

JEMAS(PG)-2022

QB No: 2101600001

**Subject: Fellowship in Regenerative Medicine & Translational Sciences. (FRMTS)**

**Duration: 90 minutes**

**No of MCQ: 100**

**Full Marks: 100**

**Instructions**

1. All questions are of objective type having four answer options for each, carry 1 mark each and only one option is correct. In case of incorrect answer or any combination of more than one answer,  $\frac{1}{4}$  mark will be deducted.
2. Questions must be answered on OMR sheet by darkening the appropriate bubble marked A, B, C, or D. Question booklet series code (A, B, C, or D) must be properly marked on the OMR.
3. Use only **Black/Blue ball point pen** to mark the answer by complete filling up of the respective bubbles.
4. Write question booklet number and your roll number carefully in the specified locations of the **OMR**. Also fill appropriate bubbles.
5. Write your name (in block letter), name of the examination center and put your full signature in appropriate boxes in the OMR.
6. The OMR is liable to become invalid if there is any mistake in filling the correct bubbles for question booklet number/roll number or if there is any discrepancy in the name/signature of the candidate, name of the examination center. The OMR may also become invalid due to folding or putting stray marks on it or any damage to it. The consequence of such invalidation due to incorrect marking or careless handling by the candidate will be sole responsibility of candidate.
7. Candidates are not allowed to carry any written or printed material, calculator, pen, log-table, wristwatch, any communication device like mobile phones etc. inside the examination hall. Any candidate found with such items will be **reported against** and his/her candidature will be summarily cancelled.
8. Rough work must be done on the question paper itself. Additional blank pages are given in the question paper for rough work.
9. Hand over the OMR to the invigilator before leaving the Examination Hall.



1. Embryonic stem cell has the ability to:
  - (A) Produce daughter cells that are an exact copy of itself.
  - (B) Produce daughter cells that are not an exact copy of itself.
  - (C) Produce daughter cells are not committed to differentiation.
  - (D) Present on the blastocoel of embryo.
2. Embryonic stem cells are generally cultured on feeder layer treated with:
  - (A) Mytomycin C.
  - (B) Amphotericin-B.
  - (C) Cryptolepine.
  - (D) UV irradiation.
3. Embryonic stem cells derivatives of the three primary germ layers: ectoderm, endoderm, and mesoderm. These germ layers generate each of the more than \_\_\_\_\_ in the adult human body.
  - (A) 120 cell types.
  - (B) 150 cell types.
  - (C) 200 cell types.
  - (D) 220 cell types.
4. What are induced pluripotent stem (iPS) cells, and what do they mean to stem cell research?
  - (A) The iPS cells, mean embryonic cells were made into adult-like cells.
  - (B) The iPS cells, mean adult cells were reversed to baby cells.
  - (C) The iPS cells, mean adult cells were made into embryo-like cells.
  - (D) The iPS cells, mean cells were totipotent and are now pluripotent.
5. Brain cells can be generated with which layer of embryonic stem cells and iPS cells:
  - (A) Endoderm.
  - (B) Mesoderm.
  - (C) Ectoderm.
  - (D) Hypoderm.
6. Capacitation of sperms during in vitro fertilization is performed using one of the chemical:
  - (A) LIF.
  - (B) Collagenase.
  - (C) Heparin.
  - (D) Sodium bicarbonate.
7. What type of stem cells are found in umbilical cord blood?
  - (A) Totipotent stem cells.
  - (B) Pluripotent stem cells.
  - (C) Multipotent stem cells.
  - (D) Unipotent stem cells.

8. James D. Watson and Francis H. Crick published their pioneering research work on DNA proposing the double helix structure of the DNA molecule in the year \_\_\_\_\_ .  
(A) 1944.  
(B) 1948.  
(C) 1953.  
(D) 1962.
9. Secretion of insufficient insulin causes:  
(A) Hypoglycemia.  
(B) Hyperglycemia.  
(C) Hydroglycemia.  
(D) Isoglycemia.
10. The spike (S) protein of SARS-CoV-2, which plays a key role in the receptor recognition and cell membrane fusion process, is composed of how many subunit(s) of protein:  
(A) 1 S1.  
(B) 2 S1 and S2.  
(C) 3 S1, S2 and S3.  
(D) 4 S1, S2, S3 and S4.
11. Oocytes and sperms can be generated from embryonic stem cells and the characterized of oocytes with markers are:  
(A) Lim28 and CD90.  
(B) Lim30 and CD90.  
(C) VASA and Stella.  
(D) CD14 and CD34.
12. Pluripotent stem cells can differentiate into:  
(A) Same type of daughter cells  
(B) Different types of other stem cells  
(C) Same type of other stem cells  
(D) Different types of daughter cells
13. Induced pluripotent stem cells are \_\_\_\_\_ in nature thus minimizing the chances of immune rejection.  
(A) Autologous.  
(B) Proliferative.  
(C) Differentiating.  
(D) Adherent.
14. What is the main risk factor when using embryonic stem cells in medical therapies?  
(A) The cells can cause infections after implantation.  
(B) Immune rejection of transplanted stem cells.  
(C) Embryonic cells can only differentiate into a limited number of tissues so they can't be used to treat very many disorders.  
(D) The cells will die as soon as they are implanted.

