

JEMAS(PG)-2022

QB No: 2102700001

**Subject: M. Phil in Regenerative Medicine & Translational Sciences (M. Phil RMTS)**

**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.



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1. What is the role of the T<sub>h</sub> or T<sub>fh</sub> or T<sub>follicular</sub> helper cells?
  - (A) These are found in secondary organs like tonsil and plays an important role in germinal center formation, maturation, and the development of most high affinity antibodies and memory B cells.
  - (B) These play an important role in cell mediated toxicity.
  - (C) These play an important role in humoral mediated immunity.
  - (D) These play an important role in immunoregulation, immunosuppression and homeostasis.
  
2. Pathogenesis of Multiple Sclerosis can be best related to:
  - (A) A non-inflammatory demyelinating disease of the CNS in which activated immune cells invade the central nervous system and cause neurodegeneration and tissue damage especially to the myelin sheaths.
  - (B) An inflammatory demyelinating disease of the CNS in which activated immune cells invade the central nervous system and cause inflammation, neurodegeneration and tissue damage especially to the myelin sheaths.
  - (C) An inflammatory demyelinating disease of the CNS in which due to viral infections, there is inflammation, neurodegeneration, and tissue damage especially to the myelin sheaths.
  - (D) An inflammatory demyelinating disease of the CNS in which activated immune cells invade the central nervous system and cause inflammation, neurodegeneration and tissue damage by destroying the dopaminergic neurons.
  
3. Why Triton X-100 buffer is preferable over other chemicals like Digitonin during immunofluorescent staining of stem cells or mammalian cells?
  - (A) Stronger non-ionic detergents, such as Triton X-100, permeabilize both the plasma membrane and interior membranes, allowing full access of the biological interactions under fluorescence microscope while preserving cell structure.
  - (B) Stronger ionic detergents, such as Triton X-100, permeabilize both the plasma membrane and interior membranes, allowing full access of the biological interactions under fluorescence microscope while preserving cell structure.
  - (C) Stronger non-ionic detergents, such as Triton X-100, permeabilize only the plasma membrane without doing much harm to the intracellular and nuclear membranes, while still preserving cell structure.
  - (D) Stronger non-ionic detergents, such as Triton X-100, permeabilize only the nuclear membrane while still preserving cell structure.
  
4. Klf-4 and c-Myc transcriptional factors along with Oct-3/4 and Sox2 can reprogram somatic cells into induced pluripotent stem cells. But there is a concern using c-Myc and Klf-4 as transcriptional factors responsible for transforming somatic cells into iPSCs why?
  - (A) Because of low reprogramming efficiency.
  - (B) Both Klf-4 and c-Myc helps in pluripotency but as these are also expressed in cancer cells therefore there is a chance of malignant transformation of the somatic cells.
  - (C) Because both these factors when introduced inside the somatic cells instead of reprogramming they make the cells undergo apoptosis.
  - (D) Klf-4 and c-Myc interfere with the other pluripotent transcription factors like SOX2, Nanog and Oct-3/4 and therefore instead of pluripotency, they direct the cell to undergo differentiation.

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5. Embryonic stem cells are derived from the \_\_\_\_\_ of the blastocyst.  
(A) Inner cell mass  
(B) Ectoderm  
(C) Blastocoel  
(D) Mesoderm
6. Embryonic stem cells are \_\_\_\_\_.  
(A) Pluripotent  
(B) Small  
(C) Large  
(D) Medium-sized
7. When was the first derivation of a human ES cell line (SCNT-hES-1)?  
(A) March 2004  
(B) March 2019  
(C) March 1950  
(D) March 1980
8. \_\_\_\_\_ is the technique used to detect genetic disorders?  
(A) (PGD) Proliferation  
(B) Gene therapy  
(C) Cell therapy  
(D) Preimplantation genetic diagnosis
9. Mesenchyme is derived from \_\_\_\_\_:  
(A) Adherent cells  
(B) Mesoderm  
(C) Ectoderm  
(D) Endoderm
10. \_\_\_\_\_ are connective tissue cells that form the supportive structure in which the functional cells of the tissue reside.  
(A) Mesenchymal stem cells  
(B) Ectodermal cells  
(C) Endodermal cells  
(D) Stromal cells
11. \_\_\_\_\_ is the most frequently utilized source of Mesenchymal stem cells.  
(A) Adrenal glands  
(B) Bone Marrow  
(C) Brain  
(D) Kidney
12. \_\_\_\_\_ are also known as somatic stem cells  
(A) Adult stem cells  
(B) Cancer cells  
(C) Endometrial cells  
(D) Epithelial cells

