

This question paper contains **2** printed pages]

**NEPKR—01—2026**

**FACULTY OF SCIENCE AND TECHNOLOGY**

**M.Sc. (NEP) (First Year) (First Semester) EXAMINATION**

**APRIL/MAY, 2026**

**RESEARCH METHODOLOGY (Compulsory)**

**Paper NEPRM-1001**

**(Thursday, 16-4-2026)**

**Time : 10.00 a.m. to 12.00 noon**

*Time—2 Hours*

*Maximum Marks—45*

*N.B.* :— (1) Question No. 1 is compulsory.

(2) Solve any *two* questions from Q. No. 2 to Q. No. 5.

(3) Calculator and log table is allowed.

1. Write notes on :

5×3=15

(a) Research motive

(b) Need of research design

(c) Coding processing operation

(d) Statistical techniques in research

(e) Variables.

P.T.O.

2. (a) Explain in detail various steps involved in research process. 8
- (b) What is research hypothesis ? Give their characteristics. 7
3. (a) Give an account on good research design. 8
- (b) Describe types of research. 7
4. (a) Calculate the mean, median and mode of the following data : 8
- 3, 6, 3, 7, 4, 3, 9.
- (b) Describe interview method for the collection of primary data. 7
5. (a) Calculate the chi-square ( $\chi^2$ ) value of the following data : 8

Fully Agree	Not Sure	Not Agree	Total
102	108	28	238

- (b) Write an essay on case study. 7

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**NEPKR—89—2026**

**FACULTY OF SCIENCE AND TECHNOLOGY**

**M.Sc. (NEP) (First Year) (First Semester) EXAMINATION**

**APRIL/MAY, 2026**

**PHYSICS**

**Paper SPHYC-401**

**(Mathematical Methods in Physics)**

**(Saturday, 18-4-2026)**

**Time : 10.00 a.m. to 12.30 p.m.**

*Time—2½ Hours*

*Maximum Marks—60*

*N.B. :—* (1) *All questions carry equal marks.*

(2) *Question No. 1 is compulsory.*

(3) *Solve any three of the remaining five questions (Q. No. 2 to Q. No. 6).*

(4) *Figures to the right indicate full marks.*

1. Solve the following questions (Each question carries **3** marks) : 15

(a) Write down properties of Eigen Value.

(b) Prove that  $P_n(1) = 1$ .

P.T.O.

- (c) Find the Fourier sine transform of  $\frac{1}{x}$ .
- (d) Write a note on Transformation of vectors and matrices.
- (e) Define the residue at a pole.
2. (a) Show that for any square matrix A, the product of all the eigen value of AS is equal to  $\det(A)$ , and the sum of all the eigen values of A is equal to the sum of the diagonal elements. 8
- (b) What is meant by unitary matrix ? Prove that if A is unitary matrix, show that  $A^T$  also unitary and if A and B are two unitary matrices, show that AB is a unitary matrix. 7
3. (a) Show that Bessel's function  $J_n(x)$  is an even function wen  $n$  is even and is odd function when  $n$  is odd. 8
- (b) Prove that  $P_n(x)$  is the coefficient of  $z^n$  in the expansion of  $(1 - 2xz + z^2)^{-1/2}$  in ascending power of  $x$ . 7
4. (a) Derive linear, change of scale and shifting properties of Fourier transform. 8
- (b) Find the Laplace transform of  $[4 \cosh 2t \sin 4t]$ . 7
5. (a) State and Prove Laurent's theorem. 8
- (b) Find the Residue at simple pole. 7

6. Solve any *three* of the following (Each question carries **5** marks) : 15

- (a) Prove that the characteristic roots of a Hermitian matrix are all real.
- (b) Prove that  $2nJ_n = x(J_{n-1} + J_{n+1})$ .
- (c) Write a note on Laplace transform and prove that  $L(1) = \frac{1}{s}$ .
- (d) Prove that continuity is a necessary condition but not sufficient condition for the existence of a finite derivative.

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**NEPKR—189—2026**

**FACULTY OF SCIENCE AND TECHNOLOGY**

**M.Sc. (NEP) (First Year) (First Semester) EXAMINATION**

**APRIL/MAY, 2026**

**PHYSICS**

Paper SPHYC-402

(Classical Mechanics)

**(Tuesday, 21-4-2026)**

**Time : 10.00 a.m. to 12.30 p.m.**

*Time—2½ Hours*

*Maximum Marks—60*

*N.B. :— (i) All questions carry equal marks.*

*(ii) Question No. 1 is compulsory.*

*(iii) Solve any three of the remaining five questions Q. No. 2 to Q. No. 6.*

*(iv) Figures to the right indicate full marks.*

1. Solve the following questions (each question 3 marks) : 15

(a) Define an inertial reference frame. Give one example.