15. Controversies regarding stem cell-based therapy to human being which is one of the most important:
- (A) Current ethical issue.
  - (B) Destroy of embryos.
  - (C) Political issue.
  - (D) Religious issue.
16. Stem cell laws are the law, rules, and policy governance concerning the sources, research and uses in treatment of stem cells in humans which statements is false.
- (A) In the European Union, stem cell research using the human embryo is only permitted.
  - (B) It is totally illegal in Canada, Germany, Austria, Ireland, Italy, and Portugal.
  - (C) The issue has similarly divided the United States, with several states enforcing a complete ban and others giving support.
  - (D) In Asia, Japan, India, Iran, Israel, South Korea, China, and Australia are not working in Stem cell research.
17. Proteins are generally analyzed which one of the following technique:
- (A) Eastern blotting.
  - (B) Western blotting.
  - (C) Southern blotting.
  - (D) Northern blotting.
18. \_\_\_\_\_ strand breaks accumulate in long term Hematopoietic stem cells during aging of human beings.
- (A) DNA.
  - (B) RNA.
  - (C) Collagen.
  - (D) Peptide.
19. Stem cell are used for:
- (A) Treat some human diseases.
  - (B) Differentiate to blood cells.
  - (C) Protect from infection.
  - (D) Treat some abnormalities.
20. Embryonic stem cells are remained in a condition:
- (A) Not take it by the donors.
  - (B) Not a plentiful supply.
  - (C) Not begun to differentiate.
  - (D) Not impose an ethical laws.
21. As per the international society of cellular therapy mesenchymal stem cells are characterized based on:
- (A) CD44, and CD90 positive markers.
  - (B) Oct4, and Nanog positive markers.
  - (C) VASA, and DAZL positive markers.
  - (D) CD14, and CD45 positive markers.
22. CD34-positive hematopoietic progenitor cells can differentiate into a variety of cell types. Which one of these cells is wrong:
- (A) Adipocytes.
  - (B) Chondrocytes.
  - (C) Dermocytes.

(D) Myocytes.

23. Why might someone be against research on iPS cells even though they are not embryonic stem cells?
- (A) They think someone might use any kind of stem cell technology to try to clone a person.
  - (B) They think scientists who try to grow body parts out of stem cells are playing God.
  - (C) They are against studies on animals that are required before studies in people.
  - (D) All of the above.
24. What are pluripotent stem cells?
- (A) Can give rise to all the three germ layer including the extra embryonic tissue.
  - (B) Can give rise to all the three germ layer excluding the extra embryonic tissue.
  - (C) Can give rise to the mesoderm and ectoderm only.
  - (D) Can give rise to only the endoderm and mesoderm layer.
25. What are multipotent stem cells?
- (A) Can give rise to all the three germ layer including the extra embryonic tissue.
  - (B) Can give rise to all the three germ layer excluding the extra embryonic tissue.
  - (C) Can give rise to all the cells of a particular organ or tissue only.
  - (D) It can give rise to all the three germ layers excluding the extra embryonic tissue and form teratomas.
26. What is the role of Treg cells?
- (A) Help in immunosuppression, regulating and maintaining homeostasis.
  - (B) Help in CD8T activation, and maintaining homeostasis.
  - (C) Help in cell mediated immunity.
  - (D) Helps in humoral mediated immunity.
27. What are the ethical issues involved with embryonic stem cell research?
- (A) Destruction of a minimum of 8 to 9 human embryos for creating a human embryonic cell line.
  - (B) Forms chimera with more than one DNA different from the host.
  - (C) Formation of teratocarcinomas.
  - (D) Abortion of human embryos for donation.
28. What is a full thickness burn?
- (A) When the epidermis and dermis both get destroyed and goes down into the sub cutaneous tissue including the fat, muscles and even bones.
  - (B) When the epidermis gets destroyed only.
  - (C) When the epidermis gets fully destroyed with some degree of injury to the dermis.
  - (D) When the dermis gets destroyed.
29. What is Di George's Syndrome?
- (A) A disorder caused by a defect in Chromosome no.21 resulting in T cell deficiency, congenital heart problem, and frequent infections some of the many symptoms.
  - (B) A disorder caused by a defect in Chromosome no.22 resulting in T cell deficiency, congenital heart problem, and frequent infections some of the many symptoms.
  - (C) A disorder caused by a defect in Chromosome no.20 resulting in T cell deficiency, congenital heart problem, and frequent infections some of the many symptoms.
  - (D) A disorder caused by a defect in Chromosome no.19 resulting in T cell deficiency, congenital heart problem, and frequent infections some of the many symptoms.