13. Ideally, \_\_\_\_\_ should also be clonogenic.
- (A) Red Blood cells
  - (B) Adherent cells
  - (C) Adult Stem cells
  - (D) Carcinoma cells.
14. Bone is a \_\_\_\_\_ tissue:
- (A) Connective
  - (B) Muscular
  - (C) Epithelial
  - (D) nervous
15. Formation of new bone tissue is known as \_\_\_\_\_.
- (A) Hematopoiesis
  - (B) Ossification
  - (C) Apoptosis
  - (D) Calcification
16. \_\_\_\_\_ are simply osteoblasts trapped in the matrix that they secrete.
- (A) Thrombocytes
  - (B) Hepatocytes
  - (C) Osteocytes
  - (D) Chondrocytes
17. \_\_\_\_\_ is rare, inherited neurodegenerative disorder characterized by a loss of medium spiny projection neurons in the striatum.
- (A) Huntington's disease (HD)
  - (B) Parkinson's Disease
  - (C) Cardiac myopathy
  - (D) Alzheimer's Disease
18. \_\_\_\_\_ is a progressive nervous system disorder that affects movement.
- (A) Myogenesis
  - (B) Hematopoiesis
  - (C) Thrombopoiesis
  - (D) Parkinson's disease
19. \_\_\_\_\_ produce the myelin sheath insulating neuronal axons.
- (A) Myocytes
  - (B) Osteocytes
  - (C) Oligodendrocytes
  - (D) Cardiomyocytes
20. The majority of neural tissue found in the CNS consists of two cell types, neuronal cells, and \_\_\_\_\_.
- (A) red blood cells
  - (B) adherent cells
  - (C) stem cells
  - (D) glial cells

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21. Induced pluripotent cells can be generated directly from \_\_\_\_\_.
- (A) adult cells
  - (B) cancer cells
  - (C) endometrial cells
  - (D) epithelial cells
22. \_\_\_\_\_ are the most well-known type of pluripotent stem cell.:
- (A) Red Blood cells
  - (B) Adherent cells
  - (C) Embryonic Stem cells
  - (D) Carcinoma cells.
23. Induced pluripotent stem cells are \_\_\_\_\_ in nature thus minimizing the chances of immune rejection.?
- (A) autologous
  - (B) proliferative
  - (C) differentiating
  - (D) adherent
24. \_\_\_\_\_ is a transcription factor essential in order to maintain the pluripotency of induced pluripotent stem cells.
- (A) TF-3
  - (B) TF-2
  - (C) TF-B
  - (D) Oct-3/4
25. Why equal volume of media is added to equal volume of trypsin after incubation of stem cells for 5 minutes with trypsin during the passaging of stem cells??
- (A) It is added just to make up a total volume having equal concentration of trypsin and media to help in the next step of centrifugation.
  - (B) Equal volume of trypsin and media is added to negate the harmful effect of trypsin on the stem cells that were kept for 5 minutes of incubation along with the trypsin.
  - (C) Equal volume of trypsin and Media will help in precipitation of the stem cells present in the solution.
  - (D) The equal volume of media is added to tyrpsin as trypsin doesn't contains any essential substances that are required for the stem cells to grow in the next step which is another round of incubation for 24 hours.
26. What is the importance of French Flag in stem cell medicine?
- (A) It shows the effect of morphogens on stem cell differentiation, with white meaning not enough morphogen, red meaning negative concentration of the morphogens and blue meaning enough morphogen concentration to activate stem cell differentiation.
  - (B) It shows the rate at which a stem cell proliferates or undergoes self-renewal, red means no proliferation, white means sub par or not optimal proliferation and blue means above par or optimal proliferation of stem cells.
  - (C) It relates to the upregulation and downregulation of cancer genes in cancer stem cells, with white showing no upregulation of the genes in cancer stem cells ,red showing downregulation of the genes in the cancer stem cells and blue showing upregulation of the genes in the cancer stem cells..
  - (D) It is a method used to see the potency of stem cells in vitro. Pluripotent stem cells are labelled as blue, multipotent stem cells are labelled as white and unipotent stem cells are labelled as red.