(b) What is meant by generalized momentum ?

(c) State the virial theorem.

(d) What are normal coordinates and normal modes ?

(e) Define generalized coordinates.

P.T.O.

2. (a) Define inertial reference frames. Derive the Galilean transformation equations. 8
- (b) Derive the condition for a force field to be conservative and give examples. 7
3. (a) Using the variational principle, derive the Lagrangian equation of motion. Discuss its physical significance. 8
- (b) Derive the Jacobi integral for a conservative system and state the condition under which it is valid. 7
4. (a) Derive Hamilton's equations of motion using the Hamiltonian principle. 8
- (b) State and prove Jacobi's identity and Poisson's theorem. 7
5. (a) Derive Euler's equations of motion for a rigid body rotating about a fixed point. 8
- (b) Derive the conditions for stable and unstable equilibrium of a system. 7
6. Solve any *three* of the following (Each question 5 marks) : 15
- (a) What is virtual displacement ?
- (b) State the variational principle (Hamilton's principle).
- (c) State the principle of least action.
- (d) Coordinate systems.

This question paper contains **3** printed pages]

**NEPKR—322—2026**

**FACULTY OF SCIENCE**

**M.Sc. (First Year) (First Semester) EXAMINATION**

**APRIL/MAY, 2026**

**PHYSICS**

(Numerical Techniques and C-programming)

**(Thursday, 23-4-2026)**

**Time : 10.00 a.m. to 12.30 p.m.**

*Time—2½ Hours*

*Maximum Marks—60*

*N.B. :—* (i) Question No. **1** is compulsory.

(ii) Solve any *three* questions from question nos. **2** to **6**.

(iii) *All* questions carry equal marks.

(iv) Use of scientific calculator is allowed.

(v) Figures to the right indicate full marks.

1. Solve the following questions (each question carries **3** marks) : 15

(a) Write the expression for forward and backward interpolation formula.

(b) Explain in brief the Runge-Kutta method.

(c) Define eigen value and eigen vector of a matrix.

(d) Define compiler and interpreter.

(e) Explain random numbers.

P.T.O.

2. (a) Find the cubic polynomial which takes the following values : 7

$x$	0	1	2	3
$f(x)$	1	2	1	10

evaluate  $f(4)$ .

- (b) Derive Newton's backward interpolation formula. 8
3. (a) Derive Simpson's  $\frac{1}{3}$ rd rule. 7
- (b) Explain Taylor series method in brief. 8
4. (a) Solve : 7

$$10x - 7y + 3z + 5u = 6$$

$$-6x + 8y - z - 4u = 5$$

$$3x + y + 4z + 11u = 2$$

$$5x - 9y - 2z + 4u = 7$$

by Gauss elimination method.

- (b) Find the eigen value and eigen vectors of matrix : 8

$$A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$$

5. (a) Write a C-program to calculate sum of numbers from 1 to 10. 7
- (b) Write a short note on flowchart symbols for input, output and decision-making statement. 8
6. Write notes on (Solve any *three*) : 15
- (a) Executable and non-executable statement
- (b) The principle of Least Squares
- (c) Newton's cotes formula
- (d) Parabolic partial differential equation.

This question paper contains 2 printed pages]

**NEPKR—44—2026**

**FACULTY OF SCIENCE AND TECHNOLOGY**

**M.Sc. (First Year) (Second Semester) EXAMINATION**

**APRIL/MAY, 2026**

**PHYSICS**

**Paper II (SPHYC-451)**

**(Quantum Mechanics)**

**(Friday, 17-4-2026)**

**Time : 10.00 a.m. to 12.30 p.m.**

*Time—2½ Hours*

*Maximum Marks—60*

*N.B. :—* (1) *All questions carry equal marks.*

(2) *Question No. 1 is compulsory.*

(3) *Solve any three questions from Q. No. 2 to Q. No. 6.*

(4) *Figures to the right indicate full marks.*

1. Solve the following questions :

15

(a) Explain Ket and Bra notations.

(b) Explain Spin Angular Momentum.

(c) Explain laboratory reference frame.

(d) Explain Fermi golden rule.