30. What is translocation?
- (A) A type of chromosomal abnormality in which a chromosome breaks and a portion of it reattaches to a different chromosome.
  - (B) A type of chromosomal abnormality in which a chromosome breaks resulting in its deletion.
  - (C) A type of chromosomal abnormality in which a part of the chromosome gets duplicated.
  - (D) A type of chromosomal abnormality where there is a homologous recombination.
31. Cord blood predominantly contains what type of stem cells?
- (A) Hematopoietic stem cells.
  - (B) Neural stem cells.
  - (C) Very small embryonic stem cells.
  - (D) None of these.
32. When does HIV become AIDS?
- (A) When the CD4 T cell count becomes below 500 cells/mm<sup>3</sup>.
  - (B) When the CD4 T cell count becomes below 200 cells/mm<sup>3</sup>.
  - (C) When the CD4 T cell count becomes below 800 cells/mm<sup>3</sup>.
  - (D) When the CD4 T cell count becomes below 400 cells/mm<sup>3</sup>.
33. Mark the best answer for the disease erythroblastosis fetalis.
- (A) Hemolytic anemia of the fetus or newborn caused due to maternal immune system and blood group incompatibility.
  - (B) Hemolytic anemia of the fetus or neonate caused due to compromise in the placental barrier.
  - (C) Hemolytic anemia of the fetus or neonate caused due to low hemoglobin of the mother.
  - (D) Hemolytic anemia of the fetus or neonate caused due to the failure to form a functional hematopoietic system during the process of fetal development.
34. What is opsonization?
- (A) Process by which viruses get coated with social antibodies called opsonins so as to make them more attractive to phagocytic cells.
  - (B) Process by which bacteria get coated with social antibodies called opsonins so as to make them more attractive to phagocytic cells.
  - (C) Process by which protozoans get coated with social antibodies called opsonins so as to make them more attractive to phagocytic cells.
  - (D) Process by which fungi get coated with social antibodies called opsonins so as to make them more attractive to phagocytic cells.
35. How best a syngeneic transplant is defined?
- (A) A transplant with some degree of genetic match between the donor and the host.
  - (B) An auto-transplant from the host from one part to another.
  - (C) A transplant with few or less degree of genetic match between the donor and the host.
  - (D) A transplant between two identical twins.

36. What is the difference between necrosis and apoptosis?
- (A) In necrosis a programmed cell death, the cell swells and forms bleb whereas apoptosis is a sudden insult to the cell whereby the cell cytoplasm release granules with membrane disintegration.
  - (B) In necrosis a sudden cell death due to hypoxia or injury, the cell swells and releases all its contents whereas apoptosis is a programmed cells death where the caspase system gets activated and brings in about shrinkage of the cells and its lysis of the cytoplasmic content through formation of apoptotic bodies and blebbing.
  - (C) In necrosis a sudden cell death due to hypoxia or injury, the cell death is brought about caspases which results in the swelling of the cells and formation of blebs whereas apoptosis is a programmed cells death where the shrinkage of the cells occur with lysis of the cytoplasmic content.
  - (D) In necrosis perforins and granzymes play a major role in forming pores on the walls of the cells through which all the cytoplasmic contents are released whereas in apoptosis, a programmed cell death procedure is brought about Caspase where the cells shrink and release all its cytoplasmic contents.
37. Name the type of bone cell that is responsible for maintaining the stemness of the human bone:
- (A) Osteoclast.
  - (B) Osteoblast.
  - (C) Osteocyte.
  - (D) Osteogenic cells.
38. What are amniocytes?
- (A) Cells of the fetus that remains in the amniotic membrane and are considered to be multipotent stem cells with some features of embryonic stem cells also.
  - (B) Cells of the fetus that remain suspended in the amniotic fluid and are considered to be multipotent stem cells with some features of embryonic stem cells also.
  - (C) Cells of the fetus that remain in the Wharton's Jelly and are considered to be multipotent stem cells with some features of embryonic stem cells also.
  - (E) Cells of the fetus that remain suspended in the Cord blood and are considered to be multipotent stem cells with some features of embryonic stem cells also.
39. What is meant by specificity in ELISA?
- (A) Antibody binding solely to a unique epitope from a single antigen in a single species, or similar epitopes present on several molecules from a few different species is called specificity..
  - (B) Antigen binding solely to a unique epitope from a single antigen in a single species, or similar epitopes present on several molecules from a few different species is called specificity..
  - (C) The lowest detection level of the molecule of interest that the antibody pair used in any form of ELISA can detect.
  - (D) The lowest detection level of the molecule of interest that the antigen pair used in any form of ELISA can detect.
40. What is asymmetric division of stem cells?
- (A) Production of two daughter stem cells out of which one become a teratoma.
  - (B) Production of two stem cells out of which one undergoes apoptosis to maintain cell homeostasis and the other remain stem cell.

