system.

Or

(b) Give any one applications to the dynamics of a particle using tensor.

14. (a) Outline the Various classes of the group and group representation.

Or

(b) Explain the main features of reducible and irreducible representations.

15. (a) Show that $J_{3/2}(x) = \sqrt{\frac{2}{nx}}\left(\frac{Sinx}{x} - Cos\,x\right)$.

Or

(b) Using Rodigue's Formula Prove that $\int_{-1}^{+1} P_n(x)\,dx = 0$.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. State and Prove Convolution theorem.

17. Derive the partial differential equation for Longitudinal and transverse Vibration of a beam.

18. Show that the Covariant derivative of an invariant is the same as its ordinary derivative.

19. Explain the regular Permutation group isomorphic to the group $G = \{a,b,c,d\}$ with the Compositional table.

20. Solve the Laguerre's differential equation $xy''+(1-x)y'+dy = 0$, where λ is a Constant and obtain the Values of the first four Laguerre Polynomials

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F–0642

Sub. Code
7MPH2C4

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Second Semester

Physics

QUANTUM MECHANICS – II

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Write the equation of $H = H^o + H^1$ perturbation theory.

2. State the transition probability of Harmonic perturbation theory.

3. Define Born approximations.

4. Write down the expression for Einstein Coefficient.

5. Define Density matrix.

6. State Induced emission of radiation.

7. What is Negative Energy states.

8. Write an expression for Dirac relativity equation.

9. Define classical Hamiltonian equation.

10. Write an expression for Non–relativistic equation.

Part B (5 × 5 = 25)

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

11. (a) Explain the transition probability of harmonic perturbation theory.

Or

(b) State and explain the Fermi – Golden rule with its uses.

12. (a) Explain the scattering amplitude and cross section amplitude.

Or

(b) Elaborate the following terms with its uses :

(i) Coulomb potential,

(ii) Yukawa potential.

13. (a) State and explain the density matrix and give its applications.

Or

(b) Explain the induced emission from semi classical theory.

14. (a) State the following terms:

(i) Spin angular momentum,

(ii) Spin orbit coupling.

Or

(b) Explain the Negative Energy states.

15. (a) Explain the classical Hamiltonian equation and give its uses.

Or

(b) Write down the quantization of wave fields with examples.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe the theory of time dependant perturbation theory with its applications.

17. Derive an expression for Born approximation and its validity with partial analysis.

18. Derive the following terms of Einstein coefficient with its uses.

    (a) Spontaneous emission in the radiation field,

    (b) Induced emission in the radiation field.

19. Discuss in detail about Dirac equation in the electromagnetic field with its uses.

20. Describe Quantization of Electromagnetic field in terms of Energy and Momentum.

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F–0643

Sub. Code
7MPH3C1

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Third Semester

Physics

ATOMIC AND MOLECULAR PHYSICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What are LS and JJ coupling scheme?

2. State pauli's Exclusion principle.

3. Define : stark effect.

4. What is spontaneous emission?

5. Write about symmetric top and asymmetric top molecules.

6. Write about the principle of IR spectroscopy.

7. State the selection rules of Raman effect.

8. Write about Franck – Condon principle.

9. Define Bloch equation.

10. Write about the basic principle of NMR.

Part B (5 × 5 = 25)

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

11. (a) Derive the expression of radius and velocity of an electron in the n^{th} Bohr orbit of Hydrogen atom.

Or

(b) Deduce pauli's exclusion principle.

12. (a) Describe the main feature of the observed stark effect, with its theoretical explanation.

Or

(b) State and derive the Einstein's A and B coefficient in laser.

13. (a) Explain the linear, symmetric and asymmetric top molecules.

Or

(b) Write about the theory of vibrational – rotational spectrum of diatomic molecules.

14. (a) Derive Raman effect and explain the selection rules.

Or

(b) Briefly explain about the rotational fine structure of electronic vibrational transitions.

15. (a) Explain the following:

(i) Chemical shift,

(ii) Chemical constant.

Or

(b) Explain the basic postulates of NMR spectroscopy.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Based on vector atom model, explain the various quantum numbers available to define the quantum states of an electron.

17. Briefly explain the quantum mechanical description of normal zeeman effect with spectral diagram.

18. Discuss the intensities of rotational lines produced by a non–rigid rotator. How is Jmax related to the absolute temperature 'T' of the molecules.

19. Discuss the rotational and vibrational Raman shift of a diatomic molecules.

20. Briefly explain the basic principle, working and construction on NMR used in free radical studies and biological applications.

