Seat No.: _____ Enrolment No.


# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2020**

**Subject Code:2173902 Date:21/01/2021**

**Subject Name:Spintronics**

**Time:10:30 AM TO 12:30 PM Total Marks: 56**

**Instructions:**

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

| | | | MARKS |
|---|---|---|---|
| **Q.1** | **(a)** | Define : Scattering in multilayer | **03** |
| | **(b)** | Explain: Periodic Super Lattice for magnetoresistance in vicinity of resistor network. | **04** |
| | **(c)** | Write a short note on Stern-Gerlach experiment. | **07** |
| **Q.2** | **(a)** | Write down various reasons for the spin scattering in Spintronics devices. | **03** |
| | **(b)** | Explain : Spin – Orbit interaction | **04** |
| | **(c)** | Explain working of Spin LED with necessary diagram. | **07** |
| **Q.3** | **(a)** | What do mean by Magnetic domain wall? | **03** |
| | **(b)** | Discuss real experiment problems associated with Spin-LED device. | **04** |
| | **(c)** | Explain :Spin photo electronic devices | **07** |
| **Q.4** | **(a)** | Define : Current driven domain wall motion | **03** |
| | **(b)** | Draw geometry for oblique Hanle geometry LED | **04** |
| | **(c)** | Briefly explain importance of history of electron spin for Spintronics. | **07** |
| **Q.5** | **(a)** | What do you mean by Quantum Mechanics. | **03** |
| | **(b)** | Explain : Role of ferromagnetic Heusler alloy in Spintronics devices | **04** |
| | **(c)** | Explain: Resistance change in multilayer structure. | **07** |
| **Q.6** | **(a)** | Draw current flows mechanism in CPP geometry in device. | **03** |
| | **(b)** | Explain: Scattering based magnetoresistance in multilayer. | **04** |
| | **(c)** | Write a short note on Domain wall velocity measurements. | **07** |
| **Q.7** | **(a)** | What is magnetization reversal process? | **03** |
| | **(b)** | Explain: Spin and exchange effect in quantum dot. | **04** |
| | **(c)** | Explain: domain-wall propagation and domain wall nucleation | **07** |
| **Q.8** | **(a)** | Sketch spin based silicon transistor with necessary notation. | **03** |
| | **(b)** | Explain role of Oxide-based tunnel injectors. | **04** |
| | **(c)** | Explain: Ratchet effect in domain wall. | **07** |