- (C) Production of two cells where one remains as a stem cell and the other develops into a progenitor and somatic cell specific to that tissue or organ.
  - (D) Production of two cells where one cell undergoes apoptosis to maintain the homeostasis and the other become an adult cell.
41. What is the role of HLA G in pregnancy?
- (A) Overexpression of HLA-G results in fetal rejection.
  - (B) HLA-G helps in the formation of placenta and maternal tolerance towards the fetus.
  - (C) HLA-G it helps in activation of the CD4T cells in activating the Th1 cell mediated profile.
  - (D) HLA-G helps in the activation of the CD8T cells and the plasma cells in fighting infection and foreign pathogens.
42. Based on which CD cell surface marker would you recognize tissue factor from a sample of other cells?
- (A) CD142+ is the specific CD cell surface marker for Tissue Factor.
  - (B) CD44+ is the specific CD cell surface marker for Tissue Factor.
  - (C) CD38+ is the specific CD cell surface marker for Tissue Factor
  - (D) CD11b + is the specific cell surface marker for tissue factor by which we can characterize it.
43. What is the composition of Leishman stain?
- (A) It consists of a mixture of eosin (an acidic stain), and methylene blue (a basic stain) in alcohol and is usually diluted and buffered before use.
  - (B) It consists of a mixture of neutro (a neutral stain), and methylene blue (a basic stain) in alcohol and is usually diluted and buffered before use.
  - (C) It consists of a mixture of zwitter ion (a neutral stain), and methylene blue (a basic stain) in alcohol and is usually diluted and buffered before use.
  - (D) It consists of a mixture of geisma (an acidic stain), and methylene blue (a basic stain) in alcohol and is usually diluted and buffered before use.
44. What is decellularization technique in tissue engineering and scaffold making process?
- (A) The process by which extracellular matrix and its proteins are removed through mechanical and chemical procedures.
  - (B) The process by which both extracellular matrix and its cellular components are removed through mechanical and chemical procedures.
  - (C) The process by which only cells are removed and not the extracellular matrix through mechanical and chemical procedures.
  - (D) The process where only stem cells are removed and not the extracellular matrix through mechanical and chemical procedures.
45. What is lung fibrosis?
- (A) Formation of excessive amount of mesenchymal stem cells and fibroblasts.
  - (B) Formation of excessive amount of leukocytes and fibroblasts.
  - (C) Deposition of excessive collagen or ECM by fibroblasts, macrophages in response to injury and chronic inflammation.
  - (D) Deposition of excessive collagen or ECM by mesenchymal stem cells, macrophages in response to injury and chronic inflammation.

46. What is the difference between Hodgkins and non Hodgkins lymphoma?
- (A) Hodgkin lymphoma is a malignancy of lymphocytes marked by the presence of Reed-Sternberg cells, mature B cells that have become malignant whereas Non-Hodgkin lymphoma is also a malignancy of lymphocytes and can be derived from B cells or T cells.
  - (B) Hodgkin lymphoma is a malignancy of lymphocytes marked by the presence of B or T cells whereas Non-Hodgkin lymphoma is also a malignancy of lymphocytes and can be derived from B cells and presence of Reed-Stsernberg cells.
  - (C) Hodgkin lymphoma is a malignancy of leukocytes marked by the presence of T cells whereas Non-Hodgkin lymphoma is also a malignancy of lymphocytes and can be derived from B cells and presence of Reed-Stsernberg cells.
  - (D) Hodgkin lymphoma is a malignancy of leukocytes marked by the presence of T cells only whereas Non-Hodgkin lymphoma is also a malignancy of leukocytes and can be derived from B cells and presence of Reed-Stsernberg cells.
47. What is the importance of LIF/STAT3 pathway in mouse embryonic stem cells?
- (A) It differentiates the mouse embryonic stem cells.
  - (B) It initiates the process of apoptosis in mosue embryonic stem cells.
  - (C) It helps in maintaining the self renewal property of mouse embryonic stem cells.
  - (D) It initiates the process of oxidative stress among mouse emryonic stem cells during their culture so that they undergo necrosis to prevent the formation of teratocarcinomas.
48. What is Pharmacodynamics?
- (A) Relationship of the host's body and how it is affecting the drug.
  - (B) Pharmacodynamics is the study of what the drug does to the body.
  - (C) Pharmacodynamics is the study of the absorption, distribution, metabolism and excretion of the drug.
  - (D) Pharmacodynamics is the study of the adverse events of the drug only.
49. Hysterotomy and hysterectomy are two very common surgical terms used during pregnancy. Which is the correct option that defines hysterotomy and hysterectomy?
- (A) Hysterectomy is a surgical procedure where there is a partial removal of the uterus with or without the female urogenital organs and Hysterotomy is the process where a surgical incision is made in the uterus during any operative procedure followed by other process of birth control like ligation.
  - (B) Hysterectomy is a surgical procedure where there is a total removal of the uterus with or without the female urogenital organs and Hysterotomy is the process where a surgical incision is made in the uterus during any operative procedure followed by other process of birth control like ligation.
  - (C) Hsterotomy is a surgical procedure where there is a complete or partial removal of the uterus with or without the female urogenital organs and Hysterectomy is the process where a surgical incision is made in the uterus during any operative procedure followed by other process of birth control like ligation..
  - (D) Hysterectomy is a surgical procedure where there is a total or partial removal of the uterus with or without the female urogenital organs and Hysterotomy is the process where a surgical incision is made in the uterus during any operative procedure followed by other process of birth control like ligation.

