NAVRACHANA UNIVERSITY
a UGC recognized University

School: School of Science
Program/s: Biomedical Science
Year: 2nd **Semester:** IX
Examination: End Semester Examination
Examination year: December - 2022

Course Code: BM502   **Course Name:** Regenerative Biomedicine and Tissue Engineering
Date: 02/12/2022   **Total Marks:** 40
Time: 11:30 AM to 01:30PM   **Total Pages:** 2

Instructions:

➔ *Write each answer on a new page*
➔ *Draw neat and well-labelled diagrams wherever required*
➔ ** COs =Course Outcome mapping. # BTL =Bloom's Taxonomy Level mapping*

Q. No.	Details	Marks	COs*	BTL#
Q.1	Choose the correct option	12	CO1 CO2 CO3 CO4 CO5	BTL1 BTL2 BTL3

Q.1 Choose the correct option

1. Which of the following are not myeloid cells?
   a. Macrophages   b. Monocytes
   c. Neutrophils   d. T cells

2. Which one of the following genes was NOT part of transcription factors used to generate induced pluripotent stem (iPS) cells from mouse skin fibroblasts?
   a. Oct 4   b. Kfl 4
   c. C-jun   d. C-myc

3. What is the major concern of using retroviral vectors to deliver or activate pluripotent genes?
   a. Not very efficient and needs repeated transfections
   b. Slow and unstable
   c. Vector and transgenes remain in the genome and can be reactivated in differentiated cells
   d. Vector is integrated but is excised by transposase

4. What are stem cell scientists investigating today?
   a. When and how embryonic stem cells make decisions to produce more specialised cells
   b. How stem cells work in the body
   c. How stem cells might be used to treat disease
   d. All of the above

5. Neural stem cells from the brain can differentiate into which types of cell?
   a. Only specialized brain cells
   b. Specialized brain and skin cells
   c. All types of specialized cells
   d. Only specialized blood cells

6. Biomaterial belonging to _____ category, possess high tensile strength.
   a. Bioceramics   b. Biopolymers
   c. Metal alloys   d. All of the above

7. _____ which leads to _____ type of cell-cell interaction, chiefly drive the transformation process during epithelial to mesenchymal transition
   a. Cadherins, heterodimeric
   b. Integrins, homodimeric
   c. Selectins, homodimeric
   d. None of the above

8. Number of hematopoetic stem cells increase with response to the increase in the activity of _____ cells
   a. Osteoclasts
   b. Osteoblasts
   c. Mesenchymal cells
   d. None of the above

9. Stem cells for hair follicle niche are found in _____
   a. Dermal papilla
   b. Basal layer
   c. Dermal sheath
   d. None of the above

10. _____ cells generate inner root sheath and hair shaft during the growth phase of hair follicles
    a. Dermal papillae
    b. Matrix cells
    c. Dermal sheath
    d. None of the above

11. Wnt (ligand) is a _____
    a. Protein
    b. Lipoprotein
    c. Glycoprotein
    d. None of the above

12. The Wnt signalling in HSC niche is described as _____
    a. an autocrine induction
    b. an endocrine indusction
    c. a paracrine induction
    d. None of the above

Q.2	**Answer the following in short.** **Any six**			
	1. What are the differences between adult stem cells and embryonic stem cells? 2. What are induced pluripotent stem cells? 3. What is Somatic Cell Nuclear Transfer? 4. Where do human embryonic stem cells come from? 5. What are the key characteristics of biomaterials to be used for tissue engineering? 6. Explain types of epithelial to mesenchymal transitions and their specific roles in the development and survival of humans. 7. Define the roles of cells found in *"rosette structure"*. 8. Define the role of Slug/Snail during epithelial to mesenchymal transition.	12	CO1 CO2 CO3 CO4 CO5	BTL1 BTL2 BTL3
Q.3	**Answer the following in detail.** **Any four**			
	1. What are the types of mesenchymal stem cells? What can mesenchymal stem cells differentiate into? 2. Provide detailed insight into the gut-epithelial stem cell niche and explain the roles of various cell types. 3. Elaborate on your understanding of stem cells being used for neurodegenerative diseases. Citing an example of any one such disease; explain at length the application of stem cells in clinical application of treating neurodegenerative diseases. 4. For type I diabetes patients the only hope is beta cell regeneration and replacement. Give your views and discuss in detail the possibility of developing beta cells from stem cells for such application. Describe the underlined mechanism. 5. Write a detailed note on stem cell technology for drug discovery and development.	16	CO1 CO2 CO3 CO4 CO5	BTL1 BTL2 BTL3

************End of Question Paper************