(e) State wave function and its physical significance.

P.T.O.

2. (a) Explain and derive the Schrodinger's time dependent wave equation. 8
- (b) Explain Unitary transformation in detail. 7
3. (a) Discuss the Clebsch-Gorden coefficients. 8
- (b) What is meant by rotational symmetry ? Explain the conservation of angular momentum. 7
4. (a) Explain the time independent perturbation theory in non-degenerate state. 8
- (b) Explain the Adiabatic and Sudden Approximations in detail. 7
5. (a) Explain the scattering by a square well potential. 8
- (b) What is meant by Identical Particles ? Derive Asymmetric wave function for N-particle system. 7
6. Write short notes on the following questions : 15
- (a) Wave function
- (b) Orbital angular momentum
- (c) Slater's Determinant
- (d) Fermi golden rule.



- (b) For an assembly of an ideal gas molecules obeying classical statistics (M-B statistics), show that free energy  $F = - NKT \log 2$ , if entropy  $S = NK \log 2 + E/T$ .
- (c) Write a brief note on the properties of liquid helium (He).
- (d) Discuss about phase space, ensembles and ensemble average.
- (e) Show that extension of phase volume in phase space is conserved.
2. (a) Obtain the Maxwell-Boltzmann velocity distribution formula. 7
- (b) Describe in detail the microcanonical, canonical, and grand canonical ensembles. 8
3. (a) Derive Richardson-Dushman equation for thermionic emission. 7
- (b) Derive an expression for mean square displacement in Brownian motion. 8
4. (a) Derive the Bose-Einstein distribution law for indistinguishable bosons. 7
- (b) State and explain Landau's theory of liquid helium anomaly (Helium-II). 8
5. (a) Discuss critical exponents in phase transition. 7
- (b) Explain the Landau theory of phase transitions. 8

6. Write notes on (solve any *three*, each question carries **5** marks) : 15

- (a) Energy fluctuations
- (b) White dwarf star
- (c) Bose-Einstein condensation
- (d) Electron gas.

This question paper contains 2 printed pages]

**NEPKR—241—2026**

**FACULTY OF SCIENCE**

**M.Sc. (First Year) (Second Semester) EXAMINATION**

**APRIL/MAY, 2026**

**PHYSICS**

**(SPHYC-453)**

**(Condensed Matter Physics—I)**

**(Wednesday, 22-4-2026)**

**Time : 10.00 a.m. to 12.30 p.m.**

*Time—2½ Hours*

*Maximum Marks—60*

*N.B. :-* (1) Question No. 1 is compulsory.

(2) Solve any *three* of remaining five questions (Q. No. 2 to Q. No. 6).

(3) *All* questions carry equal marks.

1. Solve the following questions :

15

(a) Define the following terms :

(i) Unit cell

(ii) Packing fraction

(iii) Co-ordination number.

(b) Describe properties of reciprocal lattice.

(c) Explain in brief pseudopotential model in short

P.T.O.

- (d) Explain characteristics of Fermi surface.
- (e) Describe with suitable diagrams edge dislocation and screw dislocation in crystal lattice.
2. (a) How many atoms are there in BCC and FCC unit cells ? Calculate the packing fraction of BCC and FCC structures. 8
- (b) Show that five fold axis of rotation is not compatible with a lattice. 7
3. (a) Show that reciprocal lattice of BCC lattice is FCC lattice. 8
- (b) Describe powder method of crystal structure determination. 7
4. (a) Explain in detail orthogonalized plane wave model. 8
- (b) State and prove Bloch theorem. 7
5. (a) Distinguish between Fermi surface and Brillouin zone. 8
- (b) Give an account of de Haas-Van Alphen effect. 7
6. Write short notes on any *three* : 15
- (a) Miller indices
- (b) Line defects
- (c) Distinction among metal, insulator and insulator
- (d) Characteristics of Fermi surface
- (e) Properties of reciprocal lattice.

This question paper contains 2 printed pages]

**NEPKR—20—2026**

**FACULTY OF SCIENCE**

**M.Sc. (Second Year) (Third Semester) EXAMINATION**

**APRIL/MAY, 2026**

**(CBCS/NEP-2020 Pattern)**

**PHYSICS**

Paper SPHYC-501

(Electrodynamics)

**(Thursday, 16-4-2026)**

**Time : 2.00 p.m. to 5.00 p.m.**

*Time—Three Hours*

*Maximum Marks—80*

*N.B. :— (i) All questions carry equal marks.*

*(ii) Q. No. 1 is compulsory.*

*(iii) Solve any three of the remaining five questions (Q. Nos. 2 to 6).*

*(iv) Figures to the right indicate full marks.*

1. Solve the following questions (Each question carries 5 marks) : 20

(a) Explain the concept of radiation pressure.