50. In cell count of mammalian cells, trypan blue dye is used. How does it work?
- (A) In dead cells it enters the nucleus and stains the intracellular proteins blue in colour as dead cells don't have an intact cell membrane unlike viable cells where it cannot enter inside the cytoplasm due to intact cell membrane.
  - (B) In dead cells it cannot enter the nucleus and stains blue in colour as dead cells have an intact cytoplasm unlike viable cells where the dye enters the nucleus.
  - (C) Trypan blue stain is a confirmatory stain that is used for marking the presence of mesenchymal stem cells (MSCs). It stains the mesenchymal stem cells cell membrane and gives it a blue appearance and helps in differentiating MSCs from the rest of the cells.
  - (D) Trypan blue is a dye that is used strictly to stain embryonic stem cells and their viability.
51. Alkaline phosphatase is used as a marker for which type of stem cells?
- (A) It is an enzyme that is highly upregulated in pluripotent stem cells only and therefore a pluripotent marker.
  - (B) It is an enzyme that is highly upregulated in fetal stem cells only and is therefore a marker of fetal stem cells.
  - (C) It is an enzyme that is highly upregulated in mesenchymal stem cells only and therefore a bio marker for mesenchymal stem cells.
  - (D) It is an enzyme that is highly upregulated in hematopoietic stem cells only and therefore a marker for hematopoietic stem cells.
52. What is the difference between blast and colony forming unit cells?
- (A) Blast consists of more primitive cells and can grow for a longer generation whereas colony forming unit consists of less primitive or more progenitor cells and therefore cannot grow for a longer generation.
  - (B) Both blast and colony forming units are the same as they both contain primitive hematopoietic stem cells that can grow for longer generations.
  - (C) Blast consists of more progenitor cells and can grow for a longer generation whereas colony forming unit consists of more primitive cells and therefore cannot grow for a longer generation.
  - (D) Blast are the primitive hematopoietic stem cells for mouse and Colony forming unit cells are the primitive hematopoietic stem cells for humans.
53. What is the first pass effect in delivering mesenchymal stem cells through the intravenous route?
- (A) Stem cells delivered through the IV route have to first pass through the lungs before they can distribute throughout the body especially to the site of injury. This presents a major problem with what has been termed the pulmonary "first-pass" effect, which results in significant entrapment of cells in the lungs rather than the injured organ.
  - (B) Stem cells delivered through the IV route have to first pass through the blood circulation before they can distribute throughout the body especially to the site of injury. This presents a major problem with what has been termed the pulmonary "first-pass" effect, which results in significant entrapment of cells in the lungs rather than the injured organ.
  - (C) First pass effect is defined as the effect by which stem cells when delivered through the intravenous route can result in their massive apoptosis due to change in the biological and biophysical environment.
  - (D) The phenomenon by which stem cells when delivered through the intravenous route can result in massive embolism resulting in blockage.