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F–0644	Sub. Code
	7MPH3C2

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Third Semester

Physics

NUCLEAR AND PARTICLE PHYSICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What do you meant by parity?

2. Define nucleon potential.

3. What do you meant by non–conservation of parity?

4. State the principle of Ionization chamber.

5. Define fusion process.

6. What do you meant by pinch effect?

7. Define pickup nuclear reaction.

8. State conservation of parity.

9. Define weak interaction.

10. What do you meant by charge conjugation?

Part B (5 × 5 = 25)

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

11. (a) Write short note on Binding energy.

Or

(b) Discuss in detail about charge symmetry of nuclear forces.

12. (a) Explain the Gamow's theory of alpha decay.

Or

(b) Write short note on interaction of charged particles.

13. (a) Explain the working of power type reactors.

Or

(b) Write short note on mass and energy distribution of nuclear fragments.

14. (a) Write short on direct nuclear reaction.

Or

(b) Discuss in detail about the nuclear cross section.

15. (a) Explain the symmetry in C, P and T.

Or

(b) Derive the Gellmann Nishijima formula.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss in detail about Yukawa's meson theory.

17. Explain the Fermi theory of Beta decay.

18. Explain the principles and working of Betatron.

19. Derive the expression for Q – value equation.

20. Discuss in detail about CPT theorem.

F–0645	Sub. Code
	7MPH3C3

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Third Semester

Physics

ADVANCED ELECTRONICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Give the principle of LASER diode.
2. Write a short note on frequency dependence.
3. Write down the basic principle of operational amplifier.
4. Define analog computation.
5. Draw the RS Flip flop circuit.
6. Write a note on Charged coupled devices(CCD)
7. Define wave shaping circuit.
8. Mention the accuracy of DAC Circuit.
9. List out the types of pulse modulations
10. Give the principle of Reflex Klystron.

Part B (5 × 5 = 25)

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

11. (a) Draw and explain the V-I Characteristics of a P – N Junction diode.

Or

(b) Explain the construction of SCR characteristics under different conditions.

12. (a) Discuss the operation of a integrator circuit.

Or

(b) Elaborately explain the RC active filters.

13. (a) Differentiate between asynchronous and synchronous counters.

Or

(b) Discuss the function of static and dynamic RAM'S.

14. (a) Describe the Wien bridge oscillator with the neat sketch.

Or

(b) Discuss the R-2R ladder DAC network with suitable explanation.

15. (a) With a neat diagram, explain the frequency spectrum of FM Waves.

Or

(b) Explain the working of IMPATT diode.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss JFET as an amplifier having common source configuration. Obtain an expression for its voltage gain.

17. Derive an expression for the voltage gain of an inverting and non-inverting operational amplifier.

18. Explain the type of shift register with its working function.

19. Explain the principle and working of a successive approximation of A/D Converter.

20. Explain the Amplitude modulation theory and SSB techniques of Amplitude modulation.

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F–0646

Sub. Code
7MPHE2A

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Third Semester

Physics

Elective – MICROPROCESSOR AND MICROCONTROLLERS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are the functions of HOLD and HLDA pins?
2. Enumerate the various logical instructions.
3. What is synchronous data transfer?
4. What is the functions of DMA Controller?
5. List out the flags of 8051.
6. Give the features of the 8051 microcontroller.
7. What are the call instructions in 8051?
8. What are the data transfer instructions of 8051?
9. What are data acquistion system?
10. What are the various interfaces available in 8051?

Part B (5 × 5 = 25)

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

11. (a) Explain data transfer instruction of 8085 microprocessor with example.

Or

(b) Write an assembly language program to perform multiplication of two 8-bit numbers.

12. (a) Distinguish between synchronous data transfer and asynchronous data transfer.

Or

(b) Explain the functional block diagram of DMA controller.

13. (a) Explain in detail microcontroller hardware.

Or

(b) Write a short note on counter in 8051.

14. (a) Explain addressing modes employed in 8051 microcontroller.

Or

(b) Write an 8051 program to perform addition of two numbers.

15. (a) Describe how does seven segment display is connected to 8051.

Or

(b) Describe interface connections of pulse measurement.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain the addressing modes employed in 8085 in detail giving an example each.

