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MANIPAL INSTITUTE OF TECHNOLOGY
(A constituent unit of MAHE, Manipal 576104)

VII SEM B.Tech (BME) DEGREE END-SEMESTER EXAMINATIONS, NOV-DEC 2018.

SUBJECT: TISSUE ENGINEERING (BME 4010)
(REVISED CREDIT SYSTEM)

Saturday, 1st December, 2018, 2 to 5 PM

TIME: 3 HOURS

MAX. MARKS: 50

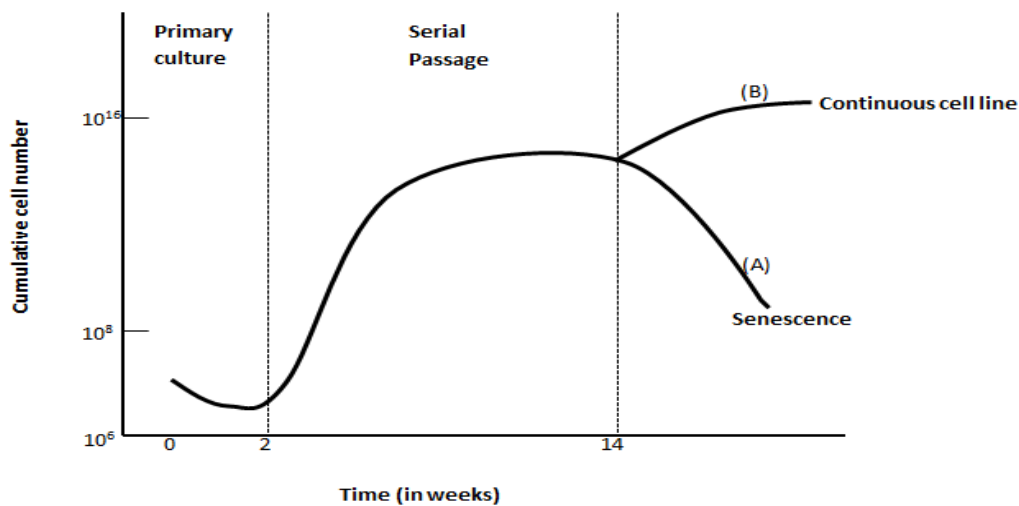
Instructions to Candidates:

- 1. Answer ALL questions.**
- 2. Draw labeled diagram wherever necessary.**

- | | |
|---|---|
| 1A. Explain the role of ectoderm and mesoderm in the development of dermis layer of skin. | 4 |
| 1B. Analyze ligand and receptor driven process involved in skin cell signaling (be specific with the answer) and also highlight the specific role of each component. | 6 |
| 2A. Explain the factors regulating asymmetric stem cell differentiation. | 3 |
| 2B. Explain briefly, the stages of isolation of mouse embryonic stem cells. | 4 |
| 2C. How do G1 phase regulators influence adult stem cell properties? What is the significance of cluster of differentiation (CD) molecule? | 3 |
| 3A. Silk proteins (sericin and fibroin) are biopolymers. How would you use these silk proteins to fabricate interconnected porous scaffold? Comprehend your strategies in logical manner. | 4 |
| 3B. Cross-linked 10 spherical alginate beads were prepared in a Laboratory. The beads are transparent and homogeneous. When all these beads were dipped in de-ionized water, the water level rose by 0.6ml (void volume). Calculate the diameter of each alginate bead. | 3 |
| 3C. What is porosity? How would you characterize porosity? Explain. | 3 |

- 4A. How would you prepare a “feeder cell” layer? 3
Can trypsin be used to dissociate human embryonic stem cell colonies *in vitro*?
- 4B. Compare “rate zonal” and isopycnic” gradient centrifugation methods of cell selection. 4
- 4C. What would be your strategy to select specifically chondrocyte cells from a mixed population of cells containing hepatocytes along with neural cells? 3

- 5A. 3



The graph indicates the development of cell lines. Analyze briefly, under what conditions- stage (B) can be satisfied (scales are indicative, not exact).

- 5B. How do embryonic stem cells counter the limitation of “Hay Flick number”? 3
- 5C. Explain the term passage and cell line. Mention the major components of tissue culture medium with purpose. 4