(b) Derive the Fresnel's equation for to reflected in case of electric field parallel to the plane of incident.

(c) Derive an expression for the resultant electric intensity due to an array of antennae.

(d) Explain the 4-potentials in electrodynamics.

P.T.O.

2. (a) Obtain the Poynting's theorem for the conservation of energy in an electromagnetic fields. 10
- (b) State Maxwell's fields equations for the electromagnetic fields and obtain the scalar and vector potentials. 10
3. (a) Describe the rectangular wave guide in TE mode. 10
- (b) Derive the Fresnel's equation for to reflected in case of electric field normal to the plane of incident. 10
4. (a) Derive expressions for the field radiated by an accelerated charged particle at high velocities. 10
- (b) Explain in detail radiation field due to oscillating electric dipole. 10
5. (a) Discuss in detail electromagnetic field tensor. 10
- (b) Explain the 4-potential and 4-current in electrodynamics. 10
6. Write short notes on (each question carries **5** marks) : 20
- (a) Equation of continuity
- (b) Brewster's angle
- (c) Concept of retarded potential
- (d) Time dilation.

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**NEPKR—90—2026**

**FACULTY OF SCIENCE AND TECHNOLOGY**

**M.Sc. (Second Year) (Third Semester) EXAMINATION**

**APRIL/MAY, 2026**

**PHYSICS**

**SPHYC-502**

**(Nuclear and Particle Physics)**

**(Saturday, 18-4-2026)**

**Time : 2.00 p.m. to 5.00 p.m.**

*Time—3 Hours*

*Maximum Marks—80*

*N.B. :-* (1) Question No. 1 is compulsory.

(2) Solve any *three* questions from Q. No. 2 to Q. No. 6.

(3) *All* questions carry equal marks.

1. Solve the following questions (each question carries 5 marks) : 20

(a) Describe briefly the Rutherford scattering method of determining nuclear size.

(b) What is Compton Scattering ? Write the equation for the Compton shift.

(c) What are magic numbers ? List the observed magic numbers and explain their significance.

(d) What are the laws of successive transformation ? Give examples.

P.T.O.



This question paper contains 2 printed pages]

**NEPKR—190—2026**

**FACULTY OF SCIENCE**

**M.Sc. (Second Year) (Third Semester) EXAMINATION**

**APRIL/MAY, 2026**

**PHYSICS**

**Paper SPHYC-503A**

**(Electronics I : Microwave Devices)**

**(Tuesday, 21-4-2026)**

**Time : 2.00 p.m. to 5.00 p.m.**

*Time—Three Hours*

*Maximum Marks—80*

*N.B. :— (i) All questions carry equal marks.*

*(ii) Q. No. 1 is compulsory.*

*(iii) Solve any three of the remaining five questions Q. No. 2 to Q. No. 6.*

*(iv) Figures to the right indicate full marks.*

1. Solve the following questions (Each question carries 5 marks) : 20

(a) Discuss standing wave ratio.

(b) Explain in brief HBT.

(c) With neat diagram explain circulators in short.

(d) Discuss factors affecting range of Radar.

P.T.O.

2. (a) Discuss distribution parameters in case of two-wire transmission line and derive the transmission line equation. 10
- (b) What is a Smith chart ? Discuss its applications in microwave. 10
3. (a) Explain construction and principle of operation of Magnetron. 10
- (b) What are microwave solid state devices ? Explain HEMT. 10
4. (a) Enlist microwave Tee junctions and with neat diagram explain construction and working of H-plane Tee. 10
- (b) With neat diagram explain in detail microwave attenuator. 10
5. (a) Draw the block diagram of pulsed Radar system and explain each block. 10
- (b) Derive Radar range equation. 10
6. Write short notes on (Each question carries 5 marks) : 20
- (a) Types of microwave transmission lines
- (b) Reflex klystron
- (c) Microwave bend
- (d) Classification of Radar.