27. This best describes a polysome:
- (A) Active site for synthesis of lipids
  - (B) Active site for synthesis of proteins
  - (C) Active site for synthesis of DNA
  - (D) all of these
28. In protein synthesis, translocation is initiated with the movement of:
- (A) tRNA from P-site to the A-site
  - (B) dipeptidyl tRNA from A-site to P-site
  - (C) tRNA from A-site to P-site
  - (D) tRNA from P-site to E-site
29. The process by which protein synthesis from genetic code occurs is best described by?
- (A) Transcription
  - (B) Translation
  - (C) Treplication
  - (D) reproduction
30. Multiple myeloma is a cancerous disease of?
- (A) When excessive white blood cells are produced.
  - (B) When excessive plasma cells are produced.
  - (C) When excessive platelets are produced.
  - (D) When excessive lymphocytes are produced
31. Which is the best answer that fits the Th1 immune profile?
- (A) Humoral mediated.
  - (B) Cell mediated.
  - (C) Immunosuppression and homeostasis.
  - (D) Cytotoxic T lymphocyte mediated.
32. How best a syngeneic transplant is defined?
- (A) Transplantation between two twins having non-identical genotype.
  - (B) Transplantation between two individuals having identical genotype.
  - (C) Transplantation between two individuals having no identical genotype
  - (D) Transplantation between two twins having identical genotype.
33. What is cord blood transfusion:
- (A) Transfer of nucleated cells from one system to another.
  - (B) Transfer of non-nucleated cells from one system to another.
  - (C) Transfer of mononuclear cells from one system to another.
  - (D) Transfer of total nucleated cells from one system to another.
34. Mark the correct nuclear transcriptional marker for embryonic stem cells?
- (A) TRA 1-60.
  - (B) TRA 1-80.
  - (C) SOX2.
  - (D) SSEA-4.
35. What type of lipid makes the bi lipid layer of a cell??
- (A) Hydrophobic.
  - (B) Hydrophillic.
  - (C) Amphiphilic.
  - (D) Zwitter ion.