54. What medical procedure would you follow to detect a patient with meningitis apart from blood tests and CT scans?
- (A) Laminectomy.
  - (B) Lumbar puncture.
  - (C) Deep brain stimulation.
  - (D) Intrathecal injection.
55. What does the side scatter detect in the flow cytometry of stem cells?
- (A) Size of the stem cell.
  - (B) The complexity or granularity of a stem cell.
  - (C) Both the complexity or granularity and size of the stem cell.
  - (D) Helps in identification of the number of viable stem cells present.
56. How do stem cells maintain tissue homeostasis?
- (A) By undergoing asymmetric cell division where one stem cell produced enters a quiescent stage and the other cell differentiates to become a tissue specific cell and thereby maintaining the balance between differentiated and undifferentiated cells.
  - (B) By undergoing symmetric cell division where both stem cells are produced and enters a quiescent stage therefore making the stem cell pool large enough.
  - (C) By undergoing asymmetric cell division where one stem cell produced enters a quiescent stage and the other stem cell undergoes apoptosis thereby maintaining the balance between differentiated and undifferentiated cells.
  - (D) By undergoing symmetric cell division where both stem cells produced undergoes tissue specific differentiation into adult cells or tissue specific cells.
57. Why cord blood transfusion can be an attractive method to treat ischemic and hypoxia induced injuries?
- (A) Cord blood has higher oxygen binding capacity.
  - (B) Cord blood has lower oxygen binding capacity.
  - (C) Cord blood has higher affinity for 2,3-Diphosphoglyceric acid.
  - (D) Cord blood has no affinity for 2,3-Diphosphoglyceric acid.
58. What are the three different class of Bio Safety Cabinet for animal and human cell culture?
- (A) Class I, Class IIA, Class III.
  - (B) Class I, Class IIA, Class IIB.
  - (C) Class I, Class II, Class III.
  - (D) Class I, Class IA, Class IIA.
59. Structurally how does fetal hemoglobin differ from adult hemoglobin?
- (A) HbF or fetal hemoglobin has two alpha and two Gamma sub units whereas HbA or adult hemoglobin has two alpha and two beta sub units.
  - (B) HbF or fetal hemoglobin has two alpha and two beta sub units whereas HbA or adult hemoglobin has two alpha and two gamma sub units.
  - (C) HbF or fetal hemoglobin has two alpha and two Delta sub units whereas HbA or adult hemoglobin has two alpha and two beta sub units.
  - (D) HbF or fetal hemoglobin has two alpha and two beta sub units whereas HbA or adult hemoglobin has two alpha and two delta sub units.

60. Pdx1 expressing pluripotent stem cells are the earliest markers for pancreatic differentiating cells and can develop into mature pancreatic cells. They help in the secretion, survival and maintenance of what type of pancreatic cells?
- (A) Alpha cell producing the hormone glucagon.
  - (B) Delta cells producing the hormone somatostatin.
  - (C) Beta cells producing insulin.
  - (D) PP cells which produces the pancreatic polypeptide.
61. How would you identify stem cells developing into neuronal cells from a group of cells present in the tissue culture?
- (A) By looking for specific neuronal markers like Nestin, NeuN using flow cytometry and Immunofluorescence.
  - (B) By looking for specific neuronal markers like SSEA-1 and GFAP.
  - (C) By looking for specific neuronal markers like SSEA-3 and Ki67.
  - (D) By looking for specific neuronal markers like SSEA-4 and NeuN.
62. What are reed sternberg cells?
- (A) These are large, abnormal lymphocytes that may contain more than one nucleus and is found in Hodgkins Lymphoma.
  - (B) These are large, abnormal lymphocytes that may contain more than one nucleus and is found in Non Hodgkins Lymphoma.
  - (C) These are large, abnormal lymphocytes that may contain more than one nucleus and is found in Multiple myeloma.
  - (D) These are large, abnormal leukocytes that may contain more than one nucleus and is found in Multiple myelomas.
63. Why porous scaffolds are important for stem cell tissue engineering?
- (A) Porous scaffolds helps in cell adhesion, proliferation and growth.
  - (B) Porous scaffolds give support to specific tissues like cartilage and muscles for support and cells cannot be seeded because of its porosity.
  - (C) Porous scaffolds helps in cthe synthesis of Collagen I.
  - (D) Porous scaffolds helps in cthe synthesis of Collagen II.
64. What is apoptosis?
- (A) Sudden insult to the cell resulting in mitochondrial dysfunction and production of reactive oxygen species.
  - (B) The process by which cells increase in their overall size, swell up and release the intracellular contents.
  - (C) Programmed cell death by which cells decrease in their size and forms bleb.
  - (D) The process by which cells increase in their overall size, swell up and release the intracellular contents in the form of apoptotic bodies.
65. What will happen when Mesenchymal stem cells are seeded onto an aligned fibrous scaffold?
- (A) Collagen II will be up regulated in mesenchymal stem cells with cartilage synthesis or chondrocytes.
  - (B) Collagen I will be up regulated in mesenchymal stem cells with synthesis of fibrous tissue.
  - (C) Hyaline cartilage will be formed from mesenchymal stem cells.
  - (D) Due to non aligned nature of the scaffolds, mesenchynal stem cells will not grow and undergo apoptosis.