This question paper contains 2 printed pages]

**NEPKR—191—2026**

**FACULTY OF SCIENCE AND TECHNOLOGY**

**M.Sc. (Second Year) (Third Semester) EXAMINATION**

**APRIL/MAY, 2026**

**PHYSICS**

**Paper SPHYC-503B**

**(Fiber Optics and Lasers–I)**

**(Tuesday, 21-4-2026)**

**Time : 2.00 p.m. to 5.00 p.m.**

*Time—Three Hours*

*Maximum Marks—80*

*N.B. :— (i) Question No. 1 is compulsory.*

*(ii) Attempt any three questions from Q. No. 2 to Q. No. 6.*

*(iii) All questions carry equal marks.*

*(iv) Symbols have their meaning in the subject.*

1. Solve the following questions :

20

(a) Explain dispersion and losses in optical fiber.

(b) Describe vapour phase oxidation process.

(c) Explain the quantum theory of radiations.

(d) Give the applications of LASER in medical field.

P.T.O.

2. (a) What is acceptance angle of a fiber ? Find out the acceptance angle of a fiber if refractive index of the core and cladding is 1.55 and 1.50 respectively. 10
- (b) Explain electromagnetic mode theory and different modes in a planer waveguide. 10
3. (a) Describe in detail the vapour phase deposition technique for fiber synthesis. 10
- (b) Write a note on liquid phase technique of fiber drawing. 10
4. (a) What are the properties of LASER light ? 10
- (b) Prove the Einstein's relation  $A_{nm}/B_{nm} = h \omega_{nm}^3 / \Pi^2 C$ . 10
5. (a) Explain the applications of LASER in optical communication. 10
- (b) How is LASER used in medical surgery ? 10
6. Write short notes on the following : 20
- (a) Numerical aperture
- (b) Plasma activated CVD
- (c) Population Inversion
- (d) Applications of lasers in ranging and navigation.

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**SUBJECT CODE NO- NEPKR-45-2026**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**EXAMINATION SUMMER 2026**  
**M.SC. (SECOND YEAR) (SEM-IV)**  
**RESEARCH PUBLICATION ETHICS**  
**NEPRPE-1002**

[Time: 2:00 Hours]

[Max. Marks:40]

“Please check whether you have got the right question paper.”

- N.B. (i) Question No. 1 is compulsory.  
(ii) Solve any three questions from Question number 2 to 6

- Q1. Write note on:** **10**
- a) Scope of philosophy.
  - b) Principles of good scientific practices.
  - c) Objective of publishing paper.
  - d) Open access publication.
  - e) International standard book number.
- Q2.** **5**
- a) Write briefly on any two branches of philosophy.
  - b) Explain common form of scientific misconduct. **5**
- Q3.** **5**
- a) What constitute a violation of publication ethics? **5**
  - b) Mention various steps of Sherpa Romeo online resource to view detail of journal. **5**
- Q4.** **5**
- a) What are the characteristics of predatory journals? **5**
  - b) What is  $i_{10}$  index? calculate the  $i_{10}$  index of following citation. **5**

Rank	Citation
1	29
2	26
3	15
4	14
5	12
6	11
7	11
8	09
9	06

- Q5.** a) Define publication ethics. Discuss unethical practices prevalent in research publications. **5**  
b) What is plagiarism? Explain its types and importance in research. **5**

**Q6. Explain:**

- a) Types of ethics. **10**  
b) Salami slicing  
c) Elsevier  
d) Turnitin

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**NEPKR—141—2026**

**FACULTY OF SCIENCE**

**M.Sc. (Second Year) (Fourth Semester) EXAMINATION**

**APRIL/MAY, 2026**

**PHYSICS**

**(SPHYC-551)**

**(Energy Studies)**

**(Monday, 20-4-2026)**

**Time : 2.00 p.m. to 5.00 p.m.**

*Time— 3 Hours*

*Maximum Marks—80*

**N.B.** :— (i) All questions carry equal marks.

(ii) Question No. 1 is compulsory.

(iii) Solve any *three* of the remaining five questions (Q. No. 2 to Q. No. 6).

(iv) Figures to the right indicate full marks.

1. Solve the following questions (each question **5** marks) : 20

(a) Write a short note on the construction and working of silicon solar cells.

(b) Explain the principle of energy generation from ocean waves with a neat diagram.

P.T.O.