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36. In Huntington Chorea disease the molecular pathology for the cause of chorea is:
- (A) It is caused by a dominantly inherited CAG repeat expansion in exon 1 of the huntingtin gene (HTT).
  - (B) It is caused by a repeated expansion in exon 1 of the huntingtin gene (HTT) only.
  - (C) Is caused by a dominantly inherited GAG repeat expansion in exon 1 of the huntingtin gene (HTT).
  - (D) Is caused by a dominantly inherited GAaA repeat expansion in exon 1 of the huntingtin gene (HTT).
37. This is incorrect about the nature of genetic code Codons:
- (A) Universal
  - (B) Overlapping
  - (C) Commaless
  - (D) triplet
38. This elongation factor is known as translocase:
- (A) EFG
  - (B) EF2
  - (C) both (a) and (b)
  - (D) EF-Tu and EF-Ts.
39. This drug inhibits the initiation step of translation:
- (A ) Ricin
  - (B) Tetracycline
  - (C) Streptomycin
  - (D) Cyclohexylamine.
40. In translation, this is not an essential component:
- (A) Amino acid
  - (B) Ligase
  - (C) Mrna
  - (D) Anticodon
41. This identifies a particular amino acid and its cognate tRNA molecule:
- (A) Topoisomerase
  - (B) rRNA
  - (C) Ribosome
  - (D) tRNA synthetase
- 42 Protein synthesis corresponds to the process of:
- (A) Duplicating required DNA for synthesis of proteins
  - (B) Formation of amino acids from mRNA
  - (C) Formation of mRNA from DNA template
  - (D) Formation of amino acids from DNA template directly
43. This is considered to be the start codon:
- (A) AGG
  - (B) UAG
  - (C) GUG
  - (D) AUG



44. The enzyme required for transcription is:  
(A) RNAase  
(B) DNA polymerase  
(C) RNA polymerase  
(D) Restriction enzymes
45. Transcription is the transfer of genetic information from:  
(A) DNA to RNA  
(B) DNA to mRNA  
(C) mRNA to tRNA  
(D) tRNA to mRNA
46. What is the role of Sodium Dodecyl Sulphate in SDS PAGE?  
(A) It helps the proteins to run easily.  
(B) It helps in the separation of the protein.  
(C) Helps in unfolding of the tertiary structure of the protein and coats the protein with an uniform negative charge.  
(D) Helps in unfolding of the tertiary structure of the protein and coats the protein with an uniform positive charge.
47. 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) SSEA-1.  
(B) Sox2.  
(C) Oct-3/4.  
(D) Lin28.
48. What is Pharmacokinetics?  
(A) It is defined as to what the body does to a drug.  
(B) It is defined as to what the drug does to a body.  
(C) It is related to adverse drug interaction.  
(D) It is related to the efficacy of the drug.
49. Northern Blotting is used to detect?  
(A) DNA.  
(B) protein.  
(C) RNA.  
(D) virus.
50. Which is the primary hemoglobin that is present only during the embryonic life:  
(A) Gower II.  
(B) Gower I.  
(C) Portland I.  
(D) Portland II.
51. What are the challenges of artificially reconstructed teeth?  
(A) Production of dentin.  
(B) Production of enamel.  
(C) Production of pulp.  
(D) Production of both enamel and dentin.

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52. Sigma factor is a component of:  
(A) DNA ligase  
(B) DNA polymerase  
(C) Endonuclease  
(D) RNA polymerase
53. The main function of tRNA with regards to protein synthesis is:  
(A) Proof reading  
(B) Identifies amino acids and transports them to ribosomes  
(C) Inhibits protein synthesis  
(D) All of the above
54. One end of tRNA matches genetic code in three-nucleotide sequences known as:  
(A) Codon  
(B) Genetic code  
(C) Blunt ends  
(D) Anticodon
55. The longest primary transcript is generated by:  
(A) Dystrophin gene  
(B) Tintin gene  
(C) Neuromedin u  
(D) Centromere protein A
56. What is reproductive cloning?  
(A) It is a part of Somatic Cell Nuclear Technology where the enucleated egg cell and the somatic cell nucleus are fused together and then injected into a surrogate mother.  
(B) It is a part of Somatic Cell Nuclear Technology where the enucleated somatic cell and the nucleus from an egg are fused together and then injected into a surrogate mother.  
(C) It is a part of Somatic Cell Nuclear Technology where the enucleated egg cell and the somatic cell nucleus are fused together and the cultured under in vitro conditions to develop into an embryo.  
(D) Polycistronic lentiviral vectors are only compatible for transfecting adult somatic stem cells during their reprogramming into iPSCs unlike other vector systems.
57. What are polycistronic lentiviral vectors in induced pluripotent stem cells (iPSCs)?  
(A) Because they can transfect somatic stem cells or fibroblasts rapidly than retroviral vectors.  
(B) Polycistronic lentiviral vectors can deliver multiple genes or Yamanaka factors in reprogramming adult somatic cells into iPSCs which is essential  
(C) Polycistronic lentiviral vectors can deliver more than one gene but not more than three genes thereby making the reprogramming of somatic cells more efficient.  
(D) Polycistronic lentiviral vectors are only compatible for transfecting adult somatic stem cells during their reprogramming into iPSCs unlike other vector systems.
58. A DNA sequence is read by an RNA polymerase that produces complementary antiparallel RNA strand known as:  
(A) Hexa transcript  
(B) Secondary transcript  
(C) Primary transcript  
(D) Tertiary transcript

