MANIPAL
ACADEMY of HIGHER EDUCATION
(Institution of Eminence Deemed to be University)

Reg. No.

DEPARTMENT OF SCIENCES, III SEMESTER M. Sc. (Physics)
END SEMESTER EXAMINATION, NOVEMBER/DECEMBER 2023
THEORETICAL PHYSICS I [PHY-6005]
(CHOICE BASED CREDIT SYSTEM-2020)

Time: 3 Hours **Date: 7 December 2023** **MAX. MARKS: 50**

Note: (i) Answer all questions.
(ii) Answer the questions to the point.

Q. No.		Marks	CO	BL
1.	What do you mean by	2×5		I
(i)	crossing symmetry		CO1	
(ii)	asymptotic freedom		CO1	
(iii)	Mott scattering		CO3	
(iv)	charge conjugation		CO1	
(v)	weak interaction		CO1	
2.(i)	How do we measure the helicity of neutrinos experimentally?	5	CO1	I
(ii)	Using the Dirac theory prove that electrons have intrinsic spin.	5	CO3	II
3.(i)	Construct the Lie algebra of SU(N) group.	5	CO2	V
(ii)	Find all the irreducible representations of three flavor mesons.	3	CO2	I
(iii)	Explain covariant representations.	2	CO2	II
4.(i)	Prove that $S^{\dagger}\gamma^0 S = \gamma^0$, where S is the Lorentz transformation matrix.	5	CO3	V
(ii)	Construct all the billinear covariants with Dirac spinors.	5	CO3	III
5.(i)	Outline the Feynman rules for quantum electrodynamics.	5	CO3	II
(ii)	Draw the Feynman diagrams for $e^- e^-$ scattering. Write the expression of scattering amplitude by applying the Feynman rules. No need to simplify this expression	5	CO3	III