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# MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

*A Constituent Institution of Manipal University*

**II SEM M.Tech (BME) DEGREE END SEMESTER EXAMINATIONS APRIL 2018**
**SUBJECT: TISSUE ENGINEERING (BME 5239)**
**(REVISED CREDIT SYSTEM)**

**Friday, 27th April 2018: 9 AM to 12 Noon**

**TIME: 3 HOURS** **MAX. MARKS: 100**

**Instructions to Candidates:**

1. **Answer ALL questions.**
2. **Answer should be brief and to the point**

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| **1A.** | Classify different types of cells by their source. Mention the function of epithelial tissue. | **6** |
| **1B.** | Write down the principles of dry heat sterilization, moist heat sterilization and gamma ray sterilization. | **6** |
| **1C.** | How do hypotonicity and hypertonicity help in sterilization? Explain the role of membrane filters in the sterilization process. | **8** |
| **2A.** | Write down the development of heart during embryogenesis (highlight the role of germ layers). | **8** |
| **2B.** | Explain the working of an autoclave. | **6** |
| **2C.** | Explain the basic steps associated in cell signaling process. | **6** |
| **3A.** | What is the role of vasculo-endothelial growth factor in angiogenesis? Explain the working of an anti-VEGF therapy in cancer management. | **3+2** |

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| **3B.** | What is ‘neural crest cell’? Analyze cellular signaling steps associated in keratinocyte proliferation (be specific with the answer) | **2+4** |
| **3C.** | Explain the following stages of cell signaling of skin (highlight the role of different factors):<br><br>(i) Hemostasis and inflammation (ii) proliferation and (iii) remodeling.<br><br>Explain how does integrin regulate bidirectional signaling? | **6+3** |
| **4A.** | Compare ‘pluripotent’ and ‘multipotent’ stem cells. Discuss factors regulating asymmetric stem cell division. | **2+3** |
| **4B.** | Classify and explain stem cell niche. | **5** |
| **4C.** | Explain the steps associated in the isolation of human embryonic stem cells. How would you assess the potency of hematopoietic stem cells *in vivo*? | **6+4** |
| **5A.** | Explain the term ‘’passage’’ and ‘’cell lines’’.<br>Mention the major components of tissue culture medium with purpose. | **4+4** |
| **5B.** | What is “porogen”? How does it help in making porous scaffold? Explain. | **2+4** |
| **5C.** | Explain different gradient centrifugation techniques for cell selection. | **6** |