59. Which of these subunits of RNA polymerase is totally required to initiate transcription?
- (A) Alpha ( $\alpha$ )
  - (B) Sigma ( $\sigma$ )
  - (C) Omega ( $\omega$ )
  - (D) Beta ( $\beta$ )
60. In both prokaryotic and eukaryotic cells, the synthesis of protein chains is initiated with:
- (A) Arginine
  - (B) Methionine
  - (C) Serine
  - (D) Valine
61. Transcription in eukaryotes is initiated when:
- (A) RNA strand is present
  - (B) RNA polymerase is present
  - (C) Core promoter sequence is present
  - (D) None of these
62. In DNA microarray technique for breast cancer gene BRCA1, what do the following colours red, green, yellow, and black will mean?
- (A) Red: strongly expressed in cancer cells Yellow: Gene is not strongly expressed in cancer cells, Green: The gene is neither strongly repressed nor strongly activated in cancer cells, Black: none of the patient's cDNA has binded with the DNA present in the chip and therefore the gene is inactive.
  - (B) Red: strongly repressed in cancer cells Yellow: strongly expressed in cancer cells, Green: The gene is neither strongly repressed nor strongly activated in cancer cells, Black: none of the patients cDNA has binded with the DNA present in the chip and therefore the gene is inactive.
  - (C) Red: strongly expressed in cancer cells Yellow: Gene is not strongly expressed nor strongly repressed in cancer cells, Green: The gene is strongly repressed in cancer cells, Black: none of the patients cDNA has binded with the DNA present in the chip and therefore the gene is inactive.
  - (D) Red: strongly expressed in cancer cells Yellow: none of the patients cDNA has binded with the DNA present in the chip and therefore the gene is inactive, Green: The gene is strongly repressed in cancer cells, Black: Gene is not strongly expressed nor strongly repressed in cancer cells.
63. What are organoids in stem cell medicine?
- (A) Organoids are small, self-organized 3d cultures made from pluripotent stem cells and that represents most of the tissue complexity and structural organization of a specific organ.
  - (B) Organoids are small, self-organized 3d cultures made from hematopoietic stem cells and that represents most of the tissue complexity and structural organization of a specific organ.
  - (C) Organoids are small, self-organized 3d cultures made from mesenchymal stem cells and that represents most of the tissue complexity and structural organization of a specific organ.
  - (D) Organoids are small, self-organized 3d cultures made from tissue specific stem cells and that represents most of the tissue complexity and structural organization of a specific organ.