17. Describe the architecture of programmable peripheral interface 8255A.

18. Describe the architecture of 8051 microcontroller.

19. Write an 8051 program to perform Multibyte addition and subtraction.

20. Explain the working of a traffic light controller using 8051 microcontroller.

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F–0648

Sub. Code
7MPHE3B

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Fourth Semester

Physics

Elective – ANALYTICAL INSTRUMENTATION

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. State Beer–Lambert law.
2. What are the types of Filters?
3. Write the working principle Atomic emission spectrometer.
4. What are the radiation sources if Infrared spectro photometry?
5. Define Raman Scattering.
6. Outline the advantages of using laser as a source for Raman spectroscopy.
7. Explain the basic principle of NMR.
8. Write the basic principle of ESR spectrometer.
9. What is the basic principle of flame emission spectrometry?
10. Compare the light source requirements for atomic absorption and atomic fluorescence spectrometry.

Part B (5 × 5 = 25)

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

11. (a) Explain the detail of Monochromators.

Or

(b) Explain the working of Photo-conductive cell.

12. (a) State the working of Concave-grating instruments of emission spectrometer.

Or

(b) Write short notes on Detectors and Readout devices.

13. (a) Explain the working and construction of Laser Raman spectrometer.

Or

(b) Write a short notes on production of X-ray.

14. (a) Write a short note on NMR Spectrometer.

Or

(b) Explain the concept of ESR Spectrometer.

15. (a) Describe construction, working of Atomic Absorption Spectrometry.

Or

(b) Distinguish between FES and AAS.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe the construction and working of Ultraviolet absorption spectrophotometry with neat block diagram.

17. Discuss in detail about the working of photographic and photoelectric detection.

18. Write a brief explanation about x-ray fluorescence spectrometer.

19. Explain in details about SEM and ESCA.

20. Write a short essay on Atomic Fluorescence Spectrometer.

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F–0649

Sub. Code
7MPHE4B

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Fourth Semester

Physics

Elective – COMMUNICATION ELECTRONICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define frequency modulation.

2. Define noise figure of circuit.

3. What is meant by pulse code modulation?

4. What is differential phase shift keying?

5. Write any two applications of magnetron.

6. Give the principle of IMPATT.

7. Compare a single mode step index with a multi mode step index fiber.

8. What is meant by fiber splicing?

9. What are the links in satellite communication?

10. Write a note on CDMA concept in satellite communication.

Part B (5 × 5 = 25)

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

11. (a) Distinguish between FM and AM.

Or

(b) Describe the half wave dipole.

12. (a) Compare frequency and time division multiplexing.

Or

(b) What is pulse frequency modulation? How PFM signal is generated.

13. (a) Compare the features of TRAPATT diode and Gunn diode.

Or

(b) Discuss the construction and working principle of reflex klystron.

14. (a) Discuss different types of fiber.

Or

(b) Explain various optical sources and detectors for optic fiber communication.

15. (a) What is a MARISAT satellite? Explain.

Or

(b) Write a brief note on multiple access cellular systems.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe the theory of AM. Obtain the relation for depth of modulation.

17. Explain in detail about

    (a) Amplitude shift keying

    (b) Frequency shift keying.

18. Derive an expression for RADAR range equation and explain.

19. Explain fiber connecting and splicing techniques.

20. Describe with a neat sketch, the architecture of GSM.

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F–0650	Sub. Code
	7MPHE5A

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Fourth Semester

Physics

Elective – ENERGY AND ENVIRONMENTAL PHYSICS

(CBCS – 2017 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Define Greenhouse effect.

2. State hydrostatic equilibrium.

3. Mention the signification of solar radiation.

4. What do you meant by solar energy collector?

5. Point out the advantages of Biogas plants.

6. What do you meant by digester?

7. List the types of fuel cells.

8. What are solar batteries?

9. What is heat island effect?

10. Give the factors governing Air pollution.

Part B (5 × 5 = 25)

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

11. (a) Elucidate the structure and thermodynamics of the atmosphere.

Or

(b) Discuss in detail about Indian monsoon.

12. (a) Write short note on solar radiation.

Or

(b) Derive the expression for energy balance equation.

13. (a) Explain the process of Biogas generation.

Or

(b) Enumerate the advantages and disadvantages of biogas plant.

14. (a) Explain how hydrogen is used for electricity generation.

Or

(b) Write short note on Fuel cells.

15. (a) Discuss the factor governing water pollution.

Or

(b) Write short note on land and sea breeze.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. State and briefly explain the Raynold' s transport theorem.

17. Discuss in detail about solar energy collector.

18. Explain the different types of biogas plants.

19. Elucidate the concept of hydrogen used as fuel.

20. Discuss in detail about water and air quality standards.

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