MANIPAL
ACADEMY of HIGHER EDUCATION
(Deemed to be University under Section 3 of the UGC Act, 1956)

Reg. No.										

DEPARTMENT OF SCIENCES, M. Sc. (Physics)
IV SEMESTER, END SEMESTER EXAMINATIONS
JULY 2020
Subject: THEORETICAL PHYSICS II (PHY-5014)
(REVISED CREDIT SYSTEM - 2017)

Time: 2 Hours **Date: July 2020** **MAX. MARKS: 25**

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

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1. Prove that $[\phi(\vec{x},t),\pi(\vec{y},t)] = i\delta^3(\vec{x}-\vec{y})$ is covariant. **[5]**

2. Obtain the expression of propagator for Dirac field. **[5]**

3. (i) How does the Gupta - Bleuler theory help to understand the quantization of electromagnetic field? Avoid mathematical details. **[3]**
(ii) What do you mean by gauge fixing? **[2]**

4. (i) What is normal ordering and time ordering? How are they taken care simultaneously in quantum field theory? **[3]**
(ii) What are virtual, on - shell, and off - shell particles? **[2]**

5. (i) How many types of regularization methods are there? **[3]**
(ii) What is ultra - violet divergence? **[2]**