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64. What is the basic principle of regeneration?
- (A) Two stage turbine used
  - (B) Steam after coming out of turbine is circulated to boiler
  - (C) Steam after coming out of condenser is circulated to boiler
  - (D) Steam after coming out of condenser is circulated to turbine
65. How does DAPI stain works to stain the nucleus?
- (A) DAPI binds to the major groove of the double stranded DNA with a preference for the GC clusters.
  - (B) DAPI binds to the major groove of the double stranded DNA with a preference for the AT clusters.
  - (C) DAPI binds to the minor groove of the double stranded DNA with a preference for the AT clusters.
  - (D) DAPI binds to the minor groove of the double stranded DNA with a preference for the GC clusters.
66. Mean temperature of heat addition is \_\_\_\_\_ due to regeneration:
- (A) Not affected
  - (B) Increases
  - (C) Decreases
  - (D) Varied exponentially
67. Ideal regenerative rankine cycle
- (A) Efficiency is unaffected
  - (B) Efficiency is increased
  - (C) Work output is increased
  - (D) Heat supplied is increased
68. What is forward scatter in FACS used for characterization of different type of stem cells:
- (A) It is used to identify different types of stem cells based on their granularity and content.
  - (B) It is used to identify different types of stem cells based on their size.
  - (C) It is used to identify the number of dead and viable cells present in a stem cell sample population.
  - (D) It is used to identify the amount of DNA content of the stem cells based on which the stem cells are characterized.
69. The following organs can be regenerated in echinodermata:
- (A) Digestive system
  - (B) Arms and disc
  - (C) Pedicellariae
  - (D) Eyes
70. The damaged leg is not regenerated in
- (A) Frog
  - (B) frog's tadpole
  - (C) salamander
  - (D) crab.
71. The repair by cell division in the damaged tissue is:
- (A) Exponential growth
  - (B) Morphallaxis regeneration
  - (C) Epimorphosis regeneration
  - (D) Deaccelerating growth

72. Restorative regeneration is
- (A) Healing of wounds
  - (B) Formation of a new entity from a piece of body of 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
73. Ability to give rise to a new individual entity from body parts is:
- (A) Reproduction
  - (B) Fragmentation
  - (C) Regeneration
  - (D) Fission
74. Regeneration of a limb or tail is an example of:
- (A) Epimorphosis
  - (B) Autotomy
  - (C) Compensatory hypertrophy
  - (D) Morphallaxis
75. Epimorphosis is regeneration through:
- (A) Repatterning of existing cells as seen in hydra
  - (B) Reinitiation of division in existing cells, followed by patterning, as occurs in amphibians such as newts
  - (C) Repatterning of existing cells as seen in amphibians
  - (D) Reinitiation of embryonic growth from remaining cells as seen in Hydra
76. Polyvinylidene difluoride or PVDF is a membrane used in Western Blotting along with nitrocellulose. Why PVDF is preferred?
- (A) PVDF has a higher protein binding affinity and higher sensitivity compared to nitrocellulose membrane.
  - (B) PVDF has a lower protein binding affinity but higher sensitivity compared to nitrocellulose membrane.
  - (C) PVDF has a higher protein binding affinity but a lower sensitivity compared to nitrocellulose membrane.
  - (D) PVDF is cheaper than nitrocellulose membrane otherwise both has the same binding affinity and similar sensitivity.
77. What is a stem cell?
- (A) A cell only found in the stem of plants.
  - (B) An unspecialized cell with the ability to create specialized cells
  - (C) A specialized cell that can only generate cells of the same type
  - (D) A cell that can be found only in bone marrow.
78. Which of the following statement is true for xeno free stem cell culture medium that is becoming essential in the field of stem cell medicine?
- (A) Xeno free stem cell culture medium reduces the chances of xeno contamination if used for clinical purposes.
  - (B) It reduces the cost of stem cell culture.
  - (C) It introduces impurities that interferes with the quality of stem cell product in vitro.
  - (D) Xeno free is not used in modern stem cell culture methods.