66. What does the Fc portion of an immunoglobulin do?
- (A) Fc portion directs the biological activity of the antibody by generating an appropriate immune response for a given antigen.
  - (B) Fc portion of the immunoglobulin has specificity for binding an epitope of an antigen.
  - (C) Fc portion of the immunoglobulin has specificity for binding an epitope of a drug.
  - (D) Fc portion of the immunoglobulin has specificity for binding an epitope of a T cell.
67. What is rheumatoid arthritis?
- (A) A chronic inflammatory disorder affecting many joints, including those in the hands and feet.
  - (B) It occurs when the protective cartilage that cushions the ends of the bones wears down over time damaging any joint, the disorder most commonly affects joints in your hands, knees, hips and spine.
  - (C) A chronic inflammatory disorder affecting the anterior cruciate ligaments of the knee.
  - (D) A chronic inflammatory disorder affecting the posterior cruciate ligaments of the knee.
68. What is the function of Alanine aminotransferase (ALT) in the liver?
- (A) The function of ALT is to convert alanine, an amino acid found in proteins, into l-glutamate and pyruvate, an important intermediate in cellular energy production.
  - (B) The function of ALT is to convert alanine, an amino acid found in proteins, into lactic acid, an important intermediate in cellular energy production.
  - (C) The function of ALT is to convert alanine, an amino acid found in proteins, into creatine phosphate, an important intermediate in cellular energy production.
  - (D) The function of ALT is to convert alanine, an amino acid found in proteins, into uric acid, an important intermediate in cellular energy production.
69. Why cord blood contains higher oxygen content than adult human blood?
- (A) Presence of adult hemoglobin.
  - (B) Presence of fetal hemoglobin.
  - (C) Because of high concentration of 2,3-DPG.
  - (D) Because of the presence of two alpha and two beta chains.
70. Mark the correct answer that is a marker for inflammation.
- (A) C reactive protein.
  - (B) Creatinine.
  - (C) Albumin.
  - (D) Urea.
71. Which of the following is false about cord blood banking :
- (A) Cord blood stem cells may support immune system during cancer treatments.
  - (B) Cord blood contains many stem cells.
  - (C) There is less chance of body rejecting the stem cells.
  - (D) More number of people can receive stem cells from cord blood.
72. What is a totipotent stem cell?
- (A) Can give rise to all the three germ layers i.e. ectoderm, endoderm and mesoderm.
  - (B) Can give rise to all the three germ layers i.e. ectoderm, endoderm and mesoderm including the extra embryonic tissues.
  - (C) Can give rise to the germ cells.

- (D) Can give rise to the cancer cells.
73. What is amniocentesis?
- (A) A procedure used to take out a small sample of the amniotic fluid for testing.
  - (B) A procedure used to take out a small sample of the amniotic membrane for testing.
  - (C) A procedure used to take out a small sample of the mesenchymal stem cells from the amniotic fluid for testing.
  - (D) A procedure used to take out a small sample of the erythroid cells from the amniotic fluid for testing.
74. What does the Fab part of the immunoglobulin does?
- (A) Fab portion directs the biological activity of the antibody by generating an appropriate immune response for a given antigen.
  - (B) Fab portion of the immunoglobulin has specificity for binding an epitope of an antigen.
  - (C) Fab portion of the immunoglobulin has specificity for binding an epitope of a drug.
  - (D) Fab portion of the immunoglobulin has specificity for binding an epitope of a T cell.
75. What is metastasis?
- (A) When cancer cells break away from primary cancer, travel through the blood or lymph system, and form new tumors.
  - (B) When cancer cells break away from secondary cancer, travel through the blood or lymph system, and form new tumors.
  - (C) When normal cells break away from secondary cancer, travel through the blood or lymph system, and form new tumors.
  - (D) When abnormal but not cancer cells break away from secondary cancer, travel through the blood or lymph system, and form new tumors.
76. What is osteoarthritis?
- (A) A chronic inflammatory disorder affecting many joints, including those in the hands and feet..
  - (B) It occurs when the protective cartilage that cushions the ends of the bones wears down over time damaging any joint, the disorder most commonly affects joints in your hands, knees, hips and spine..
  - (C) A chronic inflammatory disorder affecting the anterior cruciate ligaments of the knee.
  - (D) A chronic inflammatory disorder affecting the posterior cruciate ligaments of the knee.
77. How would you identify from a karyotype that whether the individual is male or female?
- (A) Having X and Y chromosomes.
  - (B) Having two X chromosomes with one of the X chromosomes inactivated.
  - (C) Having X and O chromosomes.
  - (D) Having two X and Y chromosomes.
78. Human Chorionic Gonadotrophin Hormone is secreted by which type of cells?
- (A) hCG, is produced specifically by the villous syncytiotrophoblast cells as pregnancy progresses.
  - (B) hCG, is produced specifically by the hypoblast cells as pregnancy progresses.
  - (C) hCG, is produced specifically by the epiblast cells as pregnancy progresses.
  - (D) hCG, is produced specifically by the primordial germ cells as pregnancy progresses.
79. What is granulation tissue in a wound?
- (A) A type of new connective tissue, and microscopic blood vessels and have three main functions like providing immunity to the area from further wound, proliferation of new cells and replaces necrotic tissue.