- (c) Discuss in detail the classification of water turbines with neat sketches and applications.
- (d) Explain the process of energy conservation planning and its key objectives.
2. Solve the following questions (each sub-question **10** marks) : 20
- (a) Write a detailed note on solar energy data (irradiance, insolation) and its application in designing solar power systems.
- (b) Explain conventional and non-conventional energy sources with examples and applications.
3. Solve the following questions (each sub-question **10** marks) : 20
- (a) Discuss various types of fuel cells and their applications.
- (b) Explain the construction and working principle of a non-barrage tidal power system.
4. Solve the following questions (each sub-questions **10** marks) : 20
- (a) Explain the basics of geothermal energy and describe its applications.
- (b) Describe the essential components of a hydroelectric system with a neat block diagram.

5. Solve the following questions (each sub-question **10** marks) : 20
- (a) Explain the types of natural resources and their importance for human society.
  - (b) Discuss in detail the various energy conservation legislations and their impact on industry and households.
6. Write short notes on (each question **5** marks) : 20
- (a) Photovoltaic technology
  - (b) Wave power devices
  - (c) Geothermal power plants
  - (d) Energy conservation planning.

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**NEPKR—242—2026**

**FACULTY OF SCIENCE**

**M.Sc. (Second Year) (Fourth Semester) EXAMINATION**

**APRIL/MAY, 2026**

**PHYSICS**

**Paper-SPHYC-552A**

(Electronics II : Microwave Measurements, Systems and Applications)

**(Wednesday, 22-4-2026)**

**Time : 2.00 p.m. to 5.00 p.m.**

*Time—3 Hours*

*Maximum Marks—80*

*N.B. :— (i) All questions carry equal marks.*

*(ii) Question No. 1 is compulsory.*

*(iii) Solve any three of the remaining five questions (Q. No. 2 to Q. No. 6).*

*(iv) Figures to the right indicate full marks.*

1. Solve the following questions (Each question carries 5 marks) : 20
  - (a) Define Antenna and explain the terms directivity and gain of an antenna.
  - (b) Discuss in short measurement of VSWR in microwave.
  - (c) Describe Planar inductor film.
  - (d) Enlist various types of radio communication.

P.T.O.

2. (a) What is lens antenna ? Explain its working and state various types of lens antenna. 10
- (b) What is microstrip antenna ? Explain principle of operation of it. 10
3. (a) What is calorimetric technique ? Explain it for microwave power measurement. 10
- (b) With neat diagram describe the measurement of Phase shift in a microwave network. 10
4. (a) Discuss the materials used for MMIC's fabrication. 10
- (b) Discuss fabrication technique for hybrid integrated circuit. 10
5. (a) Explain the method of measurement of dielectric constant and dielectric loss of the material. 10
- (b) Discuss in brief LOS microwave systems. 10
6. Write short notes (Each question carries 5 marks) : 20
- (a) E-Plane Horn antenna
- (b) Impedance Measurement
- (c) MMIC
- (d) TDR.

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**NEPKR—243—2026**

**FACULTY OF SCIENCE AND TECHNOLOGY**

**M.Sc. (NEP) (Second Year) (Fourth Semester) EXAMINATION**

**APRIL/MAY, 2026**

**PHYSICS**

**Paper-SPHYC-552B**

**(Fiber Optics and Lasers-II)**

**(Wednesday, 22-4-2026)**

**Time : 2.00 p.m. to 5.00 p.m.**

*Time—3 Hours*

*Maximum Marks—80*

*N.B. :— (i) All questions carry equal marks.*

*(ii) Question No. 1 is compulsory.*

*(iii) Solve any three of the remaining five questions (Q. No. 2 to Q. No. 6).*

*(iv) Figures to the right indicate full marks.*

1. Answer the following questions (Each 5 marks) :

20

(a) Write a note on LED characteristics.

(b) What is photoelectric effect ? Explain.

(c) Explain linear scattering losses.

(d) Discuss fiber core diameter measurement.

P.T.O.

2. (1) Explain injection laser diodes and optical emission from semiconductors. 10
- (2) Discuss structure and characteristics of double heterojunction LED. 10
3. (1) Discuss quantum efficiency and responsivity of  $p-n$  photodiodes. 10
- (2) Explain silicon reach through avalanche photodiodes. 10
4. (1) Discuss non-linear scattering losses. 10
- (2) Explain dispersion and its types in detail. 10
5. (1) Discuss the fiber refractive index profile measurement. 10
- (2) Explain fiber numerical aperture measurement. 10
6. Answer the following questions (Each 5 marks) : 20
- (1) Write a note on edge emitting LEDs.
- (2) Explain Photodiodes and its types.
- (3) What do you mean by Attenuation ? Explain.
- (4) Write a note on optical return loss in optical fibers.