79. How is stem cell homeostasis maintained?
- (A) By producing two stem cells or symmetric division that helps in maintaining the tissue resident stem cell pool.
  - (B) By producing two progenitor cells or symmetric division that differentiates into a tissue or organ specific adult cell thereby maintaining the homeostasis of the tissue.
  - (C) By undergoing asymmetric division and thereby producing one stem cell and the other progenitor cell which further differentiates into an adult cell or a tissue specific cell.
  - (D) By undergoing asymmetric division whereby one cell undergoes apoptosis and the other develops into a stem cell which later on differentiates into an adult cell of a specific tissue or organ.
80. What is the process of cell specialization called?
- (A) Proliferation
  - (B) Differentiation
  - (C) Cryopreservation
  - (D) Multiplication
81. What is the least invasive source of stem cells from the human body?
- (A) Cord blood
  - (B) Adipose tissue
  - (C) Bone Marrow
  - (D) Foetal liver
82. 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.
83. A structure formed 5 days after conception with a distinctive outer layer and inner layer is called:
- (A) A blastocyst
  - (B) A zygote
  - (C) An embryo
  - (D) None of the above
84. Cells or tissue donated by a related or unrelated individual are called,
- (A) Autologous
  - (B) Syngenic
  - (C) Allogeneic
  - (D) Homologous
85. The process whereby cells or tissue are frozen is called:
- (A) Cryopreservation
  - (B) Proliferation
  - (C) Differentiation
  - (D) Refrigeration
86. A stem cell transplant using a patient's own stem cells is described as:
- (A) Syngenic
  - (B) Autologous
  - (C) Allogeneic
  - (D) Homogenic

87. Adult stem cells are described as:

- (A) Somatic
- (B) Syngenic
- (C) Specialised
- (D) Categorised

88. Karyotyping is a technique by which one can identify the set of chromosomes and detect any disease or anomaly in the chromosome structure or number. One of them is Klinefelters syndrome. How is Klinefelters Syndrome represented by chromosome numbers?

- (A) 46 + XYY.
- (B) 46 + XXY.
- (C) 46 + XY
- (D) 46 + XX.

89. Which of the following is not a source of “ethical” stem cells?

- (A) Cord Blood
- (B) Bone Marrow
- (C) Foetal
- (D) Peripheral Blood

90. Name the defining features of stem cells

- (A) Unspecialized cells which can specialize
- (B) Mitosis
- (C) Proliferation
- (D) Meiosis.

91. What describes a stem cell best?

- (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

92. 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

93. 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

94. 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

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95. What is cycle threshold (CT) value in real time RT PCR:
- (A) It is defined as the number of cycles required for the fluorescent signal to cross the threshold (ie exceeds background level).
  - (B) It is defined as the number of cycles required for the primers to attach with the cDNA strand (ie exceeds background level)t.
  - (C) It is defined as the optimal temperature that is required for the primers to attach with the cDNA strand after a number of cycles (ie exceeds background level).
  - (D) It is defined as the optimal temperature that is required by the dNTPs to elongate the strand.
96. 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
97. What are cells 'fed' when they are grown in a lab?
- (A) Antibodies A
  - (B) Proteins and sugars B
  - (C) Salts
  - (D) Other cells
98. 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
99. Somatic Cell Nuclear Technology is an important technology that is being used in stem cell medicine. Which is the best answer for therapeutic cloning?
- (A) In therapeutic cloning the embryonic stem cells are isolated from the inner cell mass of a donated embryo and are cultured in vitro for further therapeutic use..
  - (B) In therapeutic cloning the enucleated egg is fused with the somatic cell nucleus and then transplanted in a surrogate mother for further development into blastocyst stage for further therapeutic use.
  - (C) In therapeutic cloning the enucleated egg is fused with the somatic cell nucleus and then cultured under in vitro conditions till the formation of the inner cell mass of the blastocyst stage from where embryonic stem cells can be collected for further therapeutic use.
  - (D) In therapeutic cloning the enucleated somatic cell is fused with the nucleus of the egg and then cultured under in vitro conditions till the formation of the inner cell mass of the blastocyst stage from where embryonic stem cells can be collected transplanted in a surrogate mother for further development into blastocyst stage for further therapeutic use.
100. Repetitive regeneration can be seen in:
- (A) Molluscs
  - (B) Tadpole
  - (C) Hydra
  - (D) None of these