MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

TIME: 3 HOURS

SEVENTH SEMESTER B.TECH. (E & C) DEGREE END SEMESTER EXAMINATION **DECEMBER 2018/ JANUARY 2019** SUBJECT: MEMS (ECE - 4027)

| Instructions to candidates | |
|--|--|
| • Answer ANY FIVE full questions. | |
| • | Missing data may be suitably assumed. |
| 1A. | Explain a technique alternative to bulk micro machining. Bring out utilization of different materials in this process. |
| 1 B . | With neat schematics, describe two CVD techniques. Compare and contrast those two techniques with PVD techniques. |
| 1C. | Explain how real estate be saved in bulk-micro machining. |
| | (4+3+3) |
| 2A. | Explain LIGA process for fabricating high aspect ratio micro features. |
| 2B. | With neat diagram explain electrospray ionising system to analyse chemical / biological analytes by using Mass spectrometry. |
| | (5+5) |
| 3A. | a) Micro-needles are drug delivery devices. |
| | b) Neumann formula is |
| | c) Principle of dielectrophoresis is |
| | d) In Raman scattering, the scattered light has components. |
| 3B. | Describe fabrication and working of the Inter Digital Transducer (IDT) in SAW sensors. |
| | (4+6) |
| 4A | Describe the following: a) Calorimetric spectroscopy. b) Continuous flow micro-pumps. |
| 4B. | Describe mechanisms involved in dry etching techniques and its advantage over wet etching. |
| | (5+5) |
| | |

- 5A. State four applications of electronic nose along with its construction
- With neat diagram explain how Molecular gate be utilised as a filter-out the bio molecules. 5B.

(4+6)

MAX. MARKS: 50