2017

BIOTECHNOLOGY

Paper : T-402

STEM CELL BIOLOGY

Full Marks: 80
Time: 3 hrs

The figures in the margin indicate full marks for the questions

1. Answer the following questions (any eight): 8 X 1=8

a) What is the Niche? 1

i) A type of stem cell in the bone marrow

ii) Home of stem cells

iii) A cosmetic made from plant stem cells

iv) All of them

b) Expression of Sox, Nanog, Oct4 are found in 1

i) Specifically to non Stem Cells

ii) Specifically to all cells

iii) Characteristic Marker of a specific tissue

iv) Stem Cells

c) Increasingly, what does the acronym MSC stand for? 1

i) Modified Stem Cell ii) Mesodermal stem cells

iii) Mesenchymal Stem cells iv) Mesenchymal stromal cells

d) What does the acronym SCNT stand for? 1

i) Stem Cell Nuclear Transplant

ii) Somatic Cell Nuclear Transplant

iii) Stem Cell Nuclear Transfer iv) Somatic Cell Nuclear Transfer

e) What does Pluripotency mean? 1

i) Ability of a single cell to develop into an embryonic or adult stem cell

ii) Ability of a single cell to develop into many different cell types of the body

iii) Ability of a single embryonic stem cell to develop into a adult stem cell

iv) Ability of a single stem cell to heal different type of diseases.

f) What cells produced by therapeutic cloning are used to culture new tissue? 1

i) Nerve cells

ii) Inner cell mass

iii) Muscle cells

iv) Transplant cells

g) What are the unique properties of all stem cells? 1

i) Stem cells are unspecialized, capable of dividing and renewing themselves for long periods &can give rise to specialized cells

ii) Stem cells are unspecialized, capable of dividing and renewing themselves for 24 hours & give rise to specialized cells

iii) Stem cells are unspecialized, capable of dividing and renewing themselves for long periods & can give rise to unspecialized cells

iv) Stem cells are specialized, capable of dividing and renewing themselves for long periods & can give rise to specialized cells

h) Embryonic stem cells can differentiate into which types of cell? 1

i) Only brain stem cells and specialized brain cells
ii) All types of specialized cells
iii) Only cells that can produce insulin
iv) Only cells that can produce artificial skin

i) What cells produced by therapeutic cloning are used to culture new tissue? 1

i) Nerve cells
ii) Inner cell mass
iii) Muscle cells
iv) Transplant cells

2. Distinguish between (any six): 2X6=12

a) Osteoblast and endothelial Cells
b) Allograft and Xenograft
c) MHC-I and MHC-II
d) Hematopoetic Stem Cell and Adult Progenitor Cells
e) Tumour Specific Antigen and Tumour Associated Antigen
f) Suspension Culture and Monolayer Culture
g) Hematopoetic Stem Cell and Adult Progenitor Cells

3. Write short notes on (any four): 5X4=20

a) Regulation of Cell Cycle
b) Spermetogonial Stem cell
c) Autoimmune disease
d) Stem Cell Database
e) Stem Cell aging
f) Tissue Engineering

g) Graft rejection

h) Therapeutic Cloning

4. Answer the following (any two)

a) What is cell line? Descrine a process in detail about formation of cell line. 2+6=8

b) Write an assay of Organ culture in-vitro following a standard protocol. 8

c) Describe in detail the procedure for Hand Made Cloning. 8

d) Write a process for Cell harvesting after lymphocyte culture. 8

5. Answer the following (any two):

a) What is MSC? Elaborate the role of MSC in clinical application and therapy. 1+11=12

b) Describe the isolation and characterization of hematopoietic stem cells. 2+10=12

c) What is Cancer Stem Cell? Discuss the spectrum of target antigens associated with tumor immunity and alloimmunity after allogeneic hematopoetic stem cell transplantation. 2+8+2=12

d) Describe in detail the event of hemopoetic stem cell trafficking in embryohenesis and fetal development. 3+2+7=12

e) What is tissue engineering? Explain Skin gene therapy. Describe the role of biomaterial scaffold for constructing tissue and cell delivery. 3+2+7=12