- (B) A type of new connective tissue, and microscopic blood vessels and have functions like inducing apoptosis to cells, providing immunity to the area from further wound, and angiogenesis.
  - (C) A type of new connective tissue, and microscopic blood vessels and have functions like inducing necrosis, providing immunity to the area from further wound, and angiogenesis.
  - (D) A type of new fibrous tissue, and microscopic blood vessels and have three main functions like providing immunity to the area from further wound, proliferation of new cells and angiogenesis and replaces necrotic tissue.
80. What is the function of Aspartate aminotransferase in the liver?
- (A) AST is a transaminase enzyme that catalyzes the conversion of aspartate and alpha-ketoglutarate to oxaloacetate and glutamate.
  - (B) To convert alanine, an amino acid found in proteins, into l-gutamate and pyruvate, an important intermediate in cellular energy production.
  - (C) To convert aspartate, an amino acid found in proteins, into creatine phosphate, an important intermediate in cellular energy production.
  - (D) To convert alanine, an amino acid found in proteins, into uric acid, an important intermediate in cellular energy production.
81. What is a stem cell?
- (A) A cell that can make copies of itself AND make more specialized types of cell.
  - (B) A cell that helps to fight against infections.
  - (C) A cell that is specialized.
  - (D) A cell that can produce all the cell types of the body.
82. Where can scientists obtain stem cells?
- (A) Only from an embryo.
  - (B) Only from tissues in the body.
  - (C) Only from the brain.
  - (D) From an embryo or tissues in the body.
83. Embryonic stem cells can differentiate into which types of cell?
- (A) Only brain stem cells and specialized brain cells.
  - (B) All types of specialized cells in the body.
  - (C) Only cells that can produce insulin.
  - (D) Only cells that can produce artificial skin.
84. The brain can differentiate into which types of cell?
- (A) Only specialized brain cells.
  - (B) Specialized brain cells and specialized skin cells.
  - (C) All types of specialized cells.
  - (D) Only specialized blood cells.
85. In the treatment of burns, scientists can use stem cells to help them replace:
- (A) All parts of the patient's skin.
  - (B) Hair follicles and sweat glands.
  - (C) The outermost layer of the skin.
  - (D) All parts of the skin except sweat glands.

86. What are cells 'fed' when they are grown in a lab?  
(A) Antibodies A.  
(B) Proteins and sugars B.  
(C) Salts.  
(D) Other cells.
87. A blastocyst is:  
(A) A very early stage embryo.  
(B) A type of stem cell.  
(C) Part of the blood system.  
(D) A type of brain cell.
88. When are blastocysts created in a laboratory?  
(A) At weekends.  
(B) When blood supplies are low.  
(C) During fertility treatment.  
(D) Whenever scientists are studying cells.
89. What are the roles of stem cells in our bodies?  
(A) We are not sure what roles stem cells play in the body.  
(B) They produce new specialized cells to replace cells that die or are used up.  
(C) They fight against infections.  
(D) They perform specialized roles in the body (e.g. produce insulin, transmit signals in the nervous system).
90. What are stem cell scientists investigating today?  
(A) When and how embryonic stem cells make decisions to produce more specialized cells.  
(B) How stem cells work in the body.  
(C) How stem cells might be used to treat disease.  
(D) All of the above.
91. Repetitive regeneration can be seen in:  
(A) Molluscs.  
(B) Tadpole.  
(C) Hydra.  
(D) None of these.
92. The method of asexual reproduction that can be called as a mode of regeneration is:  
(A) fragmentation.  
(B) budding.  
(C) sporulation.  
(D) binary fission.
93. Regeneration can be seen in which of the following  
(A) Plasmodium  
(B) Spongilla.  
(C) Earthworm.  
(D) Starfish.

94. Which of the following organs can be regenerated in Echinodermata?  
(A) Eyes.  
(B) Pedicellariae.  
(C) Arms and disc.  
(D) Digestive system.
95. The damaged leg is not regenerated in \_\_\_\_\_.  
(A) Frog.  
(B) Crab.  
(C) Salamander.  
(D) Frog's tadpole.
96. The repair by cell division in the damaged tissue is called \_\_\_\_\_.  
(A) Exponential growth.  
(B) Deaccelerating growth.  
(C) Epimorphosis regeneration.  
(D) Morphallaxis regeneration.
97. Restorative regeneration is \_\_\_\_\_.  
(A) Healing of wounds.  
(B) Formation of a new entity from a piece of the body of the parent.  
(C) A regular process in which the dead and worn-out cells of some organs are continuously replaced by new cells.  
(D) All of these.
98. Ability to give rise to a new individual entity from body parts is:  
(A) Reproduction.  
(B) Fragmentation.  
(C) Regeneration  
(D) Fission.
99. Regeneration of a limb or tail is an example of:  
(A) Epimorphosis.  
(B) Autotomy.  
(C) Compensatory hypertrophy.  
(D) Morphallaxis.
100. Epimorphosis is regeneration through:  
(A) The repatterning of existing cells as seen in hydra.  
(B) The reinitiation of division in existing cells, followed by patterning, as occurs in amphibians such as newts.  
(C) The repatterning of existing cells as seen in amphibians.  
(D) The reinitiation of embryonic growth from remaining cells as seen